MANDATORY DISCLOSURES IIPM—SET

Sl. No	Mandatory Disclosure sub titles	Details / contents
1	**Name of the Institution** • Address including Telephone, mobile,e-mail	**IIPM SCHOOL OF ENGINEERING & TECHNOLOGY** At/PO: Kansbahal-770 034, Near Rourkela Dist. Sundargarh, Odisha Tel: 066624-280576, e-mail : principaldiploma@iipm.ac.in
2	**Name & Address of the Society** Address including Telephone, mobile,e-mail	**Indian Institute for Production Management** At/PO: Kansbahal-770 034, Near Rourkela Dist. Sundargarh, Odisha Tel: 066624-280576, e-mail : info@iipm.ac.in
3	**Name & Address of the Principal** Address including Telephone, mobile, e-mail	**Er. Prashanta Kumar Dehury** At/PO: Kansbahal-770 034, Near Rourkela Dist. Sundargarh, Odisha Tel: 066624-280323, Mob. 8599004706,7008353610 e-mail : principaldiploma@iipm.ac.in
4	**Name of the Affiliating University**	**State Council of Technical Education & Vocational Training , Odisha**
5	**Governance** • Members of the Board and their brief background	**Annexure-5**
	• Members of the Academic Advisory Body	**Annexure-5 (i)**
	• Frequency of the Board Meeting and Academic Advisory Body	**Half-yearly**
	• Organisational Chart and processes	**Annexure-5 (ii)**
	• Nature and extent of involvement of faculty and students in academic affairs / improvements	• Faculty used to prepare lecture notes, lesson plan and give presentation to the before advising committee before going to the class. • Students are given extra hours to clear their doubts. Students are given soft skill training for overall development
	• Mechanism/ norms and procedures for democratic / good governance	• Board of Governors prepares policies. • Principal execute the policies. • A student committee has been formed and student related activities are discussed anddecided by students in presence of teachers.
	• Student feedback on institutional governance / faculty performance	• Feedback system is very exhaustive and it is done in every three months. • Institutional Governance is also evaluated by students and staff in a ten points scale every year. • Board of Governance also asks for summaryof feedback frequently.

	• Grievance redressal mechanism for faculty , staff and student.	• A Redressal committee comprising of faculties and student has been formed. • Any complain or grievances are taken before committee for amicable solution. • Grievance of serious nature are forwarded to the Principal.
	• Establishment of Anti-ragging Committee	**Annexure-5 (iv)**
	• Establishment of online grievance redressal mechanism .	
	• Establishment of Grievance redressal committee in the institution and appointment of ombudsmen by the University,	**Under process**
	• Establishment of Internal complaint Committee (ICC)	**Annexure-5 (vi)**
	• Establishment of Committee for SC/ST	**Annexure-5 (vii)**
	• Internal Quality Assurance Cell	**Annexure-5 (viii)**
6	Programmes • Name of Programmes approved by AICTE	**DIPLOMA IN MECHANICAL ENGINEERING** **&** **DIPLOMA IN MINING ENGINEERING**

	• Name of Programmes Accredited by AICTE	**Nil**
	• Status of Accreditation of the Courses	**To be applied**
	• Total number of Courses	**One**
	• No. of Courses for which applied for Accreditation	**Nil**
	• Status of Accreditation – Preliminary/ Applied for SAR and results awaited/ Applied for SAR and visits completed/ Results of the visits awaited/ Rejected/ Approved for ….. Courses	**-**
	• For each Programme the following details are to be given:	
	• Placement Facilities	**Yes**
	• Campus placement in last three years with minimum salary, maximum salary and average salary	**Annexure-6**
	• Name and duration of programme(s) having Twinning and Collaboration with Foreign University(s) and being run in the same Campus along with status of their AICTE approval. If there is Foreign Collaboration, give the following details:	**N.A.**
	• Details of the Foreign University	
	• Name of the University	
	• Address	
	• Website	
	• Accreditation status of the University in its Home Country	
	• Ranking of the University in the Home Country	
	• Whether the degree offered is equivalent to an Indian Degree? If yes, the name of the agency which has approved equivalence. If no, implications for students in terms of pursuit of higher studies in India and abroad and job both within and outside the country	**N.A.**
	• Nature of Collaboration	
	• Conditions of Collaboration	
	• Complete details of payment a student has to make to get the full benefit of Collaboration	

	• For each Programme Collaborated provide the following: • Programme Focus • Number of seats • Admission Procedure • Fee • Placement Facility • Placement Records for last three years with minimum salary, maximum salary and average salary • Whether the Collaboration Programme is approved by AICTE? If not whether the Domestic/Foreign • University has applied to AICTE for approval	**N.A.**

SL.NO.	Name of the programme	No. of Seats	Duration	Cut-off mark for admission	Fees
1	Diploma in Mechanical Engineering	60	3years	35%	25,800/year
2	Diploma in Mining Engineering	60	3years	35%	25,800/year

7	**Faculty** • Permanent Faculty • Adjunct Faculty • Permanent Faculty: Student Ratio • Number of Faculty employed and left during the last three years	**17** **Nil** **17 : 360** **Employed :4** **Left : 1**

<table>
<tr><td>8</td><td>Profile of Director/ Faculty
For each Faculty give a page covering with Passport size photograph
i. Name
ii. Date of Birth
iii. Unique id
iv. Education Qualifications
v. Work Experience
• Teaching
• Research
• Industry
• others
vi. Area of Specialization
vii. Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level
viii. Research guidance
• No. of papers published in National/ International Journals/ Conferences
• Master
• Ph.D.
ix. Projects Carried out
x. Patents
xi. Technology Transfer
xii. Research Publications
xiii. No. of Books published with detail</td><td>Annexure- 8</td></tr>
<tr><td>9</td><td>Fee
• Details of fee, as approved by State Fee Committee, for the Institution
• Time schedule for payment of fee for the entire programme
• No. of Fee waivers granted with amount and name of students
• Number of scholarship offered by the Institution, duration and amount
• Criteria for fee waivers/scholarship
• Estimated cost of Boarding and Lodging in Hostels</td><td>• The fee of the institute is charged as per the guidelines published by DTET, Odisha from time to time
• The Time Schedule for payment of fee for the entire programme is before the commencement of the academic session
• No. of fee waivers granted is 5% of total intake capacity. As per the govt. guidelines the fee waivers are treated as TFW category students.
• The institute helps the students to apply and avail various Government Scholarships from the State as well as Central Government.
• As per the guidelines of Government.
• The Boarding and Lodging cost of both Boys andGirls Hostel is Rs 48000/- per Year.</td></tr>
<tr><td>10</td><td colspan="2">Admission(For Last 3 years)
<table>
<tr><th>Sl. No.</th><th>Course Offered</th><th>Academic year</th><th>No. of Admitted Students</th></tr>
<tr><td>1</td><td>Diploma in Mechanical Engg.</td><td>2018-19</td><td>69</td></tr>
<tr><td>2</td><td>Diploma in Mining Engg.</td><td>2018-19</td><td>55</td></tr>
<tr><td>3</td><td>Diploma in Mechanical Engg.</td><td>2019-20</td><td>70</td></tr>
<tr><td>4</td><td>Diploma in Mining Engg.</td><td>2019-20</td><td>53</td></tr>
<tr><td>5</td><td>Diploma in Mechanical Engg.</td><td>2020-21</td><td>69</td></tr>
<tr><td>6</td><td>Diploma in Mining Engg.</td><td>2020-21</td><td>61</td></tr>
</table></td></tr>
<tr><td>11</td><td>Admission Procedure</td><td>As per the guidelines of Directorate of Technical Education & Training, Odisha.</td></tr>
</table>

	• Mention the admission test being followed, name and address of the Test Agency and its URL(website) • Number of seats allotted to different Test Qualified candidate separately (AIEEE/ CET (State conducted test/ University tests/ CMAT/ GPAT)/ Association conducted test) • Calendar for admission against Management/vacant seats: • Last date of request for applications • Last date of submission of applications • Dates for announcing final results • Release of admission list (main list and waiting list shall be announced on the same day) • Date for acceptance by the candidate (time given shall in no case be less than 15 days) • Last date for closing of admission • Starting of the Academic session • The waiting list shall be activated only on the expiry of date of main list • The policy of refund of the fee, in case of withdrawal, shall be clearly notified	**https://skill.samsodisha.gov.in/diploma.aspx** Directorate of Technical Education & Training, Odisha. 1. Diploma in Mechanical Engg.-60nos. 2. Diploma in Mining Engg.-60nos. • As per the guidelines of Directorate of Technical Education & Training, Odisha. • **As per** SCTE&VT, Odisha. • **N.A.** • **Yes.**
12	**Criteria and Weightages for Admission** • Describe each criterion with its respective weightages i.e. Admission Test, marks in qualifying examination etc. • Mention the minimum level of acceptance, if any • Mention the cut-off levels of percentage and percentile score of the candidates in the admission test for the last three years • Display marks scored in Test etc. and in aggregate for all candidates who were admitted	**Not applicable**
13	**List of Applicants** • List of candidate whose applications have been received along with percentile/percentage score for each of the qualifying examination in separate categories for open seats. List of candidate who have applied along with percentage and percentile score for Management quota seats	**Not applicable**

14	• Results of Admission Under Management seats/Vacant seats • Composition of selection team for admission under Management Quota with the brief profile of members (This information be made available in the public domain after the admission process is over) • Score of the individual candidate admitted arranged in order or merit • List of candidate who have been offered admission • Waiting list of the candidate in order of merit to be operative from the last date of joining of the first list candidate • List of the candidate who joined within the date, vacancy position in each category before operation of waiting list	**Not applicable**
15	• Information of Infrastructure and Other Resources Available • Number of Class Rooms and size of each • Number of Tutorial rooms and size of each • Number of Laboratories and size of each • Number of Drawing Halls with capacity of each • Number of Computer Centers with capacity of each • Central Examination Facility, Number of rooms and capacity of each • Barrier Free Built Environment for disabled and elderly persons • Occupancy Certificate • Fire and Safety Certificate • Hostel Facilities **Library** • Number of Library books/ Titles/ Journals available (program-wise) • List of online National/ International Journals subscribed • E- Library facilities • Laboratory and Workshop	**Annexure-15** **yes** **yes** **Yes** **Yes** **Programme : Diploma in Mechanical & Mining Engg.** **Volume : 2065 , Title : 279 Journals – Annexure – 15 (i)** **NA** The Institute has a well equipped all Laboratory to cater the needs of theDiploma Mechanical & mining Students.

		. .
	• List of Experimental Setup in each Laboratory/ Workshop	**N.A.**
	Computing Facilities	
	• Internet Bandwidth	**32 Mbps**
	• Number and configuration of System	
	• Total number of system connected by LAN	**All**
	• Total number of system connected by WAN	**All**
	• Major software packages available	
	• Special purpose facilities available	**Yes**
	• Innovation Cell	**Yes**
	• Social Media Cell	**Yes**
	• Compliance of the National Academic Depository (NAD), applicable to PGCM/ PGDM Institutions and University Departments	**N.A.**
	List of facilities available	**Yes**
	• Games and Sports Facilities	**Yes**
	• Extra-Curricular Activities	**Yes**
	• Soft Skill Development Facilities	
	Teaching Learning Process	**As per SCTE&VT, Odisha, Annexure-**
	• Curricula and syllabus for each of the programmes as approved by the University	**15(ii)Annexure-15(iii)**
	• Academic Calendar of the University	**Annexure – 15 (iv)**
	• Academic Time Table with the name of the Faculty members handling the Course	
	• Teaching Load of each Faculty	
	• Internal Continuous Evaluation System and place	
	• Student's assessment of Faculty, System in place	
	For each Post Graduate Courses give the following:	**NA**
	• Title of the Course	
	• Curricula and Syllabi	
	• Laboratory facilities exclusive to the Post Graduate Course	
	Special Purpose	
	• Software, all design tools in case	**Windows,CAD/CAM**
	• Academic Calendar and frame work	**YES**
16	**Enrolment of students in the last 3 years(Including Lateral entry students)**	**Academic Year 2018- 124** **Academic Year 2019- 123** **Academic Year 2020 - 130**
17	**List of Research Projects/ Consultancy Works**	**N.A.**
	• Number of Projects carried out,	

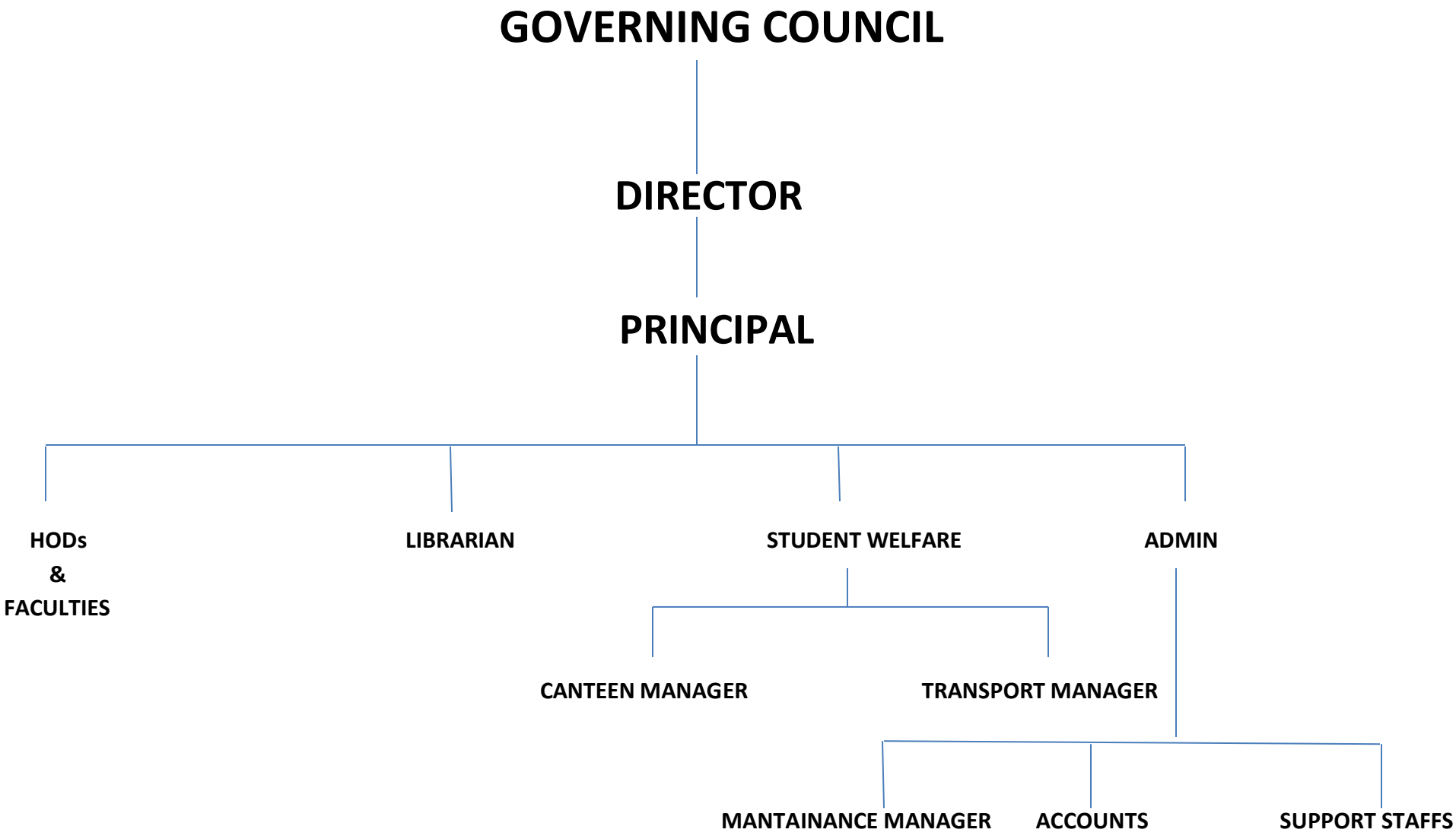
	funding agency, Grant received • • Publications (if any) out of research in last three years out of masters projects • Industry Linkage • MoUs with Industries (minimum 3)	
18	**LoA and subsequent EoA till the current Academic Year**	**Annexure-18**
19	**Accounted audited statement for the last three years**	**Annexure-19**
20	**Best Practices adopted, if any**	**Green Campus and Clean Campus Initiative**: **Indian Institute for Production Management (popularly known as IIPM)** has significant greenery covering all parts of the campus which enhances its beauty and also attracted the attention of the visitors. The beautiful green garden and the flowers are not only the reason of appreciation but also we pay special attention to the cleanliness of the campus. More green campus initiative is being taken to hand as we are planning for waste water treatment and rain water harvesting. **Discipline and Timeliness:** Discipline and timeliness are our core values. All the staffs and students value time and care for discipline. We have a goal to imbibe these values within our students to be a successful professional in life.

Annexure – 05

STRUCTURE OF GOVERNING BODY
IIPM-SCHOOL OF ENGINEERING & TECHNOLOGY, KANSBAHAL

SL.NO.	Name	Designation	Nominated by
1.	**Shri. Yogi Sriram** Advisor to CEO & MD, Group HR Larsen & Toubro Limited	Chairman	**Society**
2.	**Shri. Raju Rai** VP & Head Product BU Larsen & Toubro Limited	Member	**Society**
3.	**Prof. (Dr) Sudip Kumar Ghose** Director,IIPM	Member	**Society**
4.	**Shri Prashanta Kumar Dehury** Principal,IIPM-SET	Ex-Officio & Member Secretary	**Society**
5.	**Shri Asish Kumar Dash** Faculty Member,IIPM-SET	Member	**Institute**
6.	**Ms. Sritprava Sahoo** Faculty Member,IIPM-SET	Member	**Institute**
7.	**Nominee from SCTE&VT**	Member	**Affiliating Council/Board**
8.	**Nominee from AICTE**	Member	**AICTE**
9.	**Nominee from Industry**	Member	**Industry**
10.	**Nominee from Industry**	Member	**Industry**
11.	**Educationist**	Member	**Institute**
12.	**Educationist**	Member	**Institute**
13.	**Industrialist**	Member	**Industry**
14.	**Nominee from State Government**	Member	**State Government**

ORGANISATION CHART (ANNEXURE-5 (ii))



Anti-ragging Committee at IIPM – School of Engineering & Technology

Ragging is a practice in educational institutions that involves existing students baiting or bullying new students. In the name of introduction or initiation, millions of students are brutally abused in many educational institutions. Historically originated, probably, to generate fellow-feeling or camaraderie and the ability to work in a team, it has metamorphosed into something else. It often takes a malignant form wherein the newcomers may be subjected to psychological or physical torture.

Under the pretext of 'welcoming' new students to the college, ragging is a notorious practice that gives senior students an excuse to harass their junior counterparts and make them easy targets to satiate their own perverse sadistic pleasures.

What Is Ragging

(As defined by the Honourable Supreme Court of India)

Any disorderly conduct whether by words spoken or written, or by an act which has the effect of teasing, treating or handling with rudeness any other student, indulging in rowdy or undisciplined activities which causes or is likely to cause annoyance, hardship or psychological or physical harm or to raise fear or apprehension thereof in a fresher or a junior student and which has the effect of causing or generating a sense of shame or embarrassment so as to adversely affect the physique or psyche of a fresher or a junior student.

Punishment for Ragging:

Ragging within or outside the educational institution is prohibited. Whoever directly or indirectly commits, participates in, abets or instigates ragging inside or outside the educational institution shall be suspended, expelled or rusticated from the institution and shall also be liable to fine. The punishment includes rigorous imprisonment, cancellation of admission, suspension from attending classes, withholding/ withdrawing fellowships/ scholarships and other financial benefits, withholding or cancelling the results.

Depending upon the nature and gravity of the offence as established by the Anti-Ragging Committee of the Institution, the possible punishments for those found guilty of ragging shall be any one or any combination of the following:

Suspension from attending classes and academic privileges

withholding / withdrawing scholarship / fellowship and other benefits

Forfeiting Campus Placement opportunities / recommendations

Debarring from appearing in any test/examination or other evaluation process

Withholding of results

Debarring from representing the institution in any regional, national or international meet, tournament, youth festival etc.

Suspension/ expulsion from the hostel

Cancellation of Admission

Rustication from the institution for a period, ranging from 1 to 3 years

Expulsion from the institution and consequent debarring from admission to any other institution for a specific period

Fine of Rupees 25,000/-

Collective punishment: When the persons committing or abetting the crime of ragging are not identified, the institution shall resort to collective punishment as a deterrent to ensure community pressure on the potential raggers.

In addition, in case of every single incident of ragging, a First Information Report (FIR) will be filed with the local police authorities. The possible punishment includes rigorous imprisonment (in compliance with the order of Supreme Court of India).

In the case of any ragging incident, the students may immediately call and bring it to the notice of the members of the Anti-Ragging committee for necessary help, guidance and actions.

INTERNAL COMPLAINTS COMMITTEE

The Internal Complaints Committee (ICC) is formed according to the provisions of the "The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act", 2013. The ICC's twin functions are:

To hear and address complaints regarding sexual harassment at IIPM – School of Engineer & Technology, Kansbahal and to spread awareness about gender-related issues and functioning of the ICC.

On receipt of a complaint ICC shall conduct preliminary enquiry to ascertain the truth of the allegations by collecting the documentary evidence as well as recording statements of any possible witnesses including the complainant. ICC shall then submit the preliminary enquiry report to Director/Disciplinary Authority along with all the original documents adduced during the preliminary enquiry proceedings.

Where sexual harassment occurs as a result of an act or omission by any third party or outsider, ICC shall take all steps necessary and reasonable to assist the affected person in terms of support and preventive action.

ICC shall comply with the procedure prescribed in the aforementioned UGC Regulations 2015 and the Sexual Harassment Act for inquiring into the complaint in a time bound manner.

If ICC concludes that the allegations made were false, malicious or the complaint was made knowing it to be untrue or forged or misleading information has been provided during the inquiry, the complainant shall be liable to be punished as per the relevant provision of the aforementioned UGC Regulations 2015.

Presiding Officer, ICC shall receive the complaints of sexual harassment, if any, on behalf of ICC and shall co-ordinate the deliberations of the ICC on the complaints received.

ANNEXURE-6

CAMPUS PLACEMENTDURING LAST THREE YEARS

Year	Students eligible for Placement	Students Placed	Minimum SalaryRs. In Lakhs(annum)	Maximum Salary Rs. In Lakhs(annum)
2018-19	NA	NA	NA	NA
2019-20	44	12	1.7	2.2
2020-21	122	15	1.75	2.5

ANNEXURE-8

PROFILE OFTHE PRINCIPAL

i	Name	PRASHANTA KUMAR DEHURY
ii	Date of Birth	25/06/1987
iii	Unique id	1-3642163602
iv	Education Qualifications	B. Tech, M. Tech, Ph.D (cont..)
v	Work Experience	
	• Teaching	11
	• Research	0
	• Industry	0
	• others	0
vi	Area of Specialization	VLSI
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	3
	• Master	-
	• Ph.D.	-
ix	Projects Carried out	-
x	Patents	-
xi	Technology Transfer	-
xii	Research Publications	-

FACULTY PROFILE

i	Name	Asish Kumar Dash
ii	Date of Birth	01-05-1988
iii	Unique id	1-3641559686
iv	Education Qualifications	M Tech (CSE), B Tech (CS&E)
v	Work Experience	
	• Teaching	12 Years
	• Research	NIL
	• Industry	NILL
	• others	NIL
vi	Area of Specialization	Computer Science & Engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	NIL
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NO
ix	Projects Carried out	NA
x	Patents	NA
xi	Technology Transfer	NA
xii	Research Publications	NA

i	Name	PRASHANTA KUMAR DEHURY
ii	Date of Birth	25/06/1987
iii	Unique id	1-3642163602
iv	Education Qualifications	B. Tech, M. Tech, Ph.D (cont..)
v	Work Experience	
	• Teaching	11
	• Research	0
	• Industry	0
	• others	0
vi	Area of Specialization	VLSI
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	3
	• Master	-
	• Ph.D.	-
ix	Projects Carried out	-
x	Patents	-
xi	Technology Transfer	-
xii	Research Publications	-

i	Name	SOUMYA RANJAN DASH
ii	Date of Birth	14/05/1993
iii	Unique id	1-4712321954
iv	Education Qualifications	B.Sc.,M.Sc.
v	Work Experience	4
	• Teaching	4
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	GEOLOGY
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	Mousumi Bala Panda
ii	Date of Birth	12/12/1985
iii	Unique id	1-3641875723
iv	Education Qualifications	B.Tech(EEE),M.Tech
v	Work Experience	
	• Teaching	13 Years
	• Research	
	• Industry	NIL
	• others	
vi	Area of Specialization	ELECTRICAL ENGINEERING
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post GraduateDiploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NO
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	JHARANA PUJAHARI
ii	Date of Birth	23/07/1989
iii	Unique id	1-4432999751
iv	Education Qualifications	M.A ,Mpil, PhD (Continuing)
v	Work Experience	4 Years
	• Teaching	3
	• Research	NIL
	• Industry	1
	• others	NIL
vi	Area of Specialization	COMMUNICATIVE ENGLISH
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post GraduateDiploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NA
x	Patents	NA
xi	Technology Transfer	NA
xii	Research Publications	NIL

i	Name	BINODINI RATH
ii	Date of Birth	06/07/1989
iii	Unique id	1-9479602436
iv	Education Qualifications	B.Sc.,M.Sc.
v	Work Experience	4
	• Teaching	4
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	CHEMISTRY
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	DEEPTIKANT SHARMA
ii	Date of Birth	08/05/1982
iii	Unique id	1-4712801304
iv	Education Qualifications	B.TECH
v	Work Experience	6
	• Teaching	6
	• Research	00
	• Industry	0
	• others	NIL
vi	Area of Specialization	SURVEY
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	SACHIDANAND SWAR
ii	Date of Birth	04/09/1986
iii	Unique id	1-4864753776
iv	Education Qualifications	B.TECH
v	Work Experience	13
	• Teaching	4
	• Research	-
	• Industry	9
	• others	-
vi	Area of Specialization	ELECTRICAL MACHINARIES IN MINES
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	-
	• No. of papers published in National/ International Journals/ Conferences	-
	• Master	-
	• Ph.D.	-
ix	Projects Carried out	-
x	Patents	-
xi	Technology Transfer	-
xii	Research Publications	-

i	Name	RAHUL SARAF
ii	Date of Birth	06/06/1991
iii	Unique id	1-4864787913
iv	Education Qualifications	B.Tech
v	Work Experience	
	• Teaching	2
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	MECHANICAL ENGINEERING
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	NIL
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	BISWAJEET MOHANTA
ii	Date of Birth	15/12/1983
iii	Unique id	1-4864787920
iv	Education Qualifications	B.Tech
v	Work Experience	09
	• Teaching	4
	• Research	NIL
	• Industry	05 YEARS
	• others	NIL
vi	Area of Specialization	Mechanical engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	SARITPRAVA SAHOO
ii	Date of Birth	01/07/1983
iii	Unique id	1-7392630628
iv	Education Qualifications	B.Tech, M.Tech , Ph.D (cont.)
v	Work Experience	12
	• Teaching	10
	• Research	2
	• Industry	0
	• others	0
vi	Area of Specialization	THERMAL ENGINEERING
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	03
	• Master	0
	• Ph.D.	0
ix	Projects Carried out	0
x	Patents	0
xi	Technology Transfer	0
xii	Research Publications	0

i	Name	SANJAY KUMAR MAJHI
ii	Date of Birth	05/01/1994
iii	Unique id	1-7437800836
iv	Education Qualifications	B.Tech
v	Work Experience	06
	• Teaching	4
	• Research	NIL
	• Industry	02 YEARS
	• others	NIL
vi	Area of Specialization	Mining Engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	PRASANNA MOHANTY
ii	Date of Birth	01/04/1992
iii	Unique id	1-9323098681
iv	Education Qualifications	B.Tech, M. Tech
v	Work Experience	
	• Teaching	6
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	Production Engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	01
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	MOHAN KUMAR SAHOO
ii	Date of Birth	17/02/1970
iii	Unique id	1-9471409959
iv	Education Qualifications	MBA
v	Work Experience	
	• Teaching	1
	• Research	NIL
	• Industry	10
	• others	NIL
vi	Area of Specialization	MBA
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	00
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	SUBODH KUMAR PATEL
ii	Date of Birth	16/07/1983
iii	Unique id	1-9470735228
iv	Education Qualifications	B.Tech, M. Tech
v	Work Experience	
	• Teaching	1
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	Thermography Engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	00
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	ARABINDA MOHANTY
ii	Date of Birth	04/07/1977
iii	Unique id	1-9481030015
iv	Education Qualifications	B. Tech
v	Work Experience	12
	• Teaching	2
	• Research	NIL
	• Industry	10
	• others	NIL
vi	Area of Specialization	POWER PLANT
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	BHABANIKANTA PARIDA
ii	Date of Birth	28/10/1992
iii	Unique id	1-4864216311
iv	Education Qualifications	B. Tech
v	Work Experience	2
	• Teaching	2
	• Research	NIL
	• Industry	2
	• others	NIL
vi	Area of Specialization	MACHINE DESIGN
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

ANNEXURE-15

INFRASTRUCTURE & OTHER RESOURCES

Room No	Room type (mention Class room / Lab / Toilet, etc.)	Carpet area (in m2)	Completion of Flooring	Completion of Walls and painting	Completion of Electrification and lighting
19	Class room	69	Yes	Yes	Yes
03	Class room	67	Yes	Yes	Yes
49	Class room	66	Yes	Yes	Yes
50	Class room	66	Yes	Yes	Yes
51	Class room	66	Yes	Yes	Yes
62	Class room	66	Yes	Yes	Yes
04	Tutorial room	34	Yes	Yes	Yes
18	Tutorial room	35	Yes	Yes	Yes
01	Laboratory	67	Yes	Yes	Yes
21	Laboratory	66	Yes	Yes	Yes
22	Laboratory	66	Yes	Yes	Yes
41	Laboratory	80	Yes	Yes	Yes
42	Laboratory	80	Yes	Yes	Yes
37	Laboratory	64	Yes	Yes	Yes
46	Laboratory	66	Yes	Yes	Yes
54	Laboratory	76	Yes	Yes	Yes
57	Laboratory	68	Yes	Yes	Yes
58	Laboratory	68	Yes	Yes	Yes
60	Laboratory	66	Yes	Yes	Yes
61	Language Laboratory	66	Yes	Yes	Yes
20	Indoor Gym	40	Yes	Yes	Yes
02	First Aid	10	Yes	Yes	Yes
05	Seminar Room	133	Yes	Yes	Yes
08	Board Room	21	Yes	Yes	Yes
07	Central Store	15	Yes	Yes	Yes
12	Stationary Store	10	Yes	Yes	Yes
10	Accounts	13	Yes	Yes	Yes
09	Training & Placement	50	Yes	Yes	Yes
13	Principal	21	Yes	Yes	Yes
14	House Keeping	16	Yes	Yes	Yes
15	Director Room	16	Yes	Yes	Yes
17	Server Room	6	Yes	Yes	Yes
6,23,24	Toilet (3 nos.)	33	Yes	Yes	Yes
26	Exam Office	40	Yes	Yes	Yes
27	Faculty Cabin	50	Yes	Yes	Yes
29	HOD Cabin	40	Yes	Yes	Yes
28	Department Office	40	Yes	Yes	Yes
25	Pantry	13	Yes	Yes	Yes
33	Drawing Hall	140	Yes	Yes	Yes
32,43,44	Library	300	Yes	Yes	Yes
30	DG & Maintenance	10	Yes	Yes	Yes
31	Meter Room	5	Yes	Yes	Yes
11	Central Store	15	Yes	Yes	Yes
34	Electrical Panel Room	13	Yes	Yes	Yes
36	Workshop	200	Yes	Yes	Yes
39	Additional Workshop	400	Yes	Yes	Yes
38	Kitchen/Cafeteria	200	Yes	Yes	Yes
64	Boys Common Room	38	Yes	Yes	Yes
55	Girls Common Room	35	Yes	Yes	Yes
40	General Office	150	Yes	Yes	Yes
45	Computer Centre	150	Yes	Yes	Yes
56,67	Ladies Toilet	62	Yes	Yes	Yes
52,63	Gents Toilet	76	Yes	Yes	Yes
65	Tutorial	38	Yes	Yes	Yes
47	Tutorial	38	Yes	Yes	Yes
48	Office	38	Yes	Yes	Yes

Annexure-15(i)

LIST OF JOURNALS

1. Indian Journal for Mechanical Engg. And Research (RIP)
2. Journal of Mechanical and Mechanics Engineering
3. Intl. Journal of Mechanical Engg. And Material Science
4. Springer Institute of Engg. Series-D (Metallurgical, Material, Mining Engg.)
5. Indian Journal of Nano Technology and Applications
6. Mining Engineers Journal

STATE COUNCIL OF TECHANICAL EDUCATION & VOVATIONAL TRAINING, ODISHA

CURRICULLUM FOR DIPLOMA AS PER GUIDELINES OF AICTE 2020-21

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA

ରାଜ୍ୟ ବୈଷୟିକ ଶିକ୍ଷା ଓ ପ୍ରଶିକ୍ଷଣ ପରିଷଦ, ଓଡ଼ିଶା

No. 9934 Date 6/9/18

To
Principals of All Polytechnics

Sub: Final Revised syllabus of 1st & 2nd semester w.e.f 2018-19 session

Sir,

In continuation to this office letter No. 3684 dt. 16.8.2018, I am to say that , after discussion in the Polytechnic Principals' meeting held on 25/8/2018, and subsequent deliberations in the council, the final revised Syllabus for 1st & 2nd semester Diploma Engineering courses effective from 2018-19 session is hereby circulated with the following changes in the norms and contents. This syllabus shall be applicable for all diploma courses approved by AICTE, New Delhi under Engineering and Technology Programme and affiliated to this council w.e.f. 2018-19.

1. The conditions on selection of subjects specified in the above letter is hereby relaxed. Individual institution can select the subjects, where alternatives are available depending on the students strength and varieties of branches available with them, subject to condition that all students of a particular branch shall be offered only one of the alternative subjects and no part of students in a branch can be offered different alternative subject. The Institutions are to upload the subjects offered for different branches in SCTE&VT web portal to be notified in due course of time, so that the same can be followed from coming 1st semester onwards.
2. Engg. Mechanics and Basic Electrical Engg. & Electronics Engg. shall be offered as alternate to each other in both 1st & 2nd semester to be selected by the institute.
3. Subject contents of Communicative English, Basic Electrical & Electronics Engineering have been partially modified.
4. The Total Marks in a semester have been made as 750

Lateral Entry students admitted during 2018-19 shall appear the subjects of 1st and 2nd semester like previous year.

The students should be encouraged to undergo Internship Training during Summer Vacation to enhance their Skill and Employability.

Yours faithfully

Encl: As above

Controller of Examination 6/9/18

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA								
TEACHING AND EVALUATION SCHEME FOR 1st Semester (COMMON TO ALL ENGINEERING COURSES)(wef 2018-19)								
Subject Code	Subject	Periods/week			Evaluation Scheme			
		L	T	P	Mid Sem Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
	Theory							
Th.1a Th.1b	Communicative English ***OR*** Computer Application	4	-	-	20	80	3	100
Th.2a Th.2b	Engineering Physics **OR** Enggineering Chemistry	4	-	-	20	80	3	100
Th.3	Engineering Mathematics-I	5	1	-	20	80	3	100
Th.4 Th.4a&b	Engg. Mechanics **OR** Basic Electrical & ElectronicsEngg.	4			20	80	3	100
	Total	17	-		80	320	-	400
	Practical							
Pr.1a Pr.1b	Comm. English Lab **OR** Computer application Lab	-	-	4	50	-	-	50
Pr.2a Pr.2b	Engg. Physics Lab **OR** Engg. Chemistry Lab	-	-	4	50	50	3	100
Pr.3a Pr.3b	Engineering Drawing **OR** Workshop Practice	-	-	6	50	100	3 4	150
Pr.4	Seminar			4	50			50
	Student Centred Activities(SCA)		-	3	-	-	-	-
	Total	-	-	*21*	*200*	*150*	-	*350*
	Grand Total	**17**	**1**	**21**	**280**	**470**	**-**	**750**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration								
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%								
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies etc. Seminar and SCA shall be conducted in a section.								
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester								
In Th.4a&b Basic Electrical & Electronics Engg. paper there shall be examination in separate Answer books for Th.4a Basic Electrical Engg. and Th.4b Basic Elecronics Engg. in the same sitting								

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA								
TEACHING AND EVALUATION SCHEME FOR 2nd Semester (COMMON TO ALL ENGINEERING COURSES)(wef 2018-19)								
Subject Code	Subject	Periods/week			Evaluation Scheme			
		L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
	Theory							
Th.1a Th.1b	Communicative English ***OR*** Computer Application	4	-	-	20	80	3	100
Th.2a Th.2b	Engineering Physics **OR** Enggineering Chemistry	4	-	-	20	80	3	100
Th.3	Engineering Mathematics-II	5	1	-	20	80	3	100
Th.4 Th.4a&b	Engg. Mechanics **OR** Basic Electrical & ElectronicsEngg.	4			20	80	3	100
	Total	*17*	*1*		*80*	*320*	-	*400*
	Practical							
Pr.1a Pr.1b	Comm. English Lab **OR** Computer application Lab	-	-	4	50	-	-	50
Pr.2a Pr.2b	Engg. Physics Lab **OR** Engg. Chemistry Lab	-	-	4	50	50	3	100
Pr.3a Pr.3b	Engineering Drawing **OR** Workshop Practice	-	-	6	50	100	3 4	150
Pr.4	Seminar			4	50			50
	Student Centred Activities(SCA)		-	3	-	-	-	-
	Total	-	-	*21*	*200*	*150*	-	*350*
	Grand Total	**17**	**1**	**21**	**280**	**470**	**-**	**750**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration								
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%								
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies etc. Seminar and SCA shall be conducted in a section.								
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester								
In Th.4a&b Basic Electrical & Electronics Engg. paper there shall be examination in separate Answer books for Th.4a Basic Electrical Engg. and Th.4b Basic Elecronics Engg. in the same sitting								

CURRICULLUM OF 1ST & 2ND SEMESTER

For

DIPLOMA IN ENGINEERING

(Effective FROM 2018-19 Session)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA, BHUBANESWAR

Th.1a. COMMUNICATIVE ENGLISH

(1st & 2nd sem Common)

Theory: 4 Periods per Week I.A : 20 Marks
Total Periods: 60 Periods Term End Exam : 80 Marks
Examination: 3 Hours TOTAL MARKS : 100 Marks

Topic- wise distribution of periods with marks

S.L. No.	Topics	Periods
I	Literature Appreciation	20
II	Vocabulary	05
III	Application of Grammar	08
IV	Formal writing skills	15
V	Elements of communication	12
	• Introduction to communication	
	• Professional communication	
	• Nonverbal communication	
	Total	60

OBJECTIVE

To comprehend the given passage
To answer correctly the questions on seen and unseen passagesTo increase the vocabulary
To apply rules of grammar for flawless writing
To understand and use the basic concepts of communication in an organized set up and socialcontext
To give a positive feedback in various situation, to use appropriate body language and to avoidbarrier for effective communication
To improve writing skill

Unit-I

LITERATURE APPRECIATION

1. Reading comprehension

Sub-skills of reading comprehension are to be worked out and tested through an unseenpassage in about 200-500 words.
A student should get acquainted with sub-skills of reading for the purpose of:

- Skimming the gist
- Scanning for necessary information
- Close reading for inference and evaluation
- Main idea and supporting points
- Guessing the meaning of un-familiar words
- Note- making
- Summarizing
- Supplying a suitable title

2. Text

The following chapter from **“Invitation to English”, Book-1** for +2 students of CHSE, Odisha.**2016 reprint** to be covered in class room:

- **Standing Up For Yourself** By Yevgeny Yevtushenko

- **The Magic Of Teamwork** By Sam Pitroda
- **Inchcape Rock** By Robert Southey
- **To My True Friend** By Elizabeth Pinard

The student is to answer comprehension questions from these chapters in the end examination.

UNIT- II

VOCABULARY

Use of synonyms, antonyms

- Same word used in different situations in different meaning
- Single word substitute

Unit-III

APPLICATION OF ENGLISH GRAMMAR

- Countable an Uncountable Noun
- Articles and Determiners
- Modal Verbs
- Tenses
- Voice-change
- Subject-verb Agreement

UNIT-IV

FORMAL WRITING SKILLS

1. Paragraph writing
    - Meaning
    - Features of Paragraph Writing (Topic Statement, Supporting Points and Plot Compatibility)
    - Developing Ideas into Paragraphs **(** Describing Place/ Person/ Object /Situation and any general topic of interest)
2. Notice
3. Agenda
4. Report writing (Format of a Report, Reporting an event / news)
5. Writing personal letter
6. Letter to the Principal, Librarian, Head of the Deptt, and Hostel Superintendent
7. Writing Business letters
    - Layout of a Business Letter
    - Letter of Enquiry, Placing an Order, Execution of an Order, Complaint, Cancellation of an order(Features, Format and example)
8. Job application and C.V.(Features, Format and example)

UNIT-V

ELEMENTS OF COMMUNICATION

A. Introduction to Communication

1. Meaning, Definition and concept of communication
2. Good Communication and Bad Communication
3. Communication model
    - One-way Communication Model and Two-way Communication Model with examples
4. Process of communication and factors responsible for it
    - Sender, Message, Channel, Receiver / Audience, Feedback, Noise, Context

B. Professional Communication

1. Meaning of professional communication
2. Types of professional communication

2.1. Formal or Systematic Communication

- Upward communication (How it takes place, symbol, merits and demerits)
- Down-ward communication (How it takes place, symbol, merits and demerits)

- Parallel communication (How it takes place, symbol, merits and demerits)

2.2. Informal communication

- Grape vine communication (How it takes place, symbol, merits and demerits)

D. Non- Verbal Communication

1. Meaning of nonverbal Communication
2. Different areas of Non-verbal Communication
    - Kinesics or Body Language (Postures and Gestures, Facial Expression and Eye Contact)
    - Proxemics or Spatial Language (Private Space, Personal Space, Social Space, Public Space)
    - Language of Signs and Symbols(Audio Sign and Visual Sign in everyday life with merits and demerits)

Syllabus Coverage up to I.A

1. Reading Comprehension
2. Standing Up by Yourself
3. Use of Synonyms and Antonyms
4. Notice
5. Agenda

Books Recommended:

Invitation to English, Book-1, (for +2 students), CSHE (2016 reprint), Odisha Invitation to English, Book-2, (for +2 students), CSHE (2016 reprint), Odisha Invitation to English, Book-3, (for +2 students), CSHE (2016 reprint), Odisha Invitation to English, Book-4, (for +2 students), CSHE (2016 reprint), Odisha

Wren and Martin High School English Grammar, Dr. NDV Prasad Rao, S. Chand Publication Communication Skills, Sanjay Kumar and Puspalata, Oxford University Press

Th.1b. COMPUTER APPLICATION

(1st / 2nd sem Common)

Theory: 4 Periods per Week I.A : 20 Marks
Total Periods: 60 Periods End Sem Exam : 80 Marks
Examination: 3 Hours TOTAL MARKS : 100 Marks

Objective:

The students will get to know about the fundamentals of computer. They will get acquainted with various components of computer hardware, software etc. Idea on Role of operating system and its usability will also be known. Knowledge on word processing, electronic spreadsheet, presentation software and Internet will also be acquired. The students will be given brief knowledge about Programming methodology and C programming.

Topic wise distribution of periods

Sl. No.	Topics	Periods
1	Computer Organisation	05
2	Computer Software	07
3	Computer Network and Internet	08
4	File Management and Data Processing	05
5	Problem Solving Methodology	05
6	Overview of C Programming language	15
7	Advanced features of C	15
	TOTAL	**60**

1. COMPUTER ORGANISATION

Introduction to Computer Evolution of Computers Generation of Computers Classificationof Computers
Basic Organisation of Computer (Functional Block diagram) Input Devices, CPU &Output Devices.
Computer Memory and Classification of Memory

2. COMPUTER SOFTWARE

Software concept, System software, Application software
Overview of Operating System Objectives and Functions of O.S ,
Types of Operating System: Batch Processing, Multiprogramming, Time Sharing OSFeatures of DOS, Windows and UNIX
Programming Languages Compiler, interpreter Computer VirusDifferent Types of computer virus
Detection and prevention of Virus
Application of computers in different Domain

3. COMPUTER NETWORK AND INTERNET

Networking concept, Protocol, Connecting Media, Date Transmission mode Network Topologies, Types of Network
Networking Devices like Hub, Repeater, Switch, Bridge, Router, Gateway & NIC Internet Services like E-Mail, WWW, FTP, Chatting, Internet Conferencing,Electronic Newspaper & Online Shopping
Different types of Internet connectivity and ISP

4. FILE MANAGEMENT AND DATA PROCESSING

Concept of File and Folder
File Access and Storage methods. Sequential, Direct,
ISAMData Capture, Data storage
Data Processing and Retrieval

5. PROBLEM SOLVING METHODOLOGY

Algorithm, Pseudo code and Flowchart Generation of Programming LanguagesStructured Programming Language
Examples of Problem solving through Flowchart

6. OVERVIEW OF C PROGRAMMING LANGUAGE

Constants, Variables and Data types in C Managing Input and Output operations.
Operators, Expressions, Type conversion & Typecasting
Decision Control and Looping Statements (If, If-else, If-else-if, Switch, While, Do-while, For, Break, Continue & Goto)
Programming Assignments using the above features.

7. ADVANCED FEATURES OF C

Functions and Passing Parameters to the Function (Call by Value and Call byReference) Scope of Variables and Storage Classes
Recursion Function and Types of Recursion
One Dimensional Array and Multidimensional Array
String Operations and Pointers
Pointer Expression and Pointer Arithmetic Programming Assignments using the abovefeatures. Structure and Union (Only concepts, No Programming)

Syllabus coverage upto I.A

Chapter- 1,2 3,4

Books Recommended

1. Computer Fundamentals and Programming in C by Reema Thareja, Oxford Unversity Press
2. Programming in ANSI C by A.N Kamthane, Pearson Education
3. Computer Application by Kalyani Publisher
4. Let us C by Y. Kanetkar, BPB
5. Computer Fundamentals, by E. Balaguruswamy, TMH

Th.2a. Engineering Physics

(1st / 2nd sem Common)

Theory: 4 Periods per Week I.A: 20 Marks
Total Periods: 60 Periods End Sem Exam : 80 Marks
Examination: 3 Hours TOTAL MARKS : 100 Marks

Unit	Topic	No. of periods
1	UNITS & DIMENSIONS	03
2	SCALARS & VECTORS	03
3	KINEMATICS	06
4	WORK & FRICTION	05
5	GRAVITATION	05
6	OSCILLATIONS & WAVES	06
7	HEAT & THERMODYNAMICS	07
8	OPTICS	04
9	ELECTROSTATICS & MAGNETOSTATICS	07
10	CURRENT ELECTRICITY	06
11	ELECTROMAGNETISM & ELECTROMAGNETIC INDUCTION	05
12	MODERN PHYSICS	03
	TOTAL :	60 Periods

UNIT 1 - UNITS AND DIMENSIONS

1.1 Physical quantities - (Definition).
1.2 Definition of fundamental and derived units, systems of units (FPS, CGS, MKSand SI units).
1.3 Definition of dimension and Dimensional formulae of physical quantities.
1.4 Dimensional equations and Principle of homogeneity.
1.5 Checking the dimensional correctness of Physical relations.

UNIT 2 - SCALARS AND VECTORS

2.1 Scalar and Vector quantities (definition and concept), Representation of a Vector — examples, types of vectors.
2.2 Triangle and Parallelogram law of vector Addition (Statement only). Simple Numerical.
2.3 Resolution of Vectors – Simple Numericals on Horizontal and Vertical components.
2.4 Vector multiplication (scalar product and vector product of vectors).

UNIT 3 - KINEMATICS

3.1 Concept of Rest and Motion.
3.2 Displacement, Speed, Velocity, Acceleration & FORCE (Definition, formula, dimension & SI units).
3.3 Equations of Motion under Gravity (upward and downward motion) - no derivation.
3.4 Circular motion: Angular displacement, Angular velocity and Angular acceleration (definition, formula & SI units).
3.5 Relation between –(i) Linear & Angular velocity, (ii) Linear & Angular acceleration).

3.6 Define Projectile, Examples of Projectile.

3.7 Expression for Equation of Trajectory, Time of Flight, Maximum Height and Horizontal Range for a projectile fired at an angle, Condition for maximum Horizontal Range.

UNIT 4 – WORK AND FRICTION

4.1 Work – Definition, Formula & SI units.
4.2 Friction – Definition & Concept.
4.3 Types of friction (static, dynamic), Limiting Friction (Definition with Concept).
4.4 Laws of Limiting Friction (Only statement, No Experimental Verification).
4.5 Coefficient of Friction – Definition & Formula, Simple Numericals.
4.6 Methods to reduce friction.

UNIT 5 - GRAVITATION

5.1 Newton's Laws of Gravitation – Statement and Explanation.
5.2 Universal Gravitational Constant (G)- Definition, Unit and Dimension.
5.3 Acceleration due to gravity (g)- Definition and Concept.

5.4 Definition of mass and weight.
5.5 Relation between g and G.
5.6 Variation of g with altitude and depth (No derivation – Only Explanation).
5.7 Kepler's Laws of Planetary Motion (Statement only).

UNIT 6 - OSCILLATIONS AND WAVES

6.1 Simple Harmonic Motion (SHM) - Definition & Examples.
6.2 Expression (Formula/Equation) for displacement, velocity, acceleration of a body/ particle in SHM.
6.3. Wave motion – Definition & Concept.
6.4 Transverse and Longitudinal wave motion – Definition, Examples & Comparison.
6.5 Definition of different wave parameters (Amplitude, Wavelength, Frequency, Time Period.
6.6 Derivation of Relation between Velocity, Frequency and Wavelength of a wave
6.7 Ultrasonics – Definition, Properties & Applications.

UNIT 7 - HEAT AND THERMODYNAMICS

7.1 Heat and Temperature – Definition & Difference
7.2 Units of Heat (FPS, CGS, MKS & SI).
7.3 Specific Heat (concept, definition, unit, dimension and simple numerical)
7.4 Change of state (concept), Latent Heat (concept, definition, unit, dimension and simple numerical)
7.5 Thermal Expansion – Definition & Concept
7.6 Expansion of Solids (Concept)
7.7 Coefficient of linear, superficial and cubical expansions of Solids – Definition & Units.
7.8 Relation between α, β & γ
7.9 Work and Heat - Concept & Relation.
7.10 Joule's Mechanical Equivalent of Heat (Definition, Unit)
7.11 First Law of Thermodynamics (Statement and concept only)

UNIT 8 – OPTICS

8.1 Reflection & Refraction – Definition.
8.2 Laws of reflection and refraction (Statement only)
8.3 Refractive index – Definition, Formula &Simple numerical.
8.4 Critical Angle and Total internal reflection – Concept, Definition & Explanation
8.5 Refraction through Prism (Ray Diagram & Formula only – NO derivation)..
8.6 Fiber Optics – Definition, Properties & Applications.

UNIT 9 – ELECTROSTATICS & MAGNETOSTATICS

9.1 Electrostatics – Definition & Concept.
9.2 Statement & Explanation of Coulombs laws, Definition of Unit charge.
9.3 Absolute & Relative Permittivity (ε) – Definition, Relation & Unit.

9.4 Electric potential and Electric Potential difference (Definition, Formula & SI Units).
9.5 Electric field, Electric field intensity (E) – Definition, Formula & Unit.
9.6 Capacitance - Definition, Formula & Unit.
9.7 Series and Parallel combination of Capacitors (No derivation, Formula for effective/Combined/total capacitance & Simple numericals).
9.8 Magnet, Properties of a magnet.
9.9 Coulomb's Laws in Magnetism – Statement & Explanation, Unit Pole (Definition).
9.10 Magnetic field, Magnetic Field intensity (H) - (Definition, Formula & SI Unit).
9.11 Magnetic lines of force (Definition and Properties)
9.12 Magnetic Flux (**Φ**) & Magnetic Flux Density (B) – Definition, Formula & Unit.

UNIT 10 – CURRENT ELECTRICITY

10.1 Electric Current – Definition, Formula & SI Units.
10.2 Ohm's law and its applications.
10.3 Series and Parallel combination of resistors (No derivation, Formula for effective/ Combined/ total resistance & Simple numericals).
10.4 Kirchhoff's laws (Statement & Explanation with diagram).
10.5 Application of Kirchhoff's laws to Wheatstone bridge - Balanced condition of Wheatstone's Bridge – Condition of Balance (Equation).

UNIT 11 – ELECTROMAGNETISM & ELECTROMAGNETIC INDUCTION

11.1 Electromagnetism – Definition & Concept.
11.2 Force acting on a current carrying conductor placed in a uniform magnetic field, Fleming's Left Hand Rule
11.3 Faraday's Laws of Electromagnetic Induction (Statement only)
11.4 Lenz's Law (Statement)
11.5 Fleming's Right Hand Rule
11.6 Comparison between Fleming's Right Hand Rule and Fleming's Left Hand Rule.

UNIT 12 - MODERN PHYSICS

12.1 LASER & laser beam (Concept and Definition)
12.2 Principle of LASER (Population Inversion & Optical Pumping)
12.3 Properties & Applications of LASER
12.4 Wireless Transmission – Ground Waves, Sky Waves, Space Waves (Concept & Definition)

RECOMMENDED BOOKS

1. Text Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
2. Text Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T
3. Text Book of Engineering Physics by Barik, Das, Sharma, Kalyani Publisher
4. Concepts in Physics by H. C. Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi

Syllabus coverage upto I.A

Units 1,2,3,4,5,6

Th.2b. Engineering Chemistry

(1st / 2nd sem Common)

Theory: 4 Periods per Week I.A : 20 Marks
Total Periods: 60 Periods Term End Exam : 80 Marks
Examination: 3 Hours TOTAL MARKS : 100 Marks

Objective:

Engineering Chemistry is concerned with the changes of matters with its environment and anever growing subject. So, the aim of teaching Engineering Chemistry in Diploma Courses is toacquaint the students with the basic Chemistry of different materials used in industry and to equip the students with the basic principles of chemical changes taking place in different aspectsconnected to engineering fields. They also develop the right attitude to cope up with the continuous flow ofnew technology.

Topic wise distribution of periods

Sl. No	Topics/ Units	Periods
A	Physical Chemistry	22
B	Inorganic Chemistry	08
C	Organic Chemistry	10
D	Industrial Chemistry	20
	TOTAL	**60**

A. PHYSICAL CHEMISTRY

Chapter 1: Atomic structure : Fundamental particles (electron, proton & neutron Definition, mass and charge).Rutherford's Atomic model (postulates and failure), Atomic mass and massnumber, Definition, examples and properties of Isotopes, isobars and isotones. Bohr's Atomic model (Postulates only), Bohr-Bury scheme, Aufbau's principle, Hund's rule, Electronic configuration (up to atomic no 30).

Chapter 2 : Chemical Bonding : Definition , types (Electrovalent, Covalent and Coordinate bond with examples (formation of NaCl, $MgCl_2$, H_2,Cl_2, O_2, N_2, H_2O, CH_4, NH_3, NH_4^+, SO_2). **Chapter 3 : Acid base theory :** Concept of Arrhenius, Lowry Bronsted and Lewis theory for acidand base with examples (Postulates and limitations only). Neutralization of acid & base.

Definition of Salt, Types of salts (Normal, acidic, basic, double, complex and mixed salts, definitions with 2 examples from each).

Chapter 4: Solutions : Definitions of atomic weight, molecular weight, Equivalent weight.Determination of equivalent weight of Acid, Base and Salt.

Modes of expression of the concentrations (Molarity , Normality & Molality) with SimpleProblems. pH of solution (definition with simple numericals)

Importance of pH in industry (sugar, textile, paper industries only)

Chapter 5 : Electrochemistry : Definition and types (Strong & weak) of Electrolytes withexample. Electrolysis (Principle & process) with example of NaCl (fused and aqueous solution).
Faraday's 1st and 2nd law of Electrolysis (Statement, mathematical expression and Simplenumerical) Industrial application of Electrolysis- Electroplating (Zinc only).

Chapter 6 : Corrosion: Definition of Corrosion, Types of Corrosion- Atmospheric Corrosion, Waterline corrosion. Mechanism of rusting of Iron only. Protection from Corrosion by (i) Alloying and (ii) Galvanization.

B. INORGANIC CHEMISTRY

Chapter 7 : Metallurgy: Definition of Mineral, ores , gangue with example. Distinction between Ores And Minerals. General methods of extraction of metals,

i) Ore Dressing
ii) Concentration (Gravity separation, magnetic separation, Froth floatation &leaching)
iii) Oxidation (Calcinations, Roasting)
iv) Reduction (Smelting, Definition & examples of flux, slag)
v) Refining of the metal (Electro refining, & Distillation only)

Chapter 8 : Alloys: Definition of alloy. Types of alloys (Ferro, Non Ferro & Amalgam) with example. Composition and uses of Brass, Bronze, Alnico, Duralumin

C. ORGANIC CHEMISTRY

Chapter 9 : Hydrocarbons : Saturated and Unsaturated Hydrocarbons (Definition with example)
Aliphatic and Aromatic Hydrocarbons (Huckle's rule only). Difference between Aliphatic and aromatic hydrocarbons
IUPAC system of nomenclature of Alkane, Alkene, Alkyne, alkyl halide and alcohol (up to 6 carbons) with bond line notation.
Uses of some common aromatic compounds (Benzene, Toluene, BHC, Phenol, Naphthalene, Anthracene and Benzoic acid) in daily life.

D. INDUSTRIAL CHEMISTRY

Chapter 10 : **Water Treatment** : Sources of water, Soft water, Hard water, hardness, types of Hardness (temporary or carbonate and permanent or non-carbonate), Removal of hardness by lime soda method (hot lime & cold lime—Principle, process & advantages) , Advantages of Hotlime over cold lime process.
Organic Ion exchange method (principle, process, and regeneration of exhausted resins) **Chapter 11 : Lubricants**: Definition of lubricant, Types (solid, liquid and semisolid with examples only) and specific uses of lubricants (Graphite, Oils, Grease), Purpose of lubrication **Chapter 12 : Fuel**: Definition and classification of fuel, Definition of calorific value of fuel, Choice of good fuel.
Liquid: Diesel, Petrol, and Kerosene --- Composition and uses.
Gaseous: Producer gas and Water gas (Composition and uses). Elementary idea about LPG, CNG and coal gas (Composition and uses only).

Chapter 13 : Polymer: Definition of Monomer, Polymer, Homo-polymer, Co-polymer and Degree of polymerization. Difference between Thermosetting and Thermoplastic, Composition and uses of Polythene, & Poly-Vinyl Chloride and Bakelite.
Definition of Elastomer (Rubber). Natural Rubber (it's draw backs). Vulcanisation of Rubber. Advantages of Vulcanised rubber over raw rubber.
Chapter 14: Chemicals in Agriculture: Pesticides: Insecticides, herbicides, fungicides- Examples and uses.
Bio Fertilizers: Definition, examples and uses.

Syllabus Coverage upto I.A

Chapter 1,2,3,4,5,6

Books Recommended

1. Text Book of Intermediate Chemistry Part-1 and Part-2 by Nanda, Das, Sharma, Kalyani Publishers
2. Engg. Chemistry by B.K. Sharma, Krishna Prakashan Media Pvt. Ltd
3. Engineering Chemistry by Y.R. Sharma and P. Mitra, Kalyani Publishers
4. Engineering Chemistry for Diploma – Dr. R K Mohapatra, PHI Publication, New Delhi.
5. Engineering Chemistry- Jain & Jain, Dhanpat Roy and Sons.

Th.3. ENGINEERING MATHEMATICS-I

(1ST Sem Common)

Theory: 5 Periods per Week I.A : 20 Marks
Total Periods: 75 Periods End Sem Exam : 80 Marks
Examination: 3 Hours TOTAL MARKS : 100 Marks

OBJECTIVE:

1. This subject helps the students to develop logical thinking which is useful incomprehending the principles of all to the subjects.
2. Analytical and systematic approach towards any problem is developed through learning of this subject.
3. Mathematics being a versatile subject can be used at every stage of human life.

Topic wise distribution of periods and marks

Sl. No.	Subject	Unit	Topic	Periods
A	Algebra	1	Matrices and Determinant	18
B	Trigonometry	2	Trigonometry	15
C	Two Dimensional Geometry	3 4	Co-ordinate Geometry in Two Dimensions (Straight Line) Circle	13 07
D	Three Dimensional Geometry	5 6	Co-ordinate Geometry in Three Dimensions Sphere	15 07
			TOTAL	**75**

1) MATRICES AND DETERMINANTS

a) Types of matrices
b) Algebra of matrices
c) Determinant
d) Properties of determinant
e) Inverse of a matrix (second and third order)
(Question should be on second order matrix)
f) Cramer's Rule (Question should be on two variables)
g) Solution of simultaneous equations by matrix inverse method(Question should be on two variables)

2) TRIGONOMETRY

a) Trigonometrical ratios
b) Compound angles, multiple and sub-multiple angles (only formulae)
c) Define inverse circular functions and its properties (no derivation)

3) CO-ORDINATE GEOMETRY IN TWO DIMENSIONS (Straight line)

a) Introduction of geometry in two dimension
b) Distance formulae, division formulae, area of a triangle (only formulae no derivation)
c) Define slope of a line, angle between two lines (only F),condition of perpendicularity and parallelism.
d) Different forms of straight lines (only formulae)
i) One point form (ii) two point form (iii) slope form (iv) intercept form
(v) Perpendicular form
e) Equation of a line passing through a point and (i) parallel to a line

(ii) Perpendicular to a line

f) Equation of a line passing through the intersection of two lines

g) Distance of a point from a line

4) CIRCLE

a) Equation of a circle
(i) center radius form
(ii) general equation of a circle
(iii) end point of diameter form

5) CO-ORDINATE GEOMETRY IN THREE DIMENSIONS

a) Distance formulae, section formulae, direction ratio, direction cosine, angle between two lines (condition of parallelism and perpendicularity)
b) Equation of a plane
i) General form, angle between two planes, perpendicular distance of a pointfrom a plane, equation of a plane passing through a point and
i) parallel to a plane (ii) perpendicular to a plane

6) SPHERE

a) Equation of a sphere
i) center radius form
ii) general form
iii) two end points of a diameter form (only formulae and problems)

Books Recommended:

1. Elements of Mathematics _ Vol. _ 1 & 2 (Odisha State Bureau of Text Book preparation &Production)

Reference Books:

1. Mathematics Part- I & Part- II- Textbook for Class XII, NCERT Publication

Syllabus to be covered up to IA

Ch.1, Ch,2, and Ch,3,(a,b,c)

Th. 4. ENGINEERING MECHANICS

(2nd sem Common)

Theory: 4 Periods per Week I.A : 20 Marks
Total Periods: 60 Periods End Sem Exam : 80 Marks
Examination: 3 Hours TOTAL MARKS : 100 Marks

Objective:

On completion of the subject, the student will be able to do:

1. Compute the force, moment & their application through solving of simple problems on coplanar forces.
2. Understand the concept of equilibrium of rigid bodies.
3. Know the existence of friction & its applications through solution of problems on above.
4. Locate the C.G. & find M.I. of different geometrical figures.
5. Know the application of simple lifting machines.
6. Understand the principles of dynamics.

Topic wise distribution of periods

Sl. No.	Topics	Periods
1	Fundamentals of Engineering Mechanics	14
2	Equilibrium	08
3	Friction	10
4	Centroid & moment of Inertia	14
5	Simple Machines	08
6	Dynamics	06
	TOTAL	**60**

1. FUNDAMENTALS OF ENGINEERING MECHANICS

1.1 Fundamentals.

Definitions of Mechanics, Statics, Dynamics, Rigid Bodies,

1.2 Force

Force System.

Definition, Classification of force system according to plane & line of action. Characteristics of Force &effect of Force. Principles of Transmissibility & Principles of Superposition. Action & Reaction Forces & concept of Free Body Diagram.

1.3 Resolution of a Force.

Definition, Method of Resolution, Types of Component forces, Perpendicularcomponents & non-perpendicular components.

1.4 Composition of Forces.

Definition, Resultant Force, Method of composition of forces, such as

1.4.1 Analytical Method such as Law of Parallelogram of forces & method of resolution.

1.4.2. Graphical Method.

Introduction, Space diagram, Vector diagram, Polygon law of forces.

1.4.3 Resultant of concurrent, non-concurrent & parallel force system by Analytical& Graphical Method.

1.5 Moment of Force.

Definition, Geometrical meaning of moment of a force, measurement ofmoment of a force & its S.I units. Classification of moments according to

direction of rotation, sign convention, Law of moments, Varignon's Theorem,Couple — Definition, S.I. units, measurement of couple, properties of couple.

2. EQUILIBRIUM

2.1 Definition, condition of equilibrium, Analytical & Graphical conditions of equilibrium for concurrent, non-concurrent & Free Body Diagram.

2.2 Lamia's Theorem – Statement, Application for solving various engineeringproblems.

3. FRICTION

3.1 Definition of friction, Frictional forces, Limiting frictional force, Coefficient of Friction.
Angle of Friction & Repose, Laws of Friction, Advantages & Disadvantages ofFriction.

3.2 Equilibrium of bodies on level plane – Force applied on horizontal & inclined plane(up &down).

3.3 Ladder, Wedge Friction.

4. CENTROID & MOMENT OF INERTIA

4.1 Centroid — Definition, Moment of an area about an axis, centroid of geometrical figures such as squares, rectangles, triangles, circles, semicircles & quarter circles, centroid of composite figures.

4.2 Moment of Inertia – Definition, Parallel axis & Perpendicular axis Theorems. M.I. ofplane lamina & different engineering sections.

5. SIMPLE MACHINES

5.1 Definition of simple machine, velocity ratio of simple and compound gear train, explain simple & compound lifting machine, define M.A, V.R. & Efficiency & State the relation between them, State Law of Machine, Reversibility of Machine, Self Locking Machine.

5.2 Study of simple machines — simple axle & wheel, single purchase crab winch & double purchase crab winch, Worm & Worm Wheel, Screw Jack.

5.3 Types of hoisting machine like derricks etc, Their use and working principle. No problems.

6. DYNAMICS

6.1 Kinematics & Kinetics, Principles of Dynamics, Newton's Laws of Motion, Motion of Particle acted upon by a constant force, Equations of motion, De-Alembert's Principle.

6.2 Work, Power, Energy & its Engineering Applications, Kinetic & Potential energy & its application.

6.3 Momentum & impulse, conservation of energy & linear momentum, collision of elastic bodies, and Coefficient of Restitution.

Syllabus coverage upto I.A

Chapter 1, 2 and 3.1

Books Recommended

1. Engineering Mechanics – by A.R. Basu (TMH Publication Delhi)
2. Engineering Machines – Basudev Bhattacharya (Oxford University Press).
3. Text Book of Engineering Mechanics – R.S Khurmi (S. Chand).
4. Applied Mechanics & Strength of Material – By I.B. Prasad.
5. Engineering Mechanics – By Timosheenko, Young & Rao.

6. Engineering Mechanics – Beer & Johnson (TMH Publication).

Th.4(a). BASIC ELECTRICAL ENGINEERING

(1st sem Common)

Theory: 2 Periods per Week
Total Periods: 30 Periods

Examination: 1.5 Hours
Marks

I.A : 10 Marks
End Sem Exam : 40 Marks
TOTAL MARKS : 50

Topic wise Distribution of Periods and Marks

Sl.No.	Topics	Periods
1	Fundamentals	05
2	A C Theory	08
3	Generation of Elect. Power	03
4	Conversion of Electrical Energy	07
5	Wiring and Power Billing	04
6	Measuring Instrument	03
	Total	**30**

Objective

1. To be familiar with A.C Fundamental and circuits
2. To be familiar with basic principle and application of energy conversion devices
3. To be familiar with generation of Electrical power
4. To be familiar with wiring and protective device
5. To be familiar with calculation and commercial Billing of electrical power & energy
6. To have basic knowledge of various electrical measuring instruments & conservation of electrical energy

1. FUNDAMENTALS

1.1 Concept of current flow.
1.2 Concept of source and load.
1.3 State Ohm's law and concept of resistance.
1.4 Relation of V, I & R in series circuit.
1.5 Relation of V, I & R in parallel circuit.
1.6 Division of current in parallel circuit.
1.7 Effect of power in series & parallel circuit.
1.8 Kirchhoff's Law.
1.9 Simple problems on Kirchhoff's law.

2. A.C. THEORY

2.1 Generation of alternating emf.
2.2 Difference between D.C. & A.C.
2.3 Define Amplitude, instantaneous value, cycle, Time period, frequency, phase angle,phase difference.
2.4 State & Explain RMS value, Average value, Amplitude factor & Form factor with Simple problems.
2.5 Represent AC values in phasor diagrams.
2.6 AC through pure resistance, inductance & capacitance
2.7 AC though RL, RC, RLC series circuits.
2.8 Simple problems on RL, RC & RLC series circuits.
2.9 Concept of Power and Power factor
2.10 Impedance triangle and power triangle.

3. GENERATION OF ELECTRICAL POWER

3.1 Give elementary idea on generation of electricity from thermal , hydro & nuclear power station with block diagram

4. CONVERSION OF ELECTRICAL ENERGY

(No operation, Derivation, numerical problems)

4.1 Introduction of DC machines.

4.2 Main parts of DC machines.

4.3 Classification of DC generator

4.4 Classification of DC motor.

4.5 Uses of different types of DC generators & motors.

4.6 Types and uses of single phase induction motors.

4.7 Concept of Lumen

4.8 Different types of Lamps (Filament, Fluorescent, LED bulb) its Construction and Principle.

4.9 Star rating of home appliances (Terminology, Energy efficiency, Star rating Concept)

5. WIRING AND POWER BILLING

5.1 Types of wiring for domestic installations.

5.2 Layout of household electrical wiring (single line diagram showing all the importantcomponent in the system).

5.3 List out the basic protective devices used in house hold wiring.

5.4 Calculate energy consumed in a small electrical installation

6. MEASURING INSTRUMENTS

6.1 Introduction to measuring instruments.

6.2 Torques in instruments.

6.3 Different uses of PMMC type of instruments (Ammeter & Voltmeter).

6.4 Different uses of MI type of instruments (Ammeter & Voltmeter).

6.5 Draw the connection diagram of A.C/ D.C Ammeter, voltmeter, energy meter andwattmeter. (Single phase only).

Syllabus Coverage upto I.A

Chapter 1,2,3

BOOKS RECOMENDED:

1. ABC of Electrical Enginnering by Jain & Jain (Dhanpat Rai Publication)
2. Fundamentals of Electrical Engg and Electronics by B.L Thereja
3. Concept of Basic Electrical Enginnering ,P.K Das and A.K. Mallick by B.M Publications
4. Fundamentals of Electrical Engg by Asfaq Hussain
5. Fundamentals of Electrical Engg by JB Gupta
6. Basic Electrical Engg. By Chakraborti (Mcgraw Hill)

Th.4(b). BASIC ELECTRONIC ENGINEERING

(1st sem Common)

Theory: 2 Periods per Week — I.A : 10 Marks
Total Periods: 30 Periods — End Sem Exam : 40 Marks
Examination: 1.5 Hours — TOTAL MARKS : 50 Marks

Topic wise Distribution of Periods and Marks

Sl.No.	Topics	Periods
1	Electronic Devices	8
2	Electronic circuits	9
3	Communication System	3
4	Transducers & Measuring instruments	10
	Total	**30**

Objective

1. To be familiar with Electronic devices
2. To be familiar with Electronic circuits
3. To be familiar with communication system
4. To be familiar with Electronic measuring instruments

1. ELECTRONIC DEVICES

1.1 Basic Concept of Electronics and its application.
1.2 Basic Concept of Electron Emission & its types.
1.3 Classification of material according to electrical conductivity (Conductor, Semiconductor & Insulator) with respect to energy band diagram only.
1.4 Difference between Intrinsic & Extrinsic Semiconductor.
1.5 Difference between vacuum tube & semiconductor.
1.6 Principle of working and use of PN junction diode, Zener diode and Light Emitting Diode (LED)
1.7 Integrated circuits (I.C) & its advantages.

2. ELECTRONIC CIRCUITS

2.1 Rectifier & its uses.
2.2 Principles of working of different types of Rectifiers with their merits and demerits
2.3 Functions of filters and classification of simple Filter circuit (Capacitor, choke input and π)
2.4 Working of D.C power supply system (unregulated) with help of block diagrams only
2.5 Transistor, Different types of Transistor Configuration and state output and input current gain relationship in CE,CB and CC configuration(No mathematical derivation)
2.6 Need of biasing and explain different types of biasing with circuit diagram.(only CE configuration)
2.7 Amplifiers(concept) , working principles of single phase CE amplifier
2.8 Electronic Oscillator and its classification
2.9 Working of Basic Oscillator with different elements through simple Block Diagram
.

3. COMMUNICATION SYSTEM

3.1 Basic communication system (concept & explanation with help of Block diagram)

3.2 Concept of Modulation and Demodulation, Difference between them
3.3 Different types of Modulation (AM, FM & PM) based on signal, carrier wave andmodulated wave (only concept, No mathematical Derivation)

4. TRANSDUCERS AND MEASURING INSTRUMENTS

4.1 Concept of Transducer and sensor with their differences.
4.2 Different type of Transducers & concept of active and passive transducer.
4.3 Working principle of photo emissive, photoconductive, photovoltaic transducer and its application
4.4 Multimeter and its applications
4.5 Analog and Digital Multimeter and their differences
4.6 Working principle of Multimeter with Basic Block diagram
4.7 CRO, working principle of CRO with simple Block diagram

Syllabus Coverage upto I.A

Chapter 1,2(upto 2.6)

BOOKS RECOMENDED:

1. Principles of Electronics by V.K Mehta and Rohit Mehta,S Chand Publication
2. Principles of Electronics by S.K. SAHADEV (Dhanpatrai Publication)

Th.3. ENGINEERING MATHEMATICS – II

(2nd Sem Common)

Theory: 5 Periods per Week I.A : 20 Marks
Total Periods: 75 Periods End Sem Exam : 80 Marks
Examination: 3 Hours TOTAL MARKS : 100 Marks

Objective:

Principles and application in Engineering are firmly ground on abstract mathematical structures.Students passing from secondary level need familiarization with such structure with a view to develop their knowledge, skill and perceptions about the applied science. Calculus is the most important mathematical tool in forming engineering application into mathematical models. Wide application of calculus makes it imperative to develop methods of solving differential equations. The knowledge of limit, derivative and derivative needs to be exhaustively practiced. To help a systematic growth of skill in solving equation by calculus method will be the endeavor of this course content. Understanding the concept of co-ordinate system in 3D in case of lines, planes and sphere and it's use to solve Engineering problems. After completion of the course the student will be equipped with basic knowledge to form equations and solve them competently.

Topic wise distribution of periods

Sl. No.	Topics	Periods	Marks
1	Vector Algebra	15	12
2	Limits and Continuity	12	12
3	Derivatives	21	20
4	Integration	15	24
5	Differential Equation	12	12
TOTAL		**75**	**80**

1) VECTOR ALGEBRA

a) Introduction
b) Types of vectors (null vector, parallel vector , collinear vectors) (in component form)
c) Representation of vector
d) Magnitude and direction of vectors
e) Addition and subtraction of vectors
f) Position vector
g) Scalar product of two vectors
h) Geometrical meaning of dot product
i) Angle between two vectors
j) Scalar and vector projection of two vectors
k) Vector product and geometrical meaning(Area of triangle and parallelogram)

2) LIMITS AND CONTINUITY

a) Definition of function, based on set theory
b) Types of functions
i) Constant function
ii) Identity function
iii) Absolute value function
iv)The Greatest integer function
v) Trigonometric function

vi) Exponential function
vii) Logarithmic function
c) Introduction of limit
d) Existence of limit
e) Methods of evaluation of limit

i) $\lim_{x\to 0} \frac{x^n - a^n}{x-a} = na^{n-1}$

ii) $\lim_{x\to 0} \frac{a^x - 1}{x} = \log_e a$

iii) $\lim_{x\to 0} \frac{e^x - 1}{x} = 1$

iv) $\lim_{x\to 0} (1+x)^{1/x} = e$

v) $\lim_{x\to \infty} (1+\frac{1}{x})^x = e$

vi) $\lim_{x\to 0} \frac{\log(1+x)}{x} = 1$

vii) $\lim_{x\to 0} \frac{\sin x}{x} = 1$

viii) $\lim_{x\to 0} \frac{\tan x}{x} = 1$

e) Definition of continuity of a function at a point and problems based on it

3) DERIVATIVES

a) Derivative of a function at a point

b) Algebra of derivative

c) Derivative of standard functions

$x^n, a^x, \log_a x, e^x, \sin x, \cos x, \tan x, \cot x, \sec x, \csc x, \sin^{-1} x,$
$\cos^{-1} x, \tan^{-1} x, \cot^{-1} x, \sec^{-1} x, \csc^{-1} x$

d) Derivative of composite function (Chain Rule)

e) Methods of differentiation of

i) Parametric function

ii) Implicit function

iii) Logarithmic function

iv) a function with respect to another function

f) Applications of Derivative

i) Successive Differentiation (up to second order)

ii) Partial Differentiation (function of two variables up to second order)

g) Problems based on above

4) INTEGRATION

a) Definition of integration as inverse of differentiation

b) Integrals of standard functions

c) Methods of integration

i) Integration by substitution

ii) Integration by parts

d) Integration of the following forms

i) $\int \frac{dx}{x^2+a^2}$ ii) $\int \frac{dx}{x^2-a^2}$ iii) $\int \frac{dx}{a^2-x^2}$ iv) $\int \frac{dx}{\sqrt{x^2+a^2}}$ v) $\int \frac{dx}{\sqrt{x^2-a^2}}$ vi) $\int \frac{dx}{\sqrt{a^2-x^2}}$

vii) $\int \frac{dx}{x\sqrt{x^2-a^2}}$ viii) $\int \sqrt{a^2-x^2}\, dx$ ix) $\int \sqrt{a^2+x^2}\, dx$ x) $\int \sqrt{x^2-a^2}\, dx$

e) Definite integral, properties of definite integrals

i) $\int_0^a f(x)\, dx = \int_0^a f(a-x) dx$

ii) $\int_a^b f(x)\, dx = -\int_b^a f(x)\, dx$

iii) $\int_a^c f(x)\, dx = \int_a^b f(x) dx + \int_b^c f(x)\, dx \;,\; a < b < c$

iv) $\int_{-a}^{a} f(x)\, dx = 0$, if $f(x)$ = odd

$= 2\int_0^a f(x)\, dx$, if $f(x) = even$

f) Application of integration

i) Area enclosed by a curve and X – axis

ii) Area of a circle with centre at origin

5) DIFFERENTIAL EQUATION

a) Order and degree of a differential equation

b) Solution of differential equation

i) 1st order and 1st degree equation by the method of separation of variables

ii) Linear equation $\frac{dy}{dx} + Py = Q$, where P,Q are functions of x

Syllabus to be covered up to IA Ch. 2 and Ch. 3

Books Recommended:

1. Elements of Mathematics _ Vol. _ 1 & 2 (Odisha State Bureau of Text Book preparation &Production)

Reference Books:

Mathematics Part- I & Part- II- Textbook for Class XII, NCERT Publication

Pr.1a. Communicative English Lab

(1st & 2nd sem Common)

Theory: 4 Periods per Week — Sessional : 50 Marks

Total Periods: 60 Periods — TOTAL MARKS : 50 Marks

Sl No.	Topic	Periods
1	Listening Skill	10
2	Speaking Skill	20
3	Personality Development	10
4	Interpersonal Skills	10
5	Presenting in G D , Seminar and Conferences	10
	Total	60

PRACTICAL

1. LISTENING SKILLS

- The student should be able to listen to a text read aloud in normal speed with focus on intonation
- After listening the student can fill-in-blanks, choose a suitable title, make a summary, supply required information and be able to answer comprehension questions from the passage read aloud.

2. SPEAKING SKILL

- Reading aloud of dialogues, texts, poems, speeches focusing on intonation.
- Self-introduction
- Role-plays on any two- situations
- Telephonic conversation

3. PERSONALITY DEVELOPMENT

- Initiation
- Physical appearance
- Audience purpose

4. INTERPERSONAL SKILLS

Appropriate use of non-verbal skills in face-to-face communication[I.e. viva- voice, group-interviews, GDs and seminars]

5. PRESENTING IN GD, SEMINARS AND CONFERENCES

- Leadership quality
- Time management
- Achieving the target

Pr.1b. COMPUTER APPLICATION LAB

(1st / 2nd sem Common)

Theory: 4 Periods per Week | Sessional : 50 Marks
Total Periods: 60 Periods | TOTAL MARKS : 50 Marks

1. BASIC COMPUTER OPERATION [04]

Identification of different components of Computer Switch on and Booting Process Shut down,Restart of computer

2. PERSONAL COMPUTER SYSTEM [12]

Study of device and power supply form factor of Personal Computer System
Identification of various Mother Board components
Identification of different ports, type of connectors, and their purpose, Cooling System ofProcessor and Case
Identification and Study of ROM, RAM, Adapter Cards, Expansion Slots,SATA connectorsStudy of Adapters and Converters

3. COMPUTER LAB SAFETY AND STUDY OF LAB TOOLS [06]

Study of various types of LAB Safety measures (General Safety, Electrical Safety, Firesafety), Analysis of various Power Fluctuation Types (Blackout, Brownout, Noise, Spike,Power surge), Power Protection Devices (Surge suppressor, UPS, Standby power supply) Procedures for proper disposal or recycling of hazardous computer components (Batteries,Monitors, Toner Kits, Cartridges, Chemical Solvents and Aerosol Cans)
Study of General Lab Tools (ESD tools, Hand tools, cable tools, Cleaning tools, Diagnostictools), Disk Management Tools

4. OPERATINGSYSTEM [08]

Basic DOS commands (CLS, DIR, DATE, TIME, VERSION, MD, CD, RD, DEL, COPY,
REN, USE OF WILD CARDS, PATH), Basic Windows OS operations, MOUSE OPERATIONS, Utilities and Accessories, Installation and configuration of OS

5. WORKING WITH MS-OFFICE [12]

Basic operations of Word Processing Package. (MS-Word), Basic operations of Electronic Spread Sheet Package. (MS-Excel), Basic operations of Presentation Package (MS- Power point) *(Create, Edit, Format, Save, Print/View in the above three packages)*

6. WORKING WITH INTERNET [06]

Getting acquainted with Internet connection, Browser,
websiteURL, webpage, http, WWW, net browsing
Creating E-Mail Id, sending and receiving E-mail Chatting

7. C PROGRAMMING [12]

1. Write a Program in C to find the greatest number among three numbers.
2. Write a Program in C to find the average of n numbers by using for loop.
3. Write a program in C to determine whether a number is prime or not?
4. Write a program in C to check whether a given number is palindrome or not?
5. Write a program in C to compute the sine series.
6. Write a program in C to accept row wise and column wise element in a two dimensional array and print them.
7. Write a program in C to find the vowels in a given string.
8. Write a program in C to find the factorial of a number, by using recursion.
9. Write a program in C to find the sum of Fibonacci series, by using function.
10. Write a program in C to accept a number from keyboard and print it in reverse order of entry, by using function.

Pr.2a. Engineering Physics Lab

(1st / 2nd sem Common)

Theory: 4 Periods per Week — Sessional : 50 Marks
Total Periods: 60 Periods — End Sem Exams : 50 Marks
Examinatio: 3 Hours — TOTAL MARKS :100 Marks

(Any 10 Experiments)

SL.NO	NAME OF THE EXPERIMENTS
1	To find the cross sectional area of a wire using a screw gauge.
2	To find the thickness and volume of a glass piece using a screw gauge.
3	To find volume of a solid cylinder using a Vernier Calipers.
4	To find volume of a hollow cylinder using a Vernier Calipers.
5	To determine the radius of curvature of convex surface using a Spherometer.
6	To determine the radius of curvature of concave surface using a Spherometer.
7	To find the time period of a simple pendulum and determine acceleration due to gravity.
8	To determine the angle of Prism.
9	To determine the angle of Minimum Deviation by I ~ D curve method.
10	To trace lines of force due to a bar magnet with North pole pointing North and locate the neutral points.
11	To trace lines of force due to a bar magnet with North pole pointing South and locate the neutral points.
12	To verify Ohm's Law by Ammeter – Voltmeter method.

Pr.2b. Engineering Chemistry Lab

(1st / 2nd sem Common)

Theory: 4 Periods per Week
Total Periods: 60 Periods
Examinatio: 3 Hours

Sessional : 50 Marks
End Sem Exams : 50 Marks
TOTAL MARKS :100 Marks

Sl No.	Experiment
1	Preparation and study of physical and chemical properties CO_2 gas.
2	Preparation and study of physical and chemical properties NH_3 gas.
3	Crystallization of Copper sulphate from copper carbonate.
4	Simple acid-base titrations (i) Acidimetry (ii) Alkalimetry
5	Tests for acid radicals (Known): (i) Carbonate, (ii) Sulphide, (iii) Chloride, (iv) Nitrate and (v) Sulphate.
6	Test for Basic radicals (Known): (i) Ammonium, (ii) Zinc, (iii) Magnesium, (iv) Aluminium, (v) Calcium, (vi) Sodium and (vii) potassium.
7	Test for unknown Acid radicals
8	Test for unknown basic radicals
9	Test for unknown salt (composed of one basic radical and one acid radical)

Recommended Books:

(i) Practical Intermediate Chemistry By Dr. Bichitrananda Nanda
(ii) Elemental Experimental chemistry by Dr. Y R Sharma, A K Das, Kalyani Publisher

Pr.3a. Engineering Drawing

(1st / 2nd sem Common)

Theory: 6 Periods per Week
Total Periods: 90 Periods
Examination: 3 Hours

Sessional : 50 Marks
End Sem Exams : 100 Marks
TOTAL MARKS : 150 Marks

Objective

After completion of the study of Engg. Drawing the student should be able to

1. Understand the importance of Engineering Drawing.
2. Demonstrate the use of different drawing instrument.
3. Make free hand lettering and numbering.
4. Practice of dimensioning of drawing.
5. Undertake different geometric constructions, projections of straight line, planes and solids.
6. Take up different orthographic projections.
7. Draw sectional views, development of surface of different solids.
8. Develop the concept of building drawing.
9. Prepare 2D engineering drawing using Auto CAD software.

Topic wise distribution of periods.

Sl. No.	Topics	Periods
1	Introduction and Demonstration	03
2	Types of Lines, Lettering & Dimensioning	03
3	Scales	03
4	Curves	06
5	Orthographic Projections	21
6	Section and Developments	21
7	Isometric Projections	06
8	Building Drawing	12
9	Practices on Auto CAD	15
	TOTAL	**90**

(All drawings are to be made in First Angle Projection)

1. INTRODUCTION & DEMONSTRATION

1.1 Identify various sizes of drawing boards, drawing sheets as pr BIS.
1.2 List the types of pencils, instruments, and scales (RF).
1.3 Demonstrate lying of drawing sheet, margin, standard layout and title block as per BIS, folding principle of drawings (blue prints, print outs etc).

2. TYPES OF LINES, LETTERING & DIMENSIONING

2.1 Demonstrate and explain the use of various types of lines.
2.2 Demonstrate the principle of single stroke, gothic lettering & numerals as per BIS.

3. SCALES

3.1 Significance of scales in drawing; different scales.
3.2 Define and draw plain sale and diagonal sale.

4. CURVES

4.1 Explain Conic sections with illustration, Explain terms like focus, vertex, directrix and eccentricity.

4.2 Draw conics sections by eccentricity method – Ellipse, Parabola and Hyperbola.

4.3 Draw Ellipse by concentric circle method sand arc of cicle method.

4.4 Draw parabola by Rectangle Method and Tangent Method.

5. OTHOGRAPHIC PROJECTIONS

5.1 Demonstrate the principles of 1^{st} angle and rd angle projections with the help of models and draw symbols. 3

5.2 Draw projection of points.

5.3 Draw projection of straight line (parallel to both planes, parallel to one and perpendicular to other, parallel to one and inclined to other and inclined to both reference planes).

5.4 Draw plane figure such as squares, rectangles, triangles, circle, Pentagon and hexagon

(perpendicular to one plane and inclined to other).

5.5 Draw projections of solids such as prism, cylinder, cone, tetrahedron and pyramid in simple position (with axis parallel to one reference plane and perpendicular to other reference plane).

6. SECTION & DEVELOPMENTS

6.1 Draw the sectional projection & development of prism, cylinder, cone and pyramid in simple position by a cutting plane perpendicular to one reference plane and inclined to other reference plane.

6.2 Draw true shape of the cutting sections.

7. ISOMETRIC PROJECTIONS

Draw isometric view & Isometric projection of prism, pyramid, cone & cylinderwith axis horizontal and vertical with construction of isometric scales.

8. BUILDING DRAWING

8.1 Explain terms related to building drawing.

8.2 Draw plan, elevation of single room building with verandah (Flat roof according to given line plan and specification).

9. PRACTICES ON AUTO CAD

9.1 Introduction-Settings, Limits etc.

9.2 Auto CAD commands-

Draw commands (Line, circle, are polygon, ellipse, rectangle).

Edit command, Dimension commands and Modify Commands for two dimensional drafting only.

9.3 Exercise for practice using Auto CAD.

9.3.1 Orthographic projections of lines, planes sand solids as per chapter 5.0.

9.3.2 Isometric projection as per Chapter 7.0.

Note: Focus should be on Hands on Practice of student using AutoCAD software

Books Recommended

1. Machine Drawing by Basudeb Bhattacharya, Oxford University Press.
2. A Text Book of Engineering Drawing by Dr. R.K. Dhawan.
3. A Text Book of Engineering Graphics & Auto CAD by K Venugopal.
4. A Text book of Engineering Drawing by N.D. Bhatt.
5. Engineering Drawing by P.S. Gill.
6. A Introduction to Auto CAD – 2012 by George Omura, Willey India Publishers.

Pr.3b. Workshop Practice

(1st / 2nd sem Common)

Theory: 6 Periods per Week — Sessional : 50 Marks
Total Periods: 90 Periods — End Sem Exams : 100 Marks
Examination: 4 Hours — TOTAL MARKS : 150 Marks

Objective:

1. To demonstrate safely practice in various shops of the workshop.
2. To select suitable tools & equipment in the following shops. (a) Fitting.
   (b) Sheet Metal.
   (c) Welding (Gas & Electrical). (d) Turning.
3. To select suitable materials for different process in the above shops.
4. To demonstrate the different processes adopted in the above shops.
5. To finish the jobs within stipulated time and with accuracy as per specifications.

Topic Wise distribution of periods

Sl. No.	Topics	Periods
1	Fitting Shop	24
2	Sheet Metal	18
3	Welding Shop	24
4	Turning Shop	21
5	Exposure to CNC Milling / Lathe Machine	03
	TOTAL	**90**

1. FITTING SHOP

1.1 Demonstrate safety practices in the fitting shop.
1.2 Select suitable holding & clamping devices for fitting jobs.
1.3 Select suitable tools like- files, vice, chisels, punch, scriber, hammers, surface plate, V-block, try square, caliper etc.
1.4 Demonstrate the following operations:
Sawing, Chipping, Fitting, Craping, Grinding, Marking, Reaming, Tapping,Drilling & Angular cutting.
1.5 Introduction of chipping, demonstration on chipping and its applications.
1.6 Description, demonstration and practice of simple operation of hack saw straight and angular cutting.
1.7 Introduction and use of measuring tools used in fitting shop like steel rule, measuring tape, outside micrometer, vernier caliper and vernier height gauge.
1.8 Description and Demonstration and practice of thread cutting using taps and dies.
Job: Cutting & fitting practice on a square of 50mm X 50mm X 8mm MS Flat. Job: Angular cutting practice of 45 degree (on the above job). Job: Preparation of stud (to cut external threads) with the help of dies (mm orBSW). Job: H-fitting in the mild steel (ms) square. Job: Prepare one job on male female fitting.

2. SHEET METAL

2.1 Demonstrate safety practices in sheet metal shop.

2.2 Prepare surface development for the jobs according to the drawing.

2.3 Cut M.S and G.P. sheets according to the surface development / drawing using standard sheet metal cutting tools.

2.4 Select hand tools for sheet metal work.

2.5 Demonstrate the process of metal clamp joining and reveted joining of sheet metals.

Job: Making of sheet metal joints.

Job: Prepare a sheet metal tray or a funnel.

Job: Prepare a sheet metal job involving rolling, shearing, creasing, bending & cornering. Job: Prepare a lap riveting joint.

3. WELDING SHOP

3.1 Introduction.

3.2 Safety precautions in welding, safety equipments & its application in welding shop.

3.3 Introduction to welding, type of welding, common materials that can be welded, introduction to gas welding equipment, types of flame, adjustment of flame, applications of gas welding, Welding tools & safety precautions.

3.4 Introduction to electric arc welding (AC & DC), practice in setting current & voltage for striking proper arc, precautions while using electric arc welding. Applications of arc welding. Introduction to polarity & their use.

3.5 Demonstrate & use of the different tools used in the welding shop with sketches, Hand shield, helmet, clipping hammer, gloves, welding lead, connectors, aprons, goggles, etc.

3.6 Demonstrate of welding defects & various types of joints & end preparation.

Job: Preparation of lap joint by arc welding rod. Job: Preparation of Tee joint by arcwelding.

Job: Preparation of single V or double V butt joint by electric arc welding.

Job: Brazing practice. Use of Spelt or (on MS sheet pieces).

Job: Gas welding practice on worn-out & broken parts.

4. TURNING SHOP

4.1 Introduction.

4.2 Safety precaution & safety equipments.

4.3 Various marking, measuring, cutting & holding tools.

4.4 Demonstration of different parts of a lathe, demonstration on centering & turning operation in a group of 06 students.

Job: plain turning, taper turning & grooving practices on round bar.

5. EXPOSURE TO C.N.C MILLING / LATHE MACHINEReference

Books

1. Workshop Technology by S.K.Hajara Choudhray, Media Promoters Publishers, New Delhi.
2. Workshop Technology by B.S. Raghubanshi, Dhanpat Rai and Sons, New Delhi.
3. Workshop Technology by H.S. Bawa – TMH.
4. Workshop Familiarization by E Wilkinson.
5. Sheet metal shop practice by Bruce & Meyer.
6. Workshop Technology by R.S. Khurmi & J.K. Gupta, S.Chand.

Notes

1. Work, Progress book should be maintained continuously.

2. The roll numbers of the students must be punched on each job.

3. The turning shop job should be done by students' maximum 06 students in a group

Pr.4 Seminar

(1st / 2nd sem Common)

Theory: 4 Periods per Week — Sessional : 50 Marks
Total Periods: 60 Periods — TOTAL MARKS : 50 Marks

The students shall present seminar on different topics on latest science and Technology in the entire class. There shall not be any grouping of students. The students shall present the seminar topic to the whole class/section. All other students should be allowed and encouragedto put questions to the presenter student, who shall answer the questions. A student has to present seminar on at least 2 topics in a semester. He/she has to submit seminar report for each topic separately, to the teacher concerned, which shall be preserved for verification by the authorities. The students should be encouraged to refer to the magazines, journals ,e-materials etc. for preparing for seminar topic. Attendance of all students other than the presenters should be ensured, so that seminar shall be more participative and knowledge of students shall improve by listening to many topics presented.

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 3rd Semester Mechanical Engg.(wef 2019-20)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Production Technology	4		-	20	80	3	100
Th.2		Strength of Material	4		-	20	80	3	100
Th.3		Engineering. Material	4		-	20	80	3	100
Th.4		Thermal Engineering-I	4			20	80	3	100
Th.5		Environmental studies	4			20	80	3	100
		Total	20			100	400	-	500
		Practical							
Pr.1		Mechanical Engg. Drawing	-	-	6	25	50	3	75
Pr.2		Mechanical Engg. Lab-I	-	-	4	25	50	3	75
Pr.3		Workshop-II	-	-	6	50	50	4	100
		Student Centred Activities(SCA)		-	3	-	-	-	-
		Total	-	-	*19*	*100*	*150*	-	*250*
		Grand Total	**20**	**-**	**19**	**200**	**550**	**-**	**750**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration									
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%									
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.									
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester									

CURRICULLUM OF 3RDSEMESTER

For

DIPLOMA IN MECHANICAL ENGINEERING

(Effective FROM 2019-20 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA, BHUBANESWAR

TH-1 PRODUCTION TECHNOLOGY

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**

Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	I.A	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE :

Production Technology involves a working knowledge in the field of product design, product development and rapid part production. It deals with the production methodology and its management to make a complete analysis on the products.

B. COURSE OBJECTIVES

At the end of the course the students will be able to

1. Understand the different components and processes involved in press tool operation.
2. Understand how to minimize the job setting and tool setting times in mass production.
3. Understand the industrial requirements of fabrication systems.
4. Understand the manufacturing processes like casting and powder metallurgy.

C. CHAPTER WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Metal Forming Processes	07
02	Welding	16
03	Casting	16
04	Powder Metallurgy	07
05	Press Work	07
06	Jigs and fixtures	07
	Total Period:	60

D. COURSE CONTENTS

1.0 Metal Forming Processes

- 1.1 Extrusion: Definition & Classification
- 1.2 Explain direct, indirect and impact extrusion process.
- 1.3 Define rolling. Classify it.
- 1.4 Differentiate between cold rolling and hot rolling process.
- 1.5 List the different types of rolling mills used in Rolling process.

2.0 Welding

- 2.1 Define welding and classify various welding processes.
- 2.2 Explain fluxes used in welding.
- 2.3 Explain Oxy-acetylene welding process.
- 2.4 Explain various types of flames used in Oxy-acetylene welding process.
- 2.5 Explain Arc welding process.
- 2.6 Specify arc welding electrodes.
- 2.7 Define resistance welding and classify it.
- 2.8 Describe various resistance welding processes such as butt welding, spot welding, flash welding, projection welding and seam welding.

2.9 Explain TIG and MIG welding process
2.10 State different welding defects with causes and remedies.

3.0 *Casting*

3.1 Define Casting and Classify the various Casting processes.
3.2 Explain the procedure of Sand mould casting.
3.3 Explain different types of molding sands with their composition and properties.
3.4 Classify different pattern and state various pattern allowances.
3.5 Classify core.
3.6 Describe construction and working of cupola and crucible furnace.
3.7 Explain die casting method.
3.8 Explain centrifugal casting such as true centrifugal casting, centrifuging with advantages, limitation and area of application.
3.9 Explain various casting defects with their causes and remedies.

4.0 *Powder Metallurgy*

4.1 Define powder metallurgy process.
4.2 State advantages of powder metallurgy technology technique
4.3 Describe the methods of producing components by powder metallurgy technique.
4.4 Explain sintering.
4.5 Economics of powder metallurgy.

5.0 *Press Work*

5.1 Describe Press Works: blanking, piercing and trimming.
5.2 List various types of die and punch 7
5.3 Explain simple, Compound & Progressive dies
5.4 Describe the various advantages & disadvantages of above dies

6.0 *Jigs and fixtures*

6.1 Define jigs and fixtures
6.2 State advantages of using jigs and fixtures
6.3 State the principle of locations
6.4 Describe the methods of location with respect to 3-2-1 point location of rectangular jig
6.5 List various types of jig and fixtures.

Syllabus to be covered up to IA- Chapters 1, 2&3

LEARNING RESOURCES

Sl. No.	Author	Title of the book	Publisher
01	O.P. Khanna	Production Technology, Vol- I& II	Dhanpat Rai Publication
02	B.S Raghuwanshi	Workshop technology, Vol- I& II	Dhanpat Rai & Co
03	P.N. Rao	Manufacturing technology, Vol- I&II	TMH
04	P.C.Sharma	Manufacturing technology, Vol- I	S. Chand

TH-2 STRENGTH OF MATERIAL

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	I.A TEST	20
Maximum marks:	100	End Semester Examination:	80

A. *RATIONALE :*

Strength of material deals with the internal behaviors of solid bodies under the action of external force. The subject focuses on mechanical properties of material analysis of stress, strain and deformations. Therefore it is an important basic subject of students for Mechanical and Automobile Engg.

B. *COURSE OBJECTIVES:*

Students will develop ability towards

- Determination of stress, strain under uniaxial loading (due to static or impact load and temperature) in simple and single core composite bars.
- Determination of stress, strain and change in geometrical parameters of cylindrical and spherical shells due to pressure
- Realization of shear stress besides normal stress and computation of resultant stress in two dimensional objects.
- Drawing bending moment and shear force diagram and locating points in a beam where the effect is maximum or minimum.
- Determination of bending stress and torsional shear stress in simple cases
- Understanding of critical load in slender columns thus realizing combined effect of axial and bending load.

C. *CHAPTER WISE DISTRIBUTION OF PERIODS*

Sl. No.	Topic	Periods
01	Simple Stress & Strain	10
02	Thin cylindrical and spherical shell under internal pressure	08
03	Two dimensional stress systems	10
04	Bending moment& shear force	10
05	Theory of simple bending	10
06	Combined direct & Bending stresses	06
07	Torsion	06
	Total Period:	60

D. COURSE CONTENTS

1.0 *Simple stress& strain*

1.1 Types of load, stresses & strains,(Axial and tangential) Hooke's law, Young's modulus, bulk modulus, modulus of rigidity, Poisson's ratio, derive the relation between three elastic constants,

1.2 Principle of super position, stresses in composite section

1.3 Temperature stress, determine the temperature stress in composite bar (single core)

1.4 Strain energy and resilience, Stress due to gradually applied, suddenly applied and impact load

1.5 Simple problems on above.

2.0 *Thin cylinder and spherical shell under internal pressure*

2.1 Definition of hoop and longitudinal stress, strain

2.2 Derivation of hoop stress, longitudinal stress, hoop strain, longitudinal strain and volumetric strain

2.3 Computation of the change in length, diameter and volume

2.4 Simple problems on above

3.0 *Two dimensional stress systems*

3.1 Determination of normal stress, shear stress and resultant stress on oblique plane

3.2 Location of principal plane and computation of principal stress

3.3 Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle

4.0 *Bending moment& shear force*

4.1 Types of beam and load

4.2 Concepts of Shear force and bending moment

4.3 Shear Force and Bending moment diagram and its salient features illustration in cantilever beam, simply supported beam and over hanging beam under point load and uniformly distributed load

5.0 *Theory of simple bending*

5.1 Assumptions in the theory of bending,

5.2 Bending equation, Moment of resistance, Section modulus& neutral axis.

5.3 Solve simple problems.

6.0 *Combined direct & bending stresses*

6.1 Define column

6.2 Axial load, Eccentric load on column,

6.3 Direct stresses, Bending stresses, Maximum& Minimum stresses. Numerical problems on above.

6.4 Buckling load computation using Euler's formula (no derivation) in Columns with various end conditions

7.0 *Torsion*

7.0 Assumption of pure torsion

7.1 The torsion equation for solid and hollow circular shaft

7.2 Comparison between solid and hollow shaft subjected to pure torsion

Syllabus to be covered up to I.A - Chapters 1, 2, 3&4

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	S Ramamrutham	Strength of Materials	Dhanpat Rai
02	R K Rajput	Strength of Materials	S.Chand
03	R.S khurmi	Strength of Materials	S.Chand
04	G H Ryder	Strength of Materials	Mc millon and co. lmtd
05	S Timoshenko and D H Young	Strength of Materials	TMH

TH-3 ENGINEERING MATERIAL

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/week	IA	20
Maximum marks:	100	End Semester Examination:	80

A. *RATIONALE:*

Entire field of engineering deals with use of host of materials for making objects for human need. These materials include wide spectrum of element, metals, alloys and compounds with diverse properties. It is imperative that an engineer from any field should have a good knowledge of such materials and their properties.

B. *COURSE OBJECTIVES:*

After completion of the course students will have the ability of

- Realizing material requirements
- Realizing application area of ferrous, non ferrous and alloys
- Comprehending micro-structural changes during iron-carbon phase transformation process
- Comprehending effect of heat treatment and its effect towards change in material properties
- Comprehending continuity during evolution in engineering materials and development of modern engineering materials.

C. *CHAPTER WISE DISTRIBUTION OF PERIODS*

Sl. No.	Topic	Periods
01	Engineering materials and their properties	05
02	Ferrous Materials and alloy	05
03	Iron – Carbon system	08
04	Crystal imperfections	10
05	Heat Treatment	10
06	Non-ferrous alloys	10
07	Bearing Material	03
08	Spring materials	03
09	Polymers	03
10	Composites and Ceramics	03
	Total Period:	60

D. COURSE CONTENT:

1.0 *Engineering materials and their properties*

- **1.1** Material classification into ferrous and non ferrous category and alloys
- **1.2** Properties of Materials: Physical , Chemical and Mechanical
- **1.3** Performance requirements
- **1.4** Material reliability and safety

2.0 Ferrous Materials and alloys

- **2.1** Characteristics and application of ferrous materials
- **2.2** Classification, composition and application of low carbon steel, medium carbon steel and High carbon steel
- **2.3** Alloy steel: Low alloy steel, high alloy steel, tool steel and stainless steel
- **2.4** Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo,

3.0 Iron – Carbon system

- **3.1** Concept of phase diagram and cooling curves
- **3.2** Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel

4.0 Crystal imperfections

- **4.1** Crystal defines, classification of crystals, ideal crystal and crystal imperfections
- **4.2** Classification of imperfection: Point defects, line defects, surface defects and volume defects
- **4.3** Types and causes of point defects: Vacancies, Interstitials and impurities
- **4.4** Types and causes of line defects: Edge dislocation and screw dislocation
- **4.5** Effect of imperfection on material properties
- **4.6** Deformation by slip and twinning
- **4.7** Effect of deformation on material properties

5.0 Heat Treatment

- **5.1** Purpose of Heat treatment
- **5.2** Process of heat treatment: Annealing, normalizing, hardening, tampering, stress relieving measures
- **5.3** Surface hardening: Carburizing and Nitriding
- **5.4** Effect of heat treatment on properties of steel
- **5.5** Hardenability of steel

6.0 Non-ferrous alloys

- **6.1** Aluminum alloys: Composition, property and usage of Duralmin, y- alloy.
- **6.2** Copper alloys: Composition, property and usage of Copper-Aluminum, Copper-Tin, Babbit , Phosperous bronze, brass, Copper- Nickel
- **6.3** Predominating elements of lead alloys, Zinc alloys and Nickel alloys
- **6.4** Low alloy materials like P-91, P-22 for power plants and other

high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.

7.0 Bearing Material

7.1 Classification, composition, properties and uses of Copper base, Tin Base, Lead base, Cadmium base bearing materials

8.0 Spring materials

8.1 Classification, composition, properties and uses of Iron-base and Copper base spring material

9.0 Polymers

9.1 Properties and application of thermosetting and thermoplastic polymers

9.2 Properties of elastomers

10.0 Composites and Ceramics

10.1 Classification, composition, properties and uses of particulate based and fiber reinforced composites

10.2 Classification and uses of ceramics

Syllabus to be covered up to I.A - Chapters 1, 2, 3, 4&5

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	O P Khanna	A Textbook of Material Science and Metallurgy	Dhantpat Rai
02	R K Rajput	Engineering materials and Metallurgy	S.Chand
03	S K Hazra choudhry	Material science & process	Imdian Book Distrubuting

TH - 4 THERMAL ENGINEERING-I

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches/E&M**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/week	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. *RATIONALE:*

Thermal Engineering is the field of applied science which deals with energy possessed by heated gases and the laws which give the conversion of this energy into mechanical energy and vice versa

B. *COURSE OBJECTIVES:*

After the completion of the course the students will develop ability towards.

- Comprehending significance of thermodynamics properties in order to analyze a Thermodynamic system.
- Comprehending & applying first & second law of thermodynamics in closed & open system.
- Comprehending & applying gas laws applicable to perfect gas in order to determine Thermodynamic properties.
- Comprehending the concept of I.C engine and gas power cycle & computing work done & efficiency thereof.

C. *CHAPTER WISE DISTRIBUTION OF PERIODS*

Sl. No.	Topic	Periods
01	Thermodynamic concept & Terminology	12
02	Laws of Thermodynamics	12
03	Properties Processes of perfect gas	10
04	Internal combustion engine	08
05	Air Standard Cycle	10
06	Fuels and Combustion	08
	Total Period:	60

D. COURSE CONTENT:

1. *Thermodynamic concept & Terminology*

1.1 Thermodynamic Systems (closed, open, isolated)
1.2 Thermodynamic properties of a system (pressure, volume, temperature, entropy, enthalpy, Internal energy and units of measurement).
1.3 Intensive and extensive properties
1.4 Define thermodynamic processes, path, cycle , state, path function, point function.
1.5 Thermodynamic Equilibrium.
1.6 Quasi-static Process.
1.7 Conceptual explanation of energy and its sources
1.8 Work , heat and comparison between the two.
1.9 Mechanical Equivalent of Heat.
1.10Work transfer, Displacement work

2. *Laws of Thermodynamics*

2.1 State & explain Zeroth law of thermodynamics.

2.2 State & explain First law of thermodynamics.
2.3 Limitations of First law of thermodynamics
2.4 Application of First law of Thermodynamics (steady flow energy equation and its application to turbine and compressor)
2.4 Second law of thermodynamics (Claucius & Kelvin Plank statements).
2.5 Application of second law in heat engine, heat pump, refrigerator & determination of efficiencies & C.O.P (solve simple numerical)

3. *Properties Processes of perfect gas*

3.1 Laws of perfect gas:
Boyle's law, Charle's law, Avogadro's law, Dalton's law of partial pressure, Guy lussac law, General gas equation, characteristic gas constant, Universal gas constant.
3.2 Explain specific heat of gas (Cp and Cv)
3.3 Relation between Cp & Cv.
3.4 Enthalpy of a gas.
3.5 Work done during a non- flow process.
3.6 Application of first law of thermodynamics to various non flow process (Isothermal, Isobaric, Isentropic and polytrophic process)
3.6 Solve simple problems on above.
3.7 Free expansion & throttling process.

4. *Internal combustion engine*

4.1 Explain & classify I.C engine.
4.2 Terminology of I.C Engine such as bore, dead centers, stroke volume, piston speed &RPM.
4.3 Explain the working principle of 2-stroke & 4- stroke engine C.I & S.I engine.
4.4 Differentiate between 2-stroke & 4- stroke engine C.I & S.I engine.

5. *Gas Power Cycle*

5.1 Carnot cycle
5.2 Otto cycle.
5.3 Diesel cycle.
5.4 Dual cycle.
5.5 Solve simple numerical.

6. *Fuels and Combustion*

6.1 Define Fuel.
6.2 Types of fuel.
6.3 Application of different types of fuel.
6.4 Heating values of fuel.
6.5 Quality of I.C engine fuels Octane number, Cetane number.

Syllabus to be covered up to I.A - Chapters 1, 2&3

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	R.S. Khurmi	Thermal Engineering	S.Chand
02	A.R.Basu	Thermal Engineering	Dhanpat Rai
03	A.S. Sarao	Thermal Engineering	Satya Prakash
04	P.K.Nag	Engineering Thermodynamics	TMH
05	Mahesh M Rathore	Thermal Engineering	TMH

TH.5 ENVIRONMENTAL STUDIES

(Common to All Branches)

Theory: 4 Periods per Week — I.A: 20 Marks
Total Periods: 60 Periods — End Exam : 80 Marks
Examination: 3 Hours — TOTAL MARKS : 100 Marks

A. RATIONALE:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every student in order to take care of the environmental aspect in each and every activity in the best possible manner.

B. OBJECTIVES:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	The Multidisciplinary nature of environmental studies	04
2	Natural Resources	10
3	Systems	08
4	Biodiversity and it's Conservation	08
5	Environmental Pollution.	12
6	Social issues and the Environment	10
7	Human population and the environment	08
	Total:	**60**

D.COURSE CONTENT:

Unit 1: The Multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness.

Unit 2: Natural Resources

Renewable and non renewable resources:

a) Natural resources and associated problems.
    - Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
    - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
    - Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
    - Food Resources: World food problems ,changes caused by agriculture and overgrazing,effectsofmodernagriculture,fertilizers-pesticidesproblems, water logging, salinity,.
    - Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
    - Land Resources: Land as a resource ,land degradation ,man induces landslides, soil erosion, and desertification.
b) Role of individual in conservation of natural resources.
c) Equitable use of resources for sustainable lifestyles.

Unit 3: Systems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers, decomposers.
- Energy flow in the ecosystems.
- Ecological succession.
- Food chains, food web sand ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem:
- Forest ecosystem:
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and it's Conservation

- Introduction-Definition: genetics, species and ecosystem diversity.
- Biogeographically classification of India.
- Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and opt in values.
- Biodiversity at global, national and local level.
- Threats to biodiversity: Habitats loss, poaching of wild life, man wildlife conflicts.

Unit 5: Environmental Pollution.

Definition Causes, effects and control measures of:

a) Air pollution.
b) Water pollution.
c) Soil pollution
d) Marine pollution

e) Noise pollution.
f) Thermal pollution
g) Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Disaster management: Floods, earth quake, cyclone and landslides.

Unit 6: Social issues and the Environment

From unsustainable to sustainable development**.**

- Urban problems related to energy.
- Water conservation, rain water harvesting, water shed management.
- Resettlement and rehabilitation of people; its problems and concern.
- Environmental ethics: issue and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
- Air (prevention and control of pollution) Act.
- Water (prevention and control of pollution) Act.
- Public awareness.

Unit 7: Human population and the environment

- Population growth and variation among nations.
- Population explosion-family welfare program.
- Environment and human health.
- Human rights.
- Value education
- Role of information technology in environment and human health.

Syllabus to be covered up to I.A **Units 1, 2, 3**

Learning Resources:			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1	Text book of Environmental studies	Erach Bharucha	#UGC
2	Fundamental concepts in Environmental Studies	,D.D .Mishra	S. Chand&Co-Ltd
3	Textbook of Environmental Studies	K.Raghavan Nambiar	SCITECH Publication Pvt.Ltd.
4	Environmental Engineering	V.M.Domkundwar	- DhanpatRai&Co

MECHANICAL ENGINEERING DRAWING (PR-1)

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	90	Examination	3 hrs
Lab Periods:	6 P/week	Sessional:	25
Maximum marks:	75	End Semester Examination:	50

COURSE OBJECTIVES:-

Students will develop ability towards

- Recognizing significance of standardized representations
- Comprehending role of various fastening elements and offer engineering drawing thereof in manual mode
- Comprehending geometrical constraints and function of components in assemblies such as bearings and screw jack
- Comprehending functional requirement of major components and offer engineering drawing in manual mode thereof.

Chapter **Contents**

1.0 Revision of Engineering Drawing of 1st Year

2.0 Draw plan, elevation and side view of different machine elements from their isometric view using AutoCAD & mini drafter (Minimum 5 Drawings).

3.0 Engineering drawing of fastening elements in first angle orthographic Projection

3.1 Bolt, nut and threads

3.2 Cotter joint

3.3 Knuckle joint

4.0 Details to assembly

4.1 Rigid pedestal bearing

4.2 Foot step bearing

4.3 Simple Screw jack

5.0 Assembly to details

5.1 Connecting rod of IC Engine

5.2 Boiler safety valve

5.3 Spring loaded valve

5.4 Hydraulic non return valve

5.5 Flat belt pulley

Learning Resources:

Sl No.	Author Name	Name of the Book	Publisher Name
1	N D Bhatt	Machine Drawing	Charotar
2	T Jones	Machine Drawing	Kalyani
3	R K Dhawan	Machine Drawing	S.Chand
4	T. Jeypooven	Emgg. Graphics using Autocad	CBS

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Lab. periods:	4 P/week	Sessional	25
Maximum marks:	75	End Semester Examination:	50

COURSE OBJECTIVES

Students will develop ability towards

- Conducting experimentations to determine properties of a solid material subject to uniaxial loading and impact
- Conducting experimentations towards determining characteristics of a fuel
- Study of equipment employing using fuels.

1. Strength of Materials and thermal Laboratory

1.1 Determine end reactions in a simply supported beam using parallel force apparatus.

1.2 Determination of Young's modulus using Searle's apparatus

1.3 Determination of torsional rigidity of the shaft using torsion testing machine

1.4 Determination of salient points (Young's modulus, yield point, fracture point) from stress- strain curve using Universal Testing Machine

1.5 Determination of hardness number by Rockwell/Vickers hardness testing machine

1.6 Determination of toughness using Impact testing machine (Charpy/Izod)

1.7 Determination of Flash point and fire point

1.8 Joule's experiment

WORKSHOP PRACTICE-II (PRACTICAL-3)

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P/week	Sessional	50
Maximum marks:	100	End Semester Examination:	50

COURSE OBJECTIVES:-

Students will develop ability towards

- Practicing fitting, carpentry, smithy and machining
- Understanding the tools and equipment used in the practices
- Realize the time and resource utilization in the practices

1. *Fitting practices*

1.1 Preparation of caliper
1.2 Preparation of try square
1.3 Preparation of hammer, square , Hexagonal

2. *Smithy Practices*

2.1 Preparation of door ring with hook
2.2 Preparation of hexagonal head bolt
2.3 Preparation of octagonal flat chisel

3 *Carpentry Practices*

3.1 Cutting of slot, botch, mortise and Tenon Joint
3.2 Preparation of single dove tail joint

4 *Welding Practice*

4.1 Lap & Butt Joint using Arc Welding
4.2 Lap Joint using Gas Welding
4.3 Joining Two non-ferrous parts through

LIST OF EQUIPMENTS OF MECHANICAL ENGG. LABORATORY

Sl No	NAME OF THE EQUIPMENT	Quantity
1	PARALLEL FORCE APPARATUS	2 Nos.
2	SEARLE'S APPARATUS	2 Nos.
3	TORSION TESTING MACHINE	1 Nos.
4	DIGITAL UNIVERSAL TESTING MACHINE	1 Nos.
5	HARDNESS TESTING MACHINE	1 Nos.
6	IMPACT TESTING MACHINE	1 Nos.
7	FLASH POINT AND FIRE POINT APPARATUS	1 Nos.
8	JOULES APPARATUS	1 Nos.

LIST OF EQUIPMENTS OF WORKSHOP PRACTICE

WELDING SHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	OXYGEN CYLINDER	01 No.
02	ACETYLENE CYLINDER	01 No.
03	PRESSURE GAUSES	02 Nos
04	PRESSURE REGULATOR	02 Nos.
05	WELDING TORCH	01 No.
06	GOGGLES	10 Nos.
07	HOSE PIPES	10 Meters
08	AC WELDING TRANSFORMER SET	01 No.
09	CHIPPING BRUSH	02 Nos.
10	WIRE BRUSH	02 Nos.
11	ARC SHIELD (EYE PROTECTOR)	05 Nos.
12	MIG / TIG WELDING MACHINE	01 Nos.

CARPENTRY SHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	STEEL RULE (SCALE) 1 Meter	10 Nos.
02	SCRIBER	10 Nos.
03	MARKING GAUGE	05 Nos.
04	MORTISE GAUGE	05 Nos.
05	TRY SQURE	10 Nos.
06	DIVIDERS	10 Nos.
07	RIP SAW	10 Nos.
08	COPING SAW	10 Nos.
09	FIRMAR CHIESEL	10 Nos.
10	GAUGE CHIESEL	02 Nos.
11	IRON JACK PLANE	02 Nos.
12	TRYING PLANE	05 Nos.
13	RASP	05 Nos.
14	HAND DRILL	05 Nos.
15	GIMLET DRILL	02 Nos.
16	CLAMPING VICE	10 Nos.
17	C-CLAMP	05 Nos.
18	CROSS PEAN HAMMER	05 Nos.
19	CLAW HAMMER	10 Nos.
20	MALLET	05 Nos.
21	WOOD WORKING LATHE	01 No.
22	CIRCULAR SAW	01 No.

FITTING SHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	BENCH VICE	20 Nos.
02	PIPE VICE	04 Nos.
03	TRY SQURE	10 Nos.
04	SCRIBER & SUEFACE GAUGE	10 Nos.
05	DOT PUNCH	10 Nos.
06	CENTRE PUNCH	10 Nos.
07	SURFACE PLATE	01 No.
08	ANGLE PLATE	01 No.
09	STEEL RULE	10 Nos.
10	VERNIER CALLIPERS	05 Nos.
11	MICROMETRE	05 Nos.
12	DIVIDERS	10 Nos.
13	OUTSIDE CALLIPERS	10 Nos.
14	INSIDE CALLIPERS	05 Nos.
15	FEELER GAUGE	01 No.
16	VERNIER HEIGHT GAUGE	01 No.
17	HACKSAW (FIXED FRAME)	10 Nos.
18	ROUND FILE	10 Nos.
19	SINGLE CUT FILE	10 Nos.
20	DOUBLE CUT FILE	10 Nos.
21	BALL PEAN HAMMER	05 Nos.
22	TAP WRENCH	01 No.
23	HAND DRILLING M/C	01 No.
24	PORTABLE GRINDER	01 o.

BLACKSMITHY SHOP

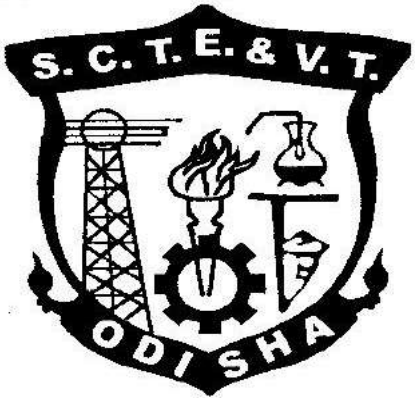
SL. NO.	NAME OF ITEM	QUANTITY
01	FURNACE OF HEARTH (WITH CENTRE BLOWER)	05 Nos.
02	SHOWEL	05 Nos.
03	POKER	05 Nos.
04	ANVIL	05 Nos.
05	SCEDGE HAMMER	05 Nos.
06	PICK UP TONG	10 Nos.
07	CHIESEL TONG	05 Nos.
08	CLOSE FLAT TONG	05 Nos.
09	PINUR TONG	05 Nos.
10	HOT CHIESEL	05 Nos.
11	COLD CHIESEL	05 Nos.
12	DRIFT	02 Nos.
13	SWAGE BLOCK	01 No.
14	BALL PEAN HAMMER	05 Nos.
15	CROSS PEAN HAMMER	05 Nos.

CURRICULLUM OF 3RD SEMESTER

For

DIPLOMA IN MINING ENGINEERING

(Effective FROM 2019-20 Sessions)



STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING,ODISHA, BHUBANESWAR

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING,ORISSA

TEACHING AND EVALUTION SCHEME FOR 3rd Semester(Branch Name- Mining)(w e f 2019-20)

SUBJECT NUMBER	SUBJECT CODE	SUBJECT	Periods/Week			Evaluation Scheme			
			L	T	P	Internal assessment /Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th .1		Surface Mining Technology	4			20	80	3	100
Th .2		Mine Survey -I	4			20	80	3	100
Th .3		Mine Geology -I	4			20	80	3	100
Th. 4		Mechanical Operation in Mines	4			20	80	3	100
Th. 5		Environmental Studies	4			20	80	3	100
		Total	20			100	400		500
		Practical							
Pr .1		Mine Survey -I LAB			6	50	50		100
Pr .2		Mine Geology -I LAB			6	50	50		100
Pr .3		Mechanical Operation in Mines LAB			6	25	25		50
		Student Centred Activities(SCA)			1				
		Total			19	125	125		250
		Grand Total	20		19	225	525		750

Abbreviations : L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration.

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/Personality Development/Environmental issues /Quiz/Hobbies/Field visits/Cultural Activities/Library Studies/Classes on MOOCS/SWAYAMetc. . SCA shall be conducted in a section.

There shall be 1 Internal Assesment done for each of Theory subject .Sessional Marks shall be total of the performance of individual different jobs/experiments in a subject throughoutthe semester. Industry/Mines Exposure Training can be conducted during semester break after 2nd semester and/or 4th semester.

Th.1. SURFACE MINING TECHNOLOGY

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

A. RATIONALE

As a Mining Engineer, one has to develop the basic concepts and principles of winning and working in mines. Further, he should have basic knowledge of explosives fordevelopment of mines.

B. OBJECTIVES

On completion of the subject, students will be able to :

- Develop the concept of choice of Opencast Mining.
- Determine bench parameters.
- Define slope stability and types, prevention of Slope failure.
- Explain various compositions, properties of Explosives and Blasting accessories.
- State and explain different drilling methods.
- Explain blasting practice in Mines.
- Describe blasting techniques as per statutory provisions.
- Identify basic constructional features and safety provisions of magazine.

Topic- wise distribution of periods

CHAPTER	TOPICS	PERIODS
1	Choice of opencast Mining	10
2	Benching	5
3	Slope stability	6
4	Explosive and Blasting Accessories	11
5	Drilling	8
6	Blasting practices in Mines	10
7	Control Blasting as per statutory provision	6
8	Magazine	4
	Total	60

COURSE CONTENTS (Based on specific objectives).

1. Choice of Opencast Mining

- State factors affecting choice of Open casting Mining method.
- Define stripping ratio.
- Determine overburden/ore ratio.
- Find out cut off stripping ratio.
- Determine quarriable limit.
- State favorable conditions for mechanized Opencast Mines.
- State limitations of large open pits.
- Define Box cut and determine the location of Box cut.

2. Benching

- Determine bench parameters- height, width & slope.
- Determine length of bench for overburden and ore.

3. Slope Stability

- Define slope stability.
- Factors affecting slope stability.
- Types of slope stability.
- Causes and prevention of slope stability.

4. Explosive and blasting accessories

- Define explosive, state constituents of explosives , properties & characteristics of explosives.
- Classify explosives, state composition and uses of explosives.
- Explain PMS and SMS.
- Define permitted explosive and classify permitted explosive.
- Explain sheathed, equivalent sheathed and ultra safe explosive.
- State properties of permitted explosives.
- State composition & constructional features of safety fuse, detonating fuse, detonating relay, igniter cord, nonel and raydet..
- Describe different types of detonators and uses, state advantages of delay detonators.
- State different types of exploder, its construction and safety features, circuit tester.
- Describe stemming rod, crack detector knife, crimper.

5. Drilling

- Explain different principles and methods of exploratory drilling in surface mining.
- State different types of drill used in Opencast mining.
- Describe simple constructional features of churn drill, drills master, wagon drill and jack hammer.
- State D.T.H..
- Describe different types of drill bits in drilling.

6. Blasting practices in Mines

- Describe preparation of charge.
- State procedure of firing shots, direct and inverse initiation, stemming materials, water ampoules, cushion firing.
- Define blasting efficiency.
- State and describe plaster shooting and pop shooting, toe blasting.

7. Controlled Blasting Techniques as per statutory provision

- State and describe pre-splitting, cushion blasting, muffle blasting, coyote hole blasting, chambered hole blasting, directional blasting, Electronics Blasting System (EBS) .

8. Magazines

- Describe layout and arrangement of different types of magazines, state their safety features.

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SYLLABUS COVERAGE UP TO I.A

Chapter 1,2,3,4.

Learning Resourses:		
Sl. No.	Title of the Book	Name of Authors
1	Surface Mining Technology	S.K. DAS
2	Blasting Manuals	Sandhu & Pradhan
3	Blasting Practices in Mines	S.K. DAS
4	EMT VOL I	D.J. DESHMUKH
5	Surface Mining	G.B. Mishra
6	SME Handbook	

Th .2. MINE SURVEY - I

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

A. RATIONALE :

Before starting the actual mining operation, it is essential for mining engineer to first survey the piece ofland where mining operation is contemplated. This is not possible without the knowledge of mine surveying.

B. OBJECTIVES:

On completion of the subject, students will be able to :

- Explain different chains and their use in the field.
- Explain prismatic compass and surveyor's compass and determine magnetic meridian. Explain local attraction and make necessary correction.
- Outline knowledge regarding plane table survey in the field.
- Describe general methods of determining areas.
- Describe various leveling methods.
- Describe different methods of calculating ore reserves by materials balance and decline curve way.
- Describe the application of theodolites in surveying, micro-optic and seconds theodolite.

C. Topic wise distribution of periods

CHAPTER	TOPICS	PERIODS
1	Chain Survey	10
2	Compass Survey	8
3	Plane Table Survey	8
4	Computataion of Areas	8
5	Levelling	10
6	Calculation of ore reserves	8
7	Theodolite	8
	TOTAL	60

D.COURSE CONTENTS (Based on Specific objectives)

1. Chain Survey

- Give survey conventional signs, abbreviation used.
- Give standards of lining, inking and coloring.
- Describe selection of scales used.
- Explain principle of chain surveying.
- Describe instruments used and checking their correctness.
- Explain ranging and chaining of a line.
- Calculate errors in chaining.
- Explain obstruction while chaining.
- Describe chaining along a sloping ground.
- Describe use of optical square and line range and checking optical square for correctness.
- Describe offsets and their measurements.
- Give reference sketches of stations.
- Give procedure of chain surveying.
- Explain field booking and plotting of chain survey.

2. Compass Survey

- Describe prismatic compass, its adjustments and use.
- Explain true meridians, magnetic meridian, grid line meridian and arbitrary meridian.
- Explain W.C.B. and Q.B. and conversion from one to other
- Find out fore and back bearing and their conversion.
- Compute angles from bearing and bearing angles
- Define local alteration
- Determine local alteration and necessary correction to the bearing.
- Explain closed and open compass surveying and its plotting.
- Give procedure of field booking in compass and chain traverses.
- Explain adjustment of closing error in compass traversing.
- Describe surveyor compass(miner's dial),its adjustment and use
- Compare prismatic compass with surveyor compass.

3. Plane Table Survey.

- Fundamentals of Plane Table Survey.
- Explain two point problems.
- Explain three point problems and its solution by tracing paper method.
- Describe advantages and disadvantages of plane table.

4. Computation of areas

- Explain methods of determining areas.
- Find out areas from offset to a base line using
  - Mid ordinate rule
  - Average ordinate rule
  - Trapezoidal rule
  - Simpson's rule
- Compute area by Planimeter and from graph paper.

5 Leveling

- Define benchmark M.S.L. Dumpy level.
- Adjust dumpy level, modern levels (Auto Level & etc.), and precise staff.
- Describe methods of leveling- Rise & fall method, height of instrument.
- Errors in ordinary leveling.
- Explain reciprocal leveling, subsidence leveling, setting out gradient, trigonometric leveling, geometrical leveling, and physical leveling.

6 Calculation of Ore Reserves

- Classify reserves.
- Evaluate reserves by exploratory .
- Calculate primary ore reserve by material balance method & decline curve method.

7 Theodolite

- Describe temporary and permanent adjustment of Theodolite.
- Describe the principles of operation & describe different parts.
- Measure Horizontal & Vertical angles.
- Describe setting of the instrument.
- Explain Traversing with Theodolite.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2,3,4

Learning Resourses:		
Sl. No.	Title of the Book	Name of Authors
1	Textbook of Surveying	B.C. Punmia Vol I & II
2	Textbook of Surveying	T.P Kanetkar

Th.3 MINE GEOLOGY - I

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

A. RATIONALE :

In majority of the cases, materials that need to be mined in order to reach the hidden treasure are rocks and minerals. It is therefore, essential for a mining engineer to have the basic knowledge of geology.

B.OBJECTIVES:

On completion of the course, students will be able to:

- Explain the dynamic natural agencies that are constantly moulding the landscape of earth. He will be able to visualize the erosional and depositional landforms created by natural agencies.
- Distinguish between Igneous, Sedimentary and Metamorphic rocks and their texture and structures.
- Distinguish and identify the various structures that one may encounter in the field.
- Underline the importance of crystal structures in the identification and study of minerals.
- Identify minerals based on their physical properties. They will possess a sound knowledge of silicate structures.
- Identify different rocks in the laboratory.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Physical Geology	15
2	Petrology	12
3	Structural Geology	6
4	Elements of Crystallography	12
5	Elements of Mineralogy	15
	Total	60

C. COURSE CONTENTS (Based on specific objectives)

1. Physical Geology

- Define weathering and erosion.
- Explain with suitable sketches the erosional and depositional land forms produced by wind.
- Explain with neat sketches the erosional and depositional land forms produced by river.
- Differentiate between glacier and iceberg

- Describe the erosional and depositional features produced by glacier.
- Define moraine. Describe the different type of moraine with sketches.

2. Petrology

- Define a Rock. Distinguish between a rock and a mineral.
- Define Igneous, Sedimentary and Metamorphic rocks.
- Describe the various textures and structures found in Igneous rocks.
- Describe some important structures of sedimentary rocks along with neat sketches.
- Describe various structure found in metamorphic rocks.

3. Structural Geology

- Define Dip. Distinguish between true dip and apparent dip.
- Define strike.
- Define folds. Classify folds and describe them.
- Define faults. Describe the various types of fault.
- Define unconformity. Describe the various type of unconformity with neat sketches.
- Define joints. Describe various joints.

4. Element of Crystallography

- Define a crystal.
- Explain Miller's indices.
- Describe the Symmetry elements and forms present in the normal class of isometric system.

5. Elements of Mineralogy

- Define a mineral.
- Enumerate and describe the physical properties of minerals.
- Describe various optical properties of minerals.
- Explain briefly the silicate structures along with diagrams.
- Classify minerals.
- Describe mineralogy and physical properties of Olivine, Quartz, Feldspar and Pyroxene group of minerals.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2,3

Learning Resourses:		
Sl. No.	Title of the Book	Name of Authors
1	Textbook of Geology	P.K Mukharjee
2	Textbook of Geology	G.B. Mohapatra
3	Ruttley's Elements of Mineralogy	H.H. Reid
4	Petrology	G.W. Tyrrel
5	Structural Geology	M.P. Billings
6	Structural Geology of Rocks at Regions	H.Davids,J Reynolds

Th. 4 MECHANICAL OPERATIONS IN MINE

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

A. RATIONALE :

As Mining Engineer it is essential to have the fundamental concept of mechanical engineering specially related to working of machines, which are used in mines.

: B.OBJECTIVES:

On completion of the subject, students will be able to:

- Describe the concept of stress, strain, bending moment and shear force, torsion with power transmission.
- Explain Fluid static's and dynamics with solution of problems.
- Explain the use of compressed air and different types of air compressor.
- Explain the concept of Internal Combustion engines.

C. Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Strength of Materials & Power Transmission	20
2	Elements of Hydraulics	15
3	Compressed Air	15
4	Internal Combustion Engines	10
	Total	60

D. COURSE CONTENTS (Based on Specific Objectives)

1. Strength of Materials and Power Transmission.

- Define
  - Elasticity
  - Hook's Law
  - Limit of Proportionality.
  - Young's Modulus
  - Factor of safety. Lateral strain and Poisson's ratio.
- Explain stress-strain curve for ductile materials.
- Explain the effect of axial load on bar of
  - Uniform section
  - Variable section
- Solve numerical problems on above
- Define bending moment and shear force.
- State types of beam and types of loading.
- Explain shear force diagram and bending moment diagram for
  - Cantilever with concentrated loading.

        - Cantilever with U.D.I. over whole span.
        - Simply supported beam with concentration loading.
        - Simply supported beam with U.D.I. over whole span.
    - State bending formula.
    - Define section modules.
        - Find out section modules for beam section of simple cases.
    - Define torsion and state its effects.
    - State application of torsion formula.
    - Explain working of
        - Shaft couplings such as hydraulic and magnetic couplings.
        - Belt, chain and rope Drive.
        - Simple and compound gear train.
        - Torque converters.
    - State function of flywheel and governors.
    - Explain working of watt, purler and proel governors.

2. Elements of Hydraulics.

- State various fluid properties.
- Define pressure of fluid and pressure head.
- State and explain working principle of various pressure measuring devices such as:
    - Pieccometer tube.
- State and explain continuity equation.
- State and explain Bernoulli's theorem.
- Explain working of venturimeter.
- Solve numerical problems on above.
- Define and classify orifices.
- State the formula and discharge for rectangular orifices and solve problems.
- Define and differentiate between orifice and notch.
- Classify notches.
- State formula for discharge through notches & solve problem on above.
- State and explain laws of fluid friction.
- State and explain loss of head due to friction (Darcy weisbach formula)
- Explain hydraulic gradient and energy gradient.
- Solve numerical problems as above.

3. Compressed Air

- Explain introduction of compressed air as a power.
- Classify Compressor & state working principle.
- State the various methods of transmission and storage of compressed air.
- State and explain the advantages of use of compressed air in mines.
- Explain the working principle of pneumatic machines.

4. Internal Combustion Engines

- Explain various air cycles utilized in I/C Engines such as:
    - OTTO Cycle.
    - Diesel Cycle.
- Explain working principle of 2 stroke and 4 stroke petrol and diesel engines.
- Define I.H.P., B.H.P. & Mechanical efficiency of I/C Engine.
- State various applications of I/C Engines in Mining field.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2

Learning Resourses:		
Sl. No.	Title of the Book	Name of Authors
1	Strength of Materials	Ramrutham
2	Applied Mechanics	Khurmi & Gupta
3	Fluid Mechanics	Ramrutham
4	Thermal Engineering	Rav Saro

Th5. ENVIRONMENTAL STUDIES

(Common to all Branches)

Name of the Course: Diploma in Electrical Engineering			
Course code:		Semester	3rd
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. RATIONALE:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every student in order to take care of the environmental aspect in each and every activity in the best possible manner.

B. OBJECTIVE:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	The Multidisciplinary nature of environmental studies	04
2	Natural Resources	10
3	Systems	08
4	Biodiversity and it ' s Conservation	08
5	Environmental Pollution	12
6	Social issues and the Environment	10
7	Human population and the environment	08
	Total:	**60**

D. COURSE CONTENTS

1. The Multidisciplinary nature of environmental studies:

1.1 Definition, scope and importance.

1.2 Need for public awareness.

2. Natural Resources:

Renewable and non renewable resources:

a) Natural resources and associated problems.

2.1.1. Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects onforests andtribalpeople.

2.1.2. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam' s benefits and problems.

2.1.3. Mineral Resources: Use and exploitation, environmental effects of extracting and using mineralresources.

2.1.4. Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity,.

2.1.5. Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

2.1.6. Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, anddesertification.

b) Role of individual in conservation of natural resources.

c) Equitable use of resources for sustainable life styles.

3. **Systems:**

3.1. Concept of an eco system.
3.2. Structure and function of an eco system.
3.3. Producers, consumers, decomposers.
3.4. Energy flow in the eco systems.
3.5. Ecological succession.
3.6. Food chains, food webs and ecological pyramids.
3.7. Introduction, types, characteristic features, structure and function of the following eco system:
3.8. Forest ecosystem:
3.9. Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).

4. **Biodiversity and it' s Conservation:**

4.1. Introduction-Definition: genetics, species and ecosystem diversity.
4.2. Biogeographically classification of India.
4.3. Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and optin values.
4.4. Biodiversity at global, national and local level.
4.5. Threats to biodiversity: Habitats loss, poaching of wild life, man wildlife conflicts.

5. **Environmental Pollution:**

5.1. Definition Causes, effects and control measures of:

a) Air pollution.
b) Water pollution.
c) Soil pollution
d) Marine pollution
e) Noise pollution.
f) Thermal pollution
g) Nuclear hazards.

5.2. Solid waste Management: Causes, effects and control measures of urban

and industrial wastes.

5.3. Role of an individual in prevention of pollution.

5.4. Disaster management: Floods, earth quake, cyclone and landslides.

6. Social issues and the Environment:

6.1. Form unsustainable to sustainable development.
6.2. Urban problems related to energy.
6.3. Water conservation, rain water harvesting, water shed management.
6.4. Resettlement and rehabilitation of people; its problems and concern.
6.5. Environmental ethics: issue and possible solutions.
6.6. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
6.7. Air (prevention and control of pollution) Act.
6.8. Water (prevention and control of pollution) Act.
6.9. Public awareness.

7. Human population and the environment:

7.1. Population growth and variation among nations.
7.2. Population explosion- family welfare program.
7.3. Environment and humanhealth.
7.4. Human rights.
7.5. Value education
7.6. Role of information technology in environment and human health.

Syllabus coverage up to Internal assessment

Chapters: 1, 2 and 3.

Learning Resources:

Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Textbook of Environmental studies	Erach Bharucha	#UGC
2.	Fundamental concepts in Environmental Studies	D.D. Mishra	S.Chand & Co-Ltd
3.	Text book of Environmental Studies	K.Raghavan Nambiar	SCITECH Publication Pvt.Ltd.
4.	Environmental Engineering	V.M.Domkundwar	Dhanpat Rai & Co

Pr.1. MINE SURVEY – I LAB

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	90	Examination	3 hrs
Theory Periods:	6P/week	Internal Assessment	50
Maximum Marks:	100	End Semester Examination	50

A. RATIONALE:

In the field of mining, it will help in all measurements,calculations & mapping at all stages from prospecting to exploitation and utilizing mineral deposits by both surface & undergroundworking.

B. OBJECTIVE:

On completion of lab students will able to :

- Develop a clear idea about Chain survey & Compass survey.
- Know various components of Level and Theodolite & their uses.
- Distinguish methods employed for measurement of horizontal and vertical angle.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Chain Survey	15
2	Compass Survey	15
3	Levels	15
4	Theodolite	15
5	Measurement of Horizontal angle	15
6	Measurement of Vertical angle	15
	Total	90

C. Course Content

1. Chain Survey

- Ranging a line more than 100 m in length and measuring its correct length applying corrections.
- Taking offsets of objects on both sides of a line.
- Plotting the above details.
- Overcoming obstructions in chaining.
  - Vision free, chaining obstructed (Pond, river)
  - Chaining free, vision obstructed (Raising ground)
  - Both vision and chaining obstructed (Building)
- Measuring on sloping ground.
- Chain surveying and plotting of small plot by triangulation.

2. Compass Survey

- Finding bearing of line and applying check.
- Closed traversing of a small plot with station (without intermediate filling)
- Open traversing of a small length with few station (without offsets)
- Plotting both the above traverses applying correction.

3 Levels:

- Temporary and permanent adjustment, sensitivity of bubble tube practice with different types of level(Auto Level & etc.)

4. Temporary & permanent adjustment of theodolite.

5. Measurement of horizontal angle by reiteration and repetition methods.

6. Measurement of vertical angle

Pr.2. MINE GEOLOGY – I LAB

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	90	Examination	3 hrs
Theory Periods:	6P/week	Internal Assessment	50
Maximum Marks:	100	End Semester Examination	50

A. RATIONALE:

In majority of the cases, materials that need to be explored comprise of rocks & minerals. It is therefore, essential for an engineer to have basic knowledge regarding the composition,structure & texture of both rock and minerals.

B. OBJECTIVE:

On completion of Lab students will able to:

- Identify ore forming & rock forming minerals.
- Determine specific gravity of minerals by workers steel yard balance.
- Analyze thin section of minerals and rocks under microscope.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Identification of Minerals	30
2	Specific Gravity by Steel yard Balance	30
3	Analysis of Thin section of Minerals and Rocks	30
	Total	90

C.Course Content:

- Identification of rock forming and ore minerals in hand specimens.
- Determinations of specific gravity by workers steel yard balance.
- Analysis of thin sections of minerals and rocks under the microscopes.

Pr.3 . MECHANICAL OPERATION IN MINES

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	90	Examination	3 hrs
Theory Periods:	6P/week	Internal Assessment	25
Maximum Marks:	50	End Semester Examination	25

A. RATIONALE

As mechanisation is a common trend now-a-days in mining sector.So as a mining engineer, one should have some fundamental knowledge regarding the machines used in mines.

B.OBJECTIVE:

On the completion of Lab students will able to:

- Know application of Bernouli's Theorem
- Determine velocity of air
- Determine volumetric efficiency of air compressor.
- Distinguish construction and working procedure of 2- stroke and 4 - stroke diesel engine.
- Describe I.C. Engine Test.

Topic wise Distribution of Periods

○

CHAPTER	TOPIC	PERIODS
V 1	Verify Bernoulli's Theorem	15
e r 2	Determine rate of flow of air	15
i f 3	Conduct Tensile test of a mild steel specimen	15
y c 4	Determine volumetric efficiency of Air compressor	15
5	Study of 2-Stroke and 4-Stroke diesel engines	15
6	Conduct of I.C Engine Test	15
	Total	90

C. Course Content:

- Bernoulli's Theorem by Bernoulli's Verification Apparatus.
- Determine rate of flow through the venturimeter set-up.

- Conduct tensile test of a mild steel specimen and plot stress-stain curve, show salient points on it.
- Determine volumetric efficiency of air- compressor.
- Study of 2-stroke & 4-stroke diesel engines.
- Conduct I/C engine testing on single cylinder diesel engine & find out I.H.P., B.H.P. & mechanical efficiency.

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 4th Semester (Mechanical Engg.) (wef. 2019-20)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Theory of Machine	4		-	20	80	3	100
Th.2		Manufacturing Technology	4		-	20	80	3	100
Th.3		Fluid Mechanics	4		-	20	80	3	100
Th.4		Thermal Engg-II	4		-	20	80	3	100
		Total	*16*			*80*	*320*	-	*400*
		Practical							
Pr.1		Theory of Machine and Measurement lab	-	-	6	25	75	3	100
Pr.2		Mechanical Engg. Lab-II	-	-	6	25	75	3	100
Pr.3		Workshop-III	-	-	6	50	50	4	100
Pr.4		Technical Seminar			2	50			50
		Student Centered Activities(SCA)		-	3				
		Total	-	-	23	150	200	-	350
		Grand Total	**16**	**-**	**23**	**230**	**520**	**-**	**750**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration									
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%									
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.									

CURRICULLUM OF 4th SEMESTER

For

DIPLOMA IN MECHANICAL ENGINEERING

(Effective FROM 2019-20 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA, BHUBANESWAR

TH 1 - THEORY OF MACHINES

Name of the Course: Diploma in **Mech/Auto/ & Other Mechanical Allied Branches**			
Course code:		Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A.RATIONAL:

Mechanical and Automobile engineering is involved with design, manufacturing and use of various types of machines. Each machine consists of a large number of static and moving parts called mechanisms. Theory of machines is study of such different kind of mechanisms.

B.COURSE OBJECTIVES:

Students will develop an ability towards

- Understanding machine system consisting of different link assemblies as components
- Comprehending Working principle of machine components such as clutch, brakes, bearings based on friction
- Comprehending working principles related to power transmission systems and predicting the work involved and efficiency.
- Comprehending working principle in speed and torque regulating devices such as governor and flywheels
- Determination of amount and position of masses required towards static and dynamic balancing
- Comprehending types and causes of vibration in machines and predicting remedial measures

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	**Topic**	**Periods**
01	Simple Mechanism	08
02	Friction	12
03	Power Transmission	12
04	Governors and Flywheel	12
05	Balancing of Machine	08
06	Vibration of machine parts	08
	Total Period:	**60**

D. CONTENT

1.0 *Simple mechanism*

- **1.1** Link ,kinematic chain, mechanism, machine
- **1.2** Inversion, four bar link mechanism and its inversion
- **1.3** Lower pair and higher pair
- **1.4** Cam and followers

2.0 *Friction*

- **2.1** Friction between nut and screw for square thread, screw jack
- **2.2** Bearing and its classification, Description of roller, needle roller& ball bearings.
- **2.3** Torque transmission in flat pivot& conical pivot bearings.
- **2.4** Flat collar bearing of single and multiple types.
- **2.5** Torque transmission for single and multiple clutches
- **2.6** Working of simple frictional brakes.

2.7 Working of Absorption type of dynamometer

3.0 *Power Transmission*

3.1 Concept of power transmission
3.2 Type of drives, belt, gear and chain drive.
3.3 Computation of velocity ratio, length of belts (open and cross)with and without slip.
3.4 Ratio of belt tensions, centrifugal tension and initial tension.
3.5 Power transmitted by the belt.
3.6 Determine belt thickness and width for given permissible stress for open and crossed belt considering centrifugal tension.
3.7 V-belts and V-belts pulleys.
3.8 Concept of crowning of pulleys.
3.9 Gear drives and its terminology.
3.10 Gear trains, working principle of simple, compound, reverted and epicyclic gear trains.

4.0 *Governors and Flywheel*

4.1 Function of governor
4.2 Classification of governor
4.3 Working of Watt, Porter, Proel and Hartnell governors.
4.4 Conceptual explanation of sensitivity, stability and isochronisms.
4.5 Function of flywheel.
4.6 Comparison between flywheel &governor.
4.7 Fluctuation of energy and coefficient of fluctuation of speed.
4.8 4.8

5.0 *Balancing of Machine*

5.1 Concept of static and dynamic balancing.
5.2 Static balancing of rotating parts.
5.3 Principles of balancing of reciprocating parts.
5.4 Causes and effect of unbalance.
5.5 Difference between static and dynamic balancing

6.0 *Vibration of machine parts*

6.1 Introduction to Vibration and related terms (Amplitude, time period and frequency, cycle)
6.2 Classification of vibration.
6.3 Basic concept of natural, forced & damped vibration
6.4 Torsional and Longitudinal vibration.
6.5 Causes & remedies of vibration.

CHAPTERS COVERED UP TO IA- 1,2,3

Learning Resources:

Sl No.	Name of the Book	Author Name	Publisher
1.	Text Book of Theory of Machine	R.S Khurmi	S.Chand
2.	Text Book of Theory of Machine	R.K. Rajput	S.Chand
3.	Text Book of Theory of Machine	P.L.Ballany	Dhanpat Rai
4.	Text Book of Theory of Machine	Thomas Bevan	Pearsion

TH-2 MANUFACTURING TECHNOLOGY

Name of the Course: Diploma in **Mech/Auto/ & Other Mechanical Allied Branches**			
Course code:		Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONAL:

Engineering basically means production of goods and services for human consumption. The major function of mechanical engineering is to manufacture various products using machineries, production processes and production management techniques. Therefore this is one of the most important subjects to be learned by a mechanical and automobile engineer.

B. COURSE OBJECTIVES:

Students will develop an ability towards

- Comprehending required material properties for cutting tools
- Comprehending machining mechanism principle and factors affecting machining performance
- Comprehendingworkingprincipleandcomponentsinmachiningtoolsincludinglathe,millin g,shaping,planning,slottingmachines
- Comprehendingrequirementofsurfacefinishandrealizeprinciplesinvolvedingrindingands uperfinishingoperations

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Tool Materials	04
02	Cutting Tools	06
03	Lathe Machine	08
04	Shaper	06
05	Planning Machine	06
06	Milling Machine	08
07	Slotter	06
08	Grinding	06
09	Internal Machining operations	06
10	Surface finish, lapping	04
	Total Period:	**60**

D. CONTENT

1.0 *Tool Materials*

1.1 Composition of various tool materials

1.2 Physical properties& uses of such tool materials.

2.1 *Cutting Tools*

2.1 Cutting action of various and tools such as Chisel, hacksaw blade, dies and reamer
2.3 Turning tool geometry and purpose of tool angle
2.5 Machining process parameters (Speed, feed and depth of cut)
2.6 Coolants and lubricants in machining and purpose

3.0 Lathe Machine

3.1 Construction and working of lathe and CNC lathe

- Major components of a lathe and their function
- Operations carried out in a lathe(Turning, thread cutting, taper turning, internal machining, parting off, facing, knurling)
- Safety measures during machining

3.2 Capstan lathe

- Difference with respect to engine lathe
- Major components and their function
- Define multiple tool holders

3.3 Turret Lathe

- Difference with respect to capstan lathe
- Major components and their function

3.4 Draw the tooling layout for preparation of a hexagonal bolt &bush

4.0 *Shaper*

4.1 Potential application areas of a shaper machine
4.2 Major components and their function
4.3 Explain the automatic able feed mechanism
4.4 Explain the construction &working of tool head
4.5 Explain the quick return mechanism through sketch
4.6 State the specification of a shaping machine.

5.0 *Planning Machine*

5.1 Application area of a planer and its difference with respect to shaper
5.2 Major components and their functions
5.3 The table drive mechanism
5.4 Working of tool and tool support
5.5 Clamping of work through sketch.

6.0 *Milling Machine*

6.1 Types of milling machine and operations performed by them and also same for CNC milling machine

6.2 Explain work holding attachment
6.3 Construction & working of simple dividing head, universal dividing head
6.4 Procedure of simple and compound indexing
6.5 Illustration of different indexing methods

7.0 Slotter

7.1 Major components and their function
7.2 Construction and working of slotter machine
7.3 Tools used in slotter

8.0 *Grinding*

8.1 Significance of grinding operations
8.2 Manufacturing of grinding wheels
8.3 Criteria for selecting of grinding wheels
8.4 Specification of grinding wheels with example Working of

- Cylindrical Grinder
- Surface Grinder
- Centreless Grinder

9.0 *Internal Machining operations*

Classification of drilling machines

9.1 Working of

- Bench drilling machine
- Pillar drilling machine
- Radial drilling machine

9.2 Boring

- Basic Principle of Boring
- Different between Boring and drilling

9.3 Broaching

- Types of Broaching(pull type, push type)
- Advantages of Broaching and applications

10 *Surface finish, lapping*

10.1 Definition of Surface finish

10.2 Description of lapping& explain their specific cutting.

CHAPTERS COVERED UP TO IA- 1, 2,3,4,5

LearningResources:

Sl No.	Name of the Book	Author Name	Publisher
1.	Text Book of Workshop Technology	Hazra Choudhury Vol-I & II	MPP Pvt. Ltd.
2.	Text Book of Workshop Technology	W.A.S Chapman Vol-I & II	
3.	Text Book of Manufacturing Process	P.N Rao	TMH

TH-3 FLUID MECHANICS

Name of the Course: Diploma in **Mech & Other Mechanical Allied Branches**			
Course code:		Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. *RATIONAL:*

Use of fluid in engineering field is of great importance. It is therefore necessary to study the physical properties and characteristics of fluids which have very important application in mechanical and automobile engineering.

B. *COURSE OBJECTIVES:*

Students will develop an ability towards

- Comprehending fluid properties and their measurements
- Realizing conditions for floatation
- Applying Bernoulli's theorem

C. *TOPIC WISE DISTRIBUTION OF PERIODS*

Sl. No.	**Topic**	**Periods**
01	Properties of Fluid	08
02	Fluid Pressure and its measurements	08
03	Hydrostatics	08
04	Kinematics of Flow	08
05	orifices, notches & weirs	08
06	Flow through pipe	10
07	Impact of jets	10
	Total Period:	**60**

D.CONTENT

1.0 Properties of Fluid

1.1 Define fluid

1.2 Description of fluid properties like Density, Specific weight, specific gravity, specific volume and solve simple problems.

1.3 Definitions and Units of Dynamic viscosity, kinematic viscosity, surface tension Capillary phenomenon

2.0 *Fluid Pressure and its measurements*

2.1 Definitions and units of fluid pressure, pressure intensity and pressure head.

2.2 Statement of Pascal's Law.

2.3 Concept of atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure

2.4 Pressure measuring instruments

Manometers (Simple and Differential)

2.4.1 Bourdon tube pressure gauge(Simple Numerical)

2.5 Solve simple problems on Manometer.

3.0 *Hydrostatics*

3.1 Definition of hydrostatic pressure

3.2 Total pressure and centre of pressure on immersed bodies(Horizontal and Vertical Bodies)

3.3 Solve Simple problems.

3.4 Archimedes 'principle, concept of buoyancy, meta center and meta centric height (Definition only)

3.5 Concept of floatation

4.0 *Kinematics of Flow*

4.1 Types of fluid flow

4.2 Continuity equation(Statement and proof for one dimensional flow)

4.3 Bernoulli's theorem(Statement and proof)
Applications and limitations of Bernoulli's theorem (Venturimeter, pitot tube)

4.4 Solve simple problems

5.0 *Orifices, notches & weirs*

5.1 Define orifice

5.2 Flow through orifice

5.3 Orifices coefficient & the relation between the orifice coefficients

5.4 Classifications of notches & weirs

5.5 Discharge over a rectangular notch or weir

5.6 Discharge over a triangular notch or weir

5.7 Simple problems on above

6.0 *Flow through pipe*

6.1 Definition of pipe.

6.2 Loss of energy in pipes.

6.3 Head loss due to friction: Darcy's and Chezy's formula (Expression only)

6.4 Solve Problems using Darcy's and Chezy's formula.

6.5 Hydraulic gradient and total gradient line

7.0 *Impact of jets*

7.1 Impact of jet on fixed and moving vertical flat plates

7.2 Derivation of work done on series of vanes and condition for maximum efficiency.

7.3 Impact of jet on moving curved vanes, illustration using velocity triangles, derivation of work done, efficiency.

CHAPTERS COVERED UP TO IA- 1, 2,3,4

Learning Resources:

Sl No.	Name of the Book	Author Name	Publisher
1.	Text Book of Fluid Mechanics	R.K.Bansal	Laxmi
2.	Text Book of Fluid Mechanics	R.S khurmi	S.Chand
3.	Text Book of Fluid Mechanics	R.K.Rajput	S.Chand
4.	Text Book of Fluid Mechanics	Modi & Seth	Rajson's pub. Pvt. lt

THEORY 4 -THERMAL ENGINEERING-II

Name of the Course: Diploma in **Mech/ & Other Mechanical Allied Branches**			
Course code:		**Semester**	**4th**
Total Period:	**60**	**Examination**	**3 hr**
Theory periods:	**4 P/week**	**Class Test:**	**20**
Maximum marks:	**100**	**End Semester Examination:**	**80**

A. *RATIONAL:*

Modern society needs lots of applications of thermodynamics, which deals with energy possessed by hot vapors, its production and its application in different fields.

B. *COURSE OBJECTIVES:*

Student will develop ability towards.

- Understanding the power developed in I.C engine and efficiency.
- Understanding the principle, performance and application of air compressor.
- Determining thermodynamic properties of steam using steam tables & mollier chart.
- Comprehending the working of various steam generators i.e. boilers.
- Comprehending the vapor power cycles and computing work done & efficiencies thereof.

C. *TOPIC WISE DISTRIBUTION OF PERIODS*

Sl. No.	**Topic**	**Periods**
01	Performance of I. C engine	08
02	Air Compressor	12
03	Properties of steam	12
04	Steam Generator	12
05	Vapor power cycle	08
06	Heat Transfer	08
Total Period:		**60**

D.CONTENT

1. *Performance of I.C engine*

1.1 Define mechanical efficiency, Indicated thermal efficiency,

Relative Efficiency, brake thermal efficiency overall efficiency

Mean effective pressure &specific fuel consumption.

1.2 Define air-fuel ratio & calorific value of fuel.

1.3 Work out problems to determine efficiencies & specific fuel consumption.

2. *Air Compressor*

2.1 Explain functions of compressor & industrial use of compressor air

2.2 Classify air compressor & principle of operation.

2.3 Describe the parts and working principle of reciprocating Air compressor.

2.4 Explain the terminology of reciprocating compressor such as bore, stroke, pressure ratio free air delivered &Volumetric efficiency.

2.5 Derive the work done of single stage & two stage compressor with and without clearance.

2.6 Solve simple problems (without clearance only)

3. *Properties of Steam*

3.1 Difference between gas & vapours.

3.2 Formation of steam.

3.3 Representation on P-V, T-S, H-S, & T-H diagram.

3.4 Definition & Properties of Steam.

3.5 Use of steam table & mollier chart for finding unknown properties.

3.6 Non flow & flow process of vapour.

3.7 P-V, T-S & H-S, diagram.

3.8 Determine the changes in properties & solve simple numerical.

4. *Steam Generator*

4.1 Classification & types of Boiler.

4.2 Important terms for Boiler.

4.3 Comparison between fire tube & Water tube Boiler.

4.4 Description & working of common boilers (Cochran, Lancashire, Babcock & Wilcox Boiler)

4.5 Boiler Draught (Forced, induced & balanced)

4.6 Boiler mountings & accessories.

5. *Steam Power Cycles*

5.1 Carnot cycle with vapour.

5.2 Derive work & efficiency of the cycle.

5.3 Rankine cycle.

5.3.1 Representation in P-V, T-S & h-s diagram.

5.3.2 Derive Work & Efficiency.

5.3.3 Effect of Various end conditions in Rankine cycle.

5.3.4 Reheat cycle & regenerative Cycle.

5.4 Solve simple numerical on Carnot vapour Cycle & Rankine Cycle.

6. *Heat Transfer*

6.1 Modes of Heat Transfer (Conduction, Convection, Radiation).

6.2 Fourier law of heat conduction and thermal conductivity (k).

6.3 Newton's laws of cooling.

6.4 Radiation heat transfer (Stefan, Boltzmann & Kirchhoff's law) only statement, no derivation & no numerical problem.

6.5 Black body Radiation, Definition of Emissivity, absorptivity, & transmissibility.

CHAPTERS COVERED UP TO IA- 1, 2,3.

Sl No.	**Reference Book**	**Author Name**	**Publisher Name**
1	Thermal Engineering	R.S. Khurmi	S.Chand
2	Thermal Engineering	A.R.Basu	Dhanpat Rai
3	Thermal Engineering	A.S. Sarao	Satya Prakash
4	Engineering Thermodynamics	P.k.Nag	TMH
5	Thermal Engineering	Mahesh M Rathore	TMH

PR-1 THEORY OF MACHINES AND MEASUREMENTS LAB

Name of the Course : Diploma in **Mech/ & Other Mechanical Allied Branches**

Course code:		Semester	4th
Total Period:	90	Examination	3 hrs
Lab. periods:	6 P/W	Term Work	25
Maximum marks:	100	End Semester Examination:	75

SL. No	Content
1	Determination of centrifugal force of a governor (Hart Nell / Watt/Porter).
2	Study & demonstration of static balancing apparatus.
3	Study & demonstration of journal bearing apparatus.
4	Study of different types of Cam and followers.
5	Study & demonstration of epicyclic gear train.
6	Determination of the thickness of ground M.S flat to an accuracy of 0.02mm using Vernier Caliper.
7	Determination of diameter of a cylindrical component to an accuracy of 0.01mm using micrometer.
8.	Determine the heights of gauge blocks or parallel bars to accuracy of 0.02mm using Vernier height gauge.
9.	Determine the thickness of ground MS plates using slip gauges.
10.	Determination of angel of Machined surfaces of components using sin bar with slip gauges.

PR- 2 MECHANICAL ENGG. LAB –II

Name of the Course: Diploma in **Mech/ & Other Mechanical Allied Branches**

Course code		Semester	4th
Total Period:	90	Examination	3 hrs
Lab. periods:	6 P/W	Term Work	25
Maximum marks:	100	End Sem Examination:	75

SL. No	Content
1	Study of 2-S, 4-S petrol & diesel engine models
2	Determine the brake thermal efficiency of single cylinder petrol engine.
3	Determine the brake thermal efficiency of single cylinder diesel engine.
4	Determine the B.H.P, I.H.P BSFC of a multi cylinder engine by Morse test.
5	Determine the mechanical efficiency of an air Compressor.
6	Study of pressure measuring devices (manometer, Bourdon tube pressure gauge)
7	Verification of Bernoulli's theorem
8	Determination of Cd from venturimeter
9	Determination of Cc, Cv, Cd from orifice meter
10	Determine of Darcy's coefficient from flow through pipe

PR-3 WORKSHOP
PRACTICE-III

Name of the Course: Diploma in **Mech/ & Other Mechanical Allied Branches**			
Course code:		Semester	4th
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P/W	Teamwork	50
Maximum marks:	100	End Semester Examination:	50

Course Objectives:

Students will develop an ability towards

- Preparing components and jobs using foundry, welding and machining
- Realizing process parameters involved and their effects

1 Machining Practices

1.1 Job in evolving drilling, boring

1.2 Internal/External threading on Turning jobs

1.3 Job in evolving use of Capstan and turret lathe (Taper Turning & Chamfering)

1.4 All gear lathe, CNC Lathe Trainer Practice
Job involving all turning process on MS Rod & aluminum rod for jobs using CNC Lathe trainer.

2 Metal Machining

2.1 Shaper
Preparation of V Block on CI or MS Blocks

2.2 Milling Machine
Preparation of Spur gear on CI or MS round

Pr4. TECHNICAL SEMINAR

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	4th
Total Period:	30		
Lab. periods:	02/week	Term Work	50
Maximum marks:	50		

OBJECTIVES:

Each student has to select a recent topic of latest technology in the area of Mechanical Engineering and present a seminar in front of all students of the class. He/She has to prepare a PowerPoint presentation of the selected topic of minimum 10 slides are the total presentation will be approximately 10 minutes duration .There will be interactive session between the presenter and rest of the students including the faculty members of the dept at the end of presentation .A student has to present at least 2 nos.of seminar during a semester and to submit the report for evaluation.

List of Equipments of Theory of Machine and Measurement Lab

Sl. No.	Name of Apparatus	QUANTITY
01	GOVERNOR APPARATUS	01No
02	STATIC AND DYNAMIC APPARATUS	01No
03	JOURNAL BEARING APPARATUS	01 No
04	CAM ANALYSIS APPARATUS	01 No
05	EPICYCLIC GEAR TRAIN	01 No
06	VERNIER CALLIPER	04 Nos.
07	MICROMETER	04 Nos.
08	VERNIER HEIGHT GAUGE	02 Nos.
09	SLIP GAUGE	02 Nos.
10	SINE BAR	02 Nos.

List of Equipments of Workshop Practice-III

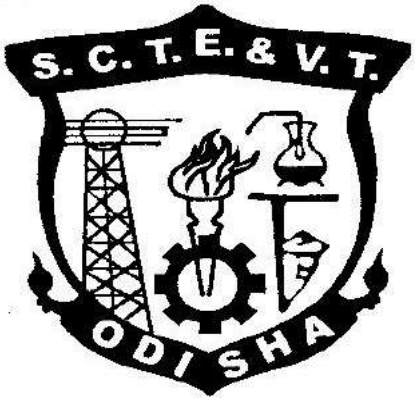
Sl. No.	Name of Apparatus	QUANTITY
01	RADIAL DRILL MACHINE	01 No
02	ALL GEAR LATHE	06 Nos.
03	CAPSTAN LATHE	01 Nos.
04	CNC LATHE TRAINER	01 Nos.

List of Equipments of MEL-II

SL. NO.	NAME OF ITEM	QUANTITY
01	MODEL OF 2 STROKE PETROL ENGINE	02 Nos
02	MODEL OF 4 STROKE PETROL ENGINE	02 Nos.
03	MODEL OF 2 STROKE DIESEL ENGINE	02 Nos.
04	MODEL OF 4 STROKE DIESEL ENGINE	02Nos.
05	SINGLE CYLINDER PETROL ENGINE TEST RIG	01 No.
06	SINGLE CYLINDER DIESEL ENGINE TEST RIG	01 No.
07	MORSE TEST APPARATUS	01 No.
08	2 STAGE AIR COMPRESSOR TEST RIG	01 No.
09	PRESSURE MEASURING DEVICES (BOURDONTUBE PRESSURE GAUGE, MANOMETER)	02 Nos. each
10	BERNOULLI'S APPARATUS	01 No.
11	VENTURIMETER APPARATUS	01 No.
12	ORIFICEMETER APPARATUS	01 No
13	FLOW THROUGH PIPE APPARATUS	01 No

CURRICULLUM OF 4TH SEMESTER
For
DIPLOMA IN MINING ENGINEERING

(Effective FROM 2019-20 Sessions)



STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA, BHUBANESWAR

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING,ORISSA

TEACHING AND EVALUTION SCHEME FOR 4th Semester Mining Engg.(wef 2019-20)

SUBJECT NUMBER	SUBJECT CODE	SUBJECT	Periods/Week			Evalution Scheme			
			L	T	P	Internal assessment/Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th .1		Underground Coal Mining	4			20	80	3	100
Th .2		Mine Survey -II	4			20	80	3	100
Th .3		Mine Ventilation	4			20	80	3	100
Th. 4		Electrical Equipment in Mines	4			20	80	3	100
		Total	16			80	320		400
		Practical							
Pr .1		Mine Survey -II LAB			06	50	50		100
Pr .2		Mine Ventilation LAB			06	50	50		100
Pr .3		Electrical Equipment in Mines LAB			06	50	50		100
Pr .4		Technical Seminar			02	50	-		50
		Student Centered Activities(SCA)			3				
		Total			23	200	150		350
		Grand Total	16		23	280	470		750

Abbreviations: L-Lecturer ,T-Tutorial ,P-Practical .Each class is of minimum 55 minutes duration.

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/Personality Development/Environmental issues/Quiz/Hobbies/Field Visits/cultural activities/Library studies/Classes on MOOCS/SWAYAM etc., Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assessment done for each of the Theory subject. Sessional Marks shall be total of the performance of individual different jobs/experiments in a subject throughout the semester.

Industry/Mines Exposure Training can be conducted during semester break after 4th semester.

Th .1. UNDERGROUND COAL MINING

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	4th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Introduction to Method of working	4
2	Bord & Pillar Method	15
3	Long wall Mining Method	10
4	Thick seam Mining Method	8
5	Horizon Mining Method	3
6	Hydraulic & Pneumatic Stowing Method	3
7	Support system & Roof control	10
8	Subsidence due to Mining	3
9	Shaft sinking	4
	Total	60

RATIONALE

As a Mining Engineer, one should know different methods of underground working in coal miningand operational principles.

OBJECTIVES

On completion of the course, students will be able to :

- Explain different mining methods and their selection.
- Describe details working of B.P. method and its development & depillaring, precautions against fire and water and B.P. layout.
- Explain long wall working.
- Describe elementary idea about thick seam mining.
- Describe horizon mining.
- Explain various practices of filling of goaf and their layout.
- Describe roof behaviors and support required in Mines.
- Identify causes of subsidence and its prevention.
- Describe various methods of shaft sinking.

COURSE CONTENTS

1. Introduction to Underground Coal Mining
    - Define mine and different methods of mining.
    - Classify Undergound Coal Mining Methods.
2. Bord and Pillar Method
    - Describe the various application of Bord & Pillar method.
    - Describe various layouts of Bord & Pillar method.
    - Describe depillaring method with stowing and caving.
    - State precautions against fire and water during and after depillaring.
    - State and describe various machineries used in working face.
    - Define contigeous seam.
    - Describe working of contiguous seams.
    - Describe working of seams above and below goaved out area.
    - State advantages and disadvantages of Bord & Pillar method.
3. Longwall Method
    - Describe Longwall advancing and retreating methods.
    - Define single unit and double unit face.
    - Describe cyclic and non-cyclic L/W layouts.
    - Describe mechanized longwall working with armoured flexible conveyor, shield support and shearer loader.
4. Thick seam Mining
    - Define Thick seams.
    - Classify Thick seam Mining.
    - Describe layouts of horizontal slicing, incline slicing, blasting gallery and sublevel caving.
5. Horizon Mining
    - State conditions, advantages, disadvantages and limitations of Horizon Mining.
    - Describe the layout of Horizon Mining.
6. Hydraulic and Pneumatic stowing
    - Describe hydraulic stowing.
    - Describe Pneumatic stowing.
7. Support and roof control in Mines
    - State properties of various types of roof & roof behavior, Pressure arch theory in B&P
    - and longwall working.
    - Describe testing of roof.
    - Classify support system in Mines construction, principle of operation application and load bearing capacity assessment.
8. Subsidence due to Mining
    - Define angle of draw
    - State factors of subsidence, critical area of extraction
    - Describe the factors affecting subsidence
    - State & describe precautionary measures against damage due to subsidence
    - Define shaft pillar.
9. Shaft Sinking
    - Describe vertical shaft and inclined shaft; determine shape and size of shaft, location of shaft. Describe sinking through normal ground. State shaft plumbing.
    - Describe sinking through difficult ground, cementation, freezing, mechanized shaft sinking, sinking upward, widening and deepening of shafts.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3,4.

BOOKS RECOMMENDED :

Sl. No.	Title of the Book	Name of Authors
1	Coal Mining	S. Mathur
2	EMT VOL I,III	D.J. Deshmukh
3	Modern Coal Mining	S.K. Das
4	Advanced Coal Mining	RT Deshmukh & B.Borovjev
5	UMS	
6	Coal Mine Ground Control	S S Peng
7	SME Mining Engg. Handbook	
8	Strata Control	Jermic

Th. 2 . MINE SURVEY – II

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	4th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Tacheometry	10
2	Triangulation & Trilateration	12
3	Co-relation of Surface & Underground Survey	10
4	Setting out curves	10
5	Stope Surveying	10
6	G.P.S & Total Station	8
	Total	60

RATIONALE

Before starting the actual mining operation, it is essential for mining engineer to first survey the piece of land where mining operation is contemplated. This is not possible without the knowledgeof mine surveying.

OBJECTIVES

On completion of the subject, students will be able to :

- Comprehend principle of tachometry & its application in measurement of distance.
- Explain principle of triangulation & trilateration.
- Explain principles of correlations by different methods.
  Define various terms in connection with cove setting, laying out of curves by different methods.
- Explain different methods of stope surveying, transfer of stope faces to mine Plan.
- Explain the basic principle of global positioning systems & total station.

COURSE CONTENTS

1. Tacheometry
   - Define stadia & its principle.
   - Explain diaphragm, reticules, tacheometer, instruments constants.
   - Find out height & distance from stadia intercepts, tangential systems, movable hair method.
2. Triangulation and Trilateration.
   - State purpose & principle involved in triangulation & trilateration method.
   - Classify various methods of triangulation survey primary, secondary & tertiary colliery triangulation.
   - Develop concept about reconnaissance survey. Describe methods of measuring angle, types of theodolite used in triangulation survey.
   - Describe the methods of base line measurement using E.D.M.
   - Define tape correction.
   - State construction of triangulation station of permanent nature.
3. Correlation of surface and underground survey
   - State direct correlation by traversing & optical methods.
   - Describe orientation by wires in two shafts.
   - Explain correlation by mines in vertical shafts.
   - State co-planning/ alignment, weissbach triangle weis-quadrilateral methods, precise magnetic correlation.

4. Setting out curves
   - State elements of curves.
   - Define designation of curves, simple, compound & reverse curves.
   - Explain setting out of surface & underground curves by chords & offsets, chords and angle, tangent and offset, plate layers method.
   - Describe various setting out by chain & one theodolite, two theodolites.
   - Define super elevation, transition and vertical curves.
5. Stope Surveying
   - Explain tape triangulation, instrumental survey.
   - Determine stope face.
   - State preparation of stope planes, plotting the stope station, plotting of stope face to the mine plan.
   - Find out area of extraction by Planimeter and calculation of triangle thereof.

6. G.P.S. & Total Station
   - Explain the basic principles of global positioning system & total station.
   - Introduction to DGPS.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3

RECOMMENDED BOOKS

Sl. No.	Title of the Book	Name of Authors
1	Surveying Vol I	E.Mason
2	Surveying and Levelling	T.P. Kanetkar
3	Geodetic Surveying Vol I	David Clerk
4	Mineral Economics	Sinha & Sharma

Th. 3. MINE VENTILATION

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	4th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

Topic wise distribution of Periods

CHAPTER	TOPIC	PERIODS
1	Natural Ventilation	8
2	Air Crossing & Distribution	10
3	Mechanical Ventilation	9
4	Booster Fan & Its Effect	10
5	Auxiliary Ventilation	7
6	Ventilation Survey	10
7	Leakage of air in Mines	6
	Total	60

RATIONALE

The provision of proper ventilation is very essential for any underground mining operation. As a mining Engineer, one should have the thorough knowledge of types of ventilation, methods of aircrossing, types of fans etc

OBJECTIVES

On completion of the course, students will be able to :

- Describe different instruments measuring temperature, pressure and humidity and have idea on natural ventilation and laws of mine air friction.
- Describe different types of ventilation and methods of air crossings and distribution.
- Illustrate different types of fans, fan characteristics, Mine characteristics and selection of fans.
- Identify different locations of booster fan and solve simple problems relating to this.
- Explain different systems of auxiliary ventilation and its advantages and disadvantages.
- Explain different ways of pressure survey, quantity survey & quality survey.
- Explain causes & preventives measure of leakage of air in mines.

COURSE CONTENTS

1. Natural Ventilation
    - Definition of natural ventilation and factors affecting natural ventilation.
    - Describe the different types of Thermometer.
    - Describe the different types of Barometer.
    - Describe kata thermometer.
    - Describe water gauge.
    - Calculate ventilation pressure by using piton static tube.

- Explain effects of heat & humidity.
- Explain natural ventilation motive column, geothermic gradient.
- Enumerate laws of mine air friction and solve problems on above.
- Statutory provision as per CMR 2017,MMR 1961.

2. Air Crossing and distribution
   - Describe ventilation stopping, air crossing, ventilation door, brattice partition.
   - Describe different types of ventilation.
   - Accessional & declensional ventilation.
   - Homotropal & Antitropal ventilation.
   - Boundary ventilation.
   - Central & combined ventilation.
   - Explain splitting of air current & solve numerical problems on splitting.
   - Describe air locks at pit top.

3. Mechanical Ventilation
   - Explain construction & principle of operation of centrifugal flow fans.
   - State fan laws & calculate fan efficiency and capacity.
   - Explain installation of mine fan with reversal arrangement.
   - Describe fan drift, fan drive, evasee and diffusers.

Explain fan characteristics and mine characteristics.
   - Describe methods of output of mine fans.

4. Booster fan and its Effects
   - Describe installation, location and purpose of booster fan.
   - Solve problems relating to booster fan.

5. Auxiliary Ventilation
   - Describe systems of auxiliary ventilation.
   - Describe advantages & disadvantages of auxiliary ventilation.

6. Ventilation Survey
   - Describe methods of pressure survey using barometer, gauge and pitot tube with manometer.
   - Describe the method of measurement of cross-sectional area.
   - Describe the method of velocity measurements by using anemometer, voltmeter, and pitot- static tube and smoke & cloud method.
   - Determine percentage of oxygen, methane, carbon monoxide SO_2 & H_2S.

7. Leakage of air in Mines
   - Describe causes and preventive measures of leakage of air in mines.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3

RECOMMENDED BOOKS

Sl. No.	Title of the Books	Name of Authors
1	Mine Ventilation	G B Mishra
2	EMT II	D J Deshmukh
3	Coal Mine Practices	E. Mason
4	Mine Ventilation	L C KAKU
5	UMS Volume -I	
6	SME HANDBOOK VOL-I & III	

Th. 4. ELECTRICAL EQUIPMENT IN MINES

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	4th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Electrical cables for Mining use	5
2	Protective systems including Fuses & Circuit Breakers	14
3	Fundamentals of Transformer	10
4	Industrial drives-Mining Type	4
5	Electric Braking Used in Mines	8
6	Flame proof and intrinsically safe apparatus	5
7	Underground signaling arrangement	4
8	Sensors & their applications	5
9	Describe Battery locomotive and Electric LHD	5
	Total	60

RATIONALE

For a Mining Engineer, it is essential to have the fundamental concepts of electrical engineeringand its applications in mining operation.

OBJECTIVES

On completion of the course, students will be able to :

- Describe various types of electrical cables used in Mines.
- State & explain the purposes of uses.
- Describe and explain circuit breakers and draw circuit diagram of gate-end box and drill panel.
- Describe different types of protective system.
- Select electric drives for mining use.
- Describe & explain different types of electric braking.
- Describe proof apparatus and intrinsically safe apparatus.
- Explain underground signaling arrangement.

COURSE CONTENTS

1. Electrical cables for Mining use
   - Classify cables for mining use.
   - Constructional features of high tension and low-tension cables armored & trailing cables.
     - State size of cables & their use.

        - State procedures of cable laying at surface, underground roadway & in shafts.
    - Describe cable joint box mining type.

2. Protective Systems
    - Fuses.
        - Fuse Materials
        - Rewireable Fuse, HRC Fuse.
        - Uses of Fuse.
    - Circuit Breakers.
        - Describe & Explain Air Circuit Breaker.
        - Describe & Explain Minimum Oil Circuit Breaker (MOCB).
        - Describe & Explain Bulk Oil Circuit Breaker (BOCB).
        - Describe & Explain Air Blast Circuit Breaker.
        - Describe SF6 Circuit Breaker.
    - Explain essential qualities of a good protective system.
    - State & describe types of relays (plunger, induction & direction over current, over loads, no volt and latching relay, frequency relay and Earth leakage relay)
    - Describe protection of transformer by differential relay.
    - Describe general principle of working-basis remote control circuit & various protective devices of Gate-End Box.
    - Describe functions & operation of drill panel.
    - Earthing system in mines.
    - Voltage limit.

3. Fundamentals of Transformer (without numerical problems)

4. Industrial drives- Mining type
    - Explain starting & running characteristics of D.C. & A.C. Motors.
    - State selection of motors for mining use.
5. Electric braking used in Mines
    - Describe & explain regenerative braking.
    - Describe & explain magnetic braking.
6. Flame proof & intrinsically safe apparatus
    - Define flame proof apparatus & intrinsically safe apparatus.
    - Describe & explain the safety features of flame proof & intrinsically safe apparatus.

7. Underground signaling arrangement
    - Describe signals & shaft signal.
    - Describe communication system in U/G mines.
    - Point to point communication.
    - Intercom system/Telephone
    - Cordless system.
8. Sensors & their applications.
9. Battery locomotive, Automation with Thyroster control, Elecrical LHD, Electric mine phone.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3.4.

RECOMMENDED BOOKS

Sl. No.	Title of the Books	Name of Authors
1	Electrical Equipment in Mines	H.Cotton
2	Electrical Power System	V K Mehta
3	Power Electronics	P S Punmia

Pr.1 . MINE SURVEY – II LAB

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	4th
Total Periods:	90	Examination	3 hrs
Practical Periods:	6P/week	Sessional Exam	50
Maximum Marks:	100	End Semester Examination	50

Topic wise Distribution of Periods

CHAPTER	TOPIC	PERIODS
1	Study of Tacheometer	15
2	Study of GPS	15
3	Study of DGPS	15
4	Study of Total Station	15
5	Uses of Autocad in survey	15
6	Software based Mine planning	15
	Total	90

A. **RATIONALE**:

In the field of mining, it will help in all measurements,calculations & mapping at all stages from prospecting to exploitation and utilizing mineral deposits by both surface & undergroundworking.

B. OBJECTIVE:

On completion of lab students will able to :

- Develop a clear idea about Tacheometer and Tacheometry.
- Know various components of GPS and DGPS & their uses.
- Use Total station in calculations of various components in mining field.
- Learn uses of Autocad and software in Mine planning.

C. Course Contents

- Fix triangulation and measurement of peripheral and hub angles. Base line measurement applying all corrections and plotting by co-ordinates.
- Determine the north.
- Set out curves by Total Station and Theodolites.
- Correlate underground and surface survey during survey camp.
- Measurement of Horizontal & Vertical angles, measurement of distance by Total Station.
- Mining lease boundary survey using Total Station .
- Base line fixation using Total Station.
- Coordinate point shifting and reference point shifting by Total Station .

- Fixation of control point by 02 traversing (both Horizontal and Vertical control points) with Total Station and auto level.
- Topographic survey & existing features.
- Area calculation using software.
- Volume calculation using software
- GPS Survey.
- Preparation of plan and section using AUTOCAD.
- DGPS Survey.
- Reserve calculation of Ore.

Pr.2 .MINE VENTILATION LAB

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	4th
Total Periods:	90	Examination	3 hrs
Practical Periods:	6P/week	Sessional Examination	50
Maximum Marks:	100	End Semester Examination	50

Topic wise distribution of Periods

CHAPTER	TOPIC	PERIODS
1	Calculation of relative humidity by stationary hygrometer	8
2	Study of relative humidity by storrow's hygrometer	7
3	Calculation of cooling power of mine air using Kata thermometer.	8
4	Study of air crossing, ventilation doors at pit-top	8
5	Study & use of Vane Anemometer,Digital Anemometer, Velometer	9
6	Determination of duct characteristic.	9
7	Study of constructional features of axial flow and centrifugal fans.	9
8	Determination of fan characteristic curve.	8
9	Study and sketching of regulator, airlocks	8
10	Study and use of digital anemometer.	8
11	Measurement of quantity of air flow by digital anemometer.	8
	Total	90

A. RATIONALE

The provision of proper ventilation is very essential for any underground mining operation. As amining Engineer, one should have the thorough knowledge about types of mechanical ventilators,different measuring instruments & air leakage protecting devices used in mines.

B. OBJECTIVES

On completion of the lab, students will be able to :

- Know uses of stationary & storrow's hygrometer in calculation of relative humidity.
- Calculate cooling power of air with help of kata thermometer.
- Illustrate different types of fans, fan characteristics and selection of fans.
- Explain the uses of Regulators and Air locks in different parts of mine.
- Calculate velocity of air with the help of vane anemometer.
- Explain different ways of pressure survey, quantity survey & quality survey.

C. Course Contents

- Determine the relative humidity by stationary hygrometer.
- Determine the relative humidity by storrow's hygrometer.
- Determine the cooling power of mine air using Kata thermometer.
- Study and sketching of air crossing, ventilation doors at pit-top & different types of explosive proof fire stopping.
- Study & use of Vane Anemometer,Digital Anemometer, Velometer, Pitot static-tube measurement of quantity of air flow. Study of digital pressure meter.
- Determination of duct characteristic.
- Study of constructional features of axial flow and centrifugal fans.
- Determination of fan characteristic curve.
- Study and sketching of regulator, airlocks.
- Study and use of digital anemometer.
- Measurement of quantity of air flow by digital anemometer.

Pr .3 . ELECTRICAL EQUIPMENT IN MINE LAB

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	4th
Total Periods:	90	Examination	3 hrs
Practical Periods:	6P/week	Sessional Examination	50
Maximum Marks:	100	End Semester Examination	50

Topic wise Distribution of Periods

CHAPTER	TOPIC	PERIODS
1	Preparation of Electrical switch board to control two light points, one plug point	15
2	Study of circuit breakers	15
3	Study of Gate End Box	15
4	Study of Relays	15
5	Identify the different part of given cable	15
6	Use of Megger check and the continuity of windings	15
	Total	90

A. RATIONALE

For a Mining Engineer, it is essential to have the fundamental concepts of electrical engineeringand its applications in mining operation.

B. OBJECTIVES

On completion of the lab, students will be able to :

- Prepare an electrical switch board to control 2 light points & 1 plug points.
- Describe and explain circuit breakers and draw circuit diagram of gate-end box and drill panel.
- Describe different types of protective system and Relays.
- Distinguish different types of cables used for mining purpose
- Explain the uses of Megger check and continuity of windings.

C. Course Contents

- Prepare an Electrical switch board to control two light points, one plug point, one fan point and put a required fuse.
- Study of circuit breakers (Air Circuit Breaker & Oil Circuit Breaker).
- Study of Gate End Box.
- Study of Relays (Buchholz Relay , Over Current Relay).
- Identify the different part of given cable and find fault on the cable.
- By the use of Megger check the continuity of windings, body to winding, body to earth of an 3-Phase induction Motor.

Pr. 4. Technical Seminar

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	4th
Total Periods:	30	Examination	-
Practical Periods:	2P/week	Sessional Examination	50
Maximum Marks:	50		

Each student has to select a recent topic of latest technology in the area of Mining Engineering and present a seminar in front of all students of the class. He/She has to prepare a PowerPoint presentation of the selected topic of minimum 10 slides are the total presentation will be approximately 10 minutes duration .There will be interactive session between the presenter and rest of the students including the faculty members of the dept at the end of presentation .A student has to present at least 2 nos. of seminar during a semester and to submit the report for evaluation.

CURRICULLUM OF 5TH SEMESTER

For

DIPLOMA IN MECHANICAL ENGINEERING

(Effective FROM 2020-21 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING,ODISHA, BHUBANESWAR

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 5th Semester (Mechanical.) (wef 2020-21)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Entrepreneurship and Management & Smart Technology	4		-	20	80	3	100
Th.2		Design of Machine elements	4		-	20	80	3	100
Th.3		Hydraulic Machines &Industrial Fluid Power	4		-	20	80	3	100
Th.4		Mechatronics	4			20	80	3	100
Th.5		Refrigeration and air-conditioning	4			20	80	3	100
		Total	20			100	400	-	500
		Practical							
Pr.1		Refrigeration and Air conditioning lab	-	-	4	25	50	3	75
Pr.2		Hydraulic machines &Industrial Fluid power lab	-	-	4	25	50	3	75
Pr.3		CAD/CAM LAB	-	-	4	25	50	3	75
Pr.4		Project Work Phase -I		-	4	25	-	-	25
		Student Centered Activities (SCA)			3				
		Total	-	-	*19*	*100*	*150*	-	*250*
		Grand Total	**20**	**-**	**19**	**200**	**550**	**-**	**750**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration									
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%									
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.									
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester									

Th1. ENTREPRENEURSHIP and MANAGEMENT & SMART TECHNOLOGY

(Common to All Branches)

Theory	**4 Periods per week**	**Internal Assessment**	**20 Marks**
Total Periods	**60 Periods**	**End Sem Exam**	**80 Marks**
Examination	**3hours**	**Total Marks**	**100Marks**

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Entrepreneurship	10
2	Market Survey and Opportunity Identification(Business Planning)	8
3	Project report Preparation	4
4	Management Principles	5
5	Functional Areas of Management	10
6	Leadership and Motivation	6
7	Work Culture, TQM & Safety	5
8	Legislation	6
9	Smart Technology	6
	TOTAL	60

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students, so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. It may be further added that an entrepreneurial mind set with managerial skill helps the student in the job market. The students can also be introduced with Startup and Smart Technology concept, which shall radically change the working environment in the coming days in the face of Industry 4.0

In this subject, the Students shall be introduced/ exposed to different concepts and Terminologies in brief only, so that he/she can have broad idea about different concepts/items taught in this subject. Solving numerical problem on any topic/item is beyond the scope of this subject.

OBJECTIVES

After undergoing this course, the students will be able to :

- Know about Entrepreneurship, Types of Industries and Startups
- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- know the management Principles and functional areas of management
- Inculcate leadership qualities to motivate self and others.
- Maintain and be a part of healthy work culture in an organisation.
- Use modern concepts like TQM
- Know the General Safety Rules
- Know about IOT and its Application in SMART Environment.

DETAILED CONTENTS

1. Entrepreneurship

- Concept /Meaning of Entrepreneurship
- Need of Entrepreneurship
- Characteristics, Qualities and Types of entrepreneur, Functions
- Barriers in entrepreneurship
- Entrepreneurs vrs. Manager
- Forms of Business Ownership: Sole proprietorship, partnership forms and others
- Types of Industries, Concept of Start-ups
- Entrepreneurial support agencies at National, State, District Level(Sources): DIC, NSIC,OSIC, SIDBI, NABARD, Commercial Banks, KVIC etc.
- Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks

2. Market Survey and Opportunity Identification (Business Planning)

- Business Planning
- SSI, Ancillary Units, Tiny Units, Service sector Units
- Time schedule Plan, Agencies to be contacted for Project Implementation
- Assessment of Demand and supply and Potential areas of Growth
- Identifying Business Opportunity
- Final Product selection

3. Project report Preparation

- Preliminary project report
- Detailed project report, Techno economic Feasibility
- Project Viability

4. Management Principles

- Definitions of management
- Principles of management
- Functions of management (planning, organising, staffing, directing and controlling etc.)
- Level of Management in an Organisation

5. Functional Areas of Management

a) Production management
    - Functions, Activities
    - Productivity
    - Quality control
    - Production Planning and control

b) Inventory Management
    - Need for Inventory management
    - Models/Techniques of Inventory management

c) Financial Management
    - Functions of Financial management
    - Management of Working capital
    - Costing (only concept)
    - Break even Analysis
    - Brief idea about Accounting Terminologies: Book Keeping, Journal entry, Petty Cash book, P&L Accounts, Balance Sheets(only Concepts)

d) Marketing Management
    - Concept of Marketing and Marketing Management
    - Marketing Techniques (only concepts)
    - Concept of 4P s (Price, Place, Product, Promotion)

e) Human Resource Management

- Functions of Personnel Management
- Manpower Planning, Recruitment, Sources of manpower, Selection process, Method of Testing, Methods of Training & Development, Payment of Wages

6. Leadership and Motivation

a) Leadership

- Definition and Need/Importance
- Qualities and functions of a leader
- Manager Vs Leader
- Style of Leadership (Autocratic, Democratic, Participative)

b) Motivation

- Definition and characteristics
- Importance of motivation
- Factors affecting motivation
- Theories of motivation (Maslow)
- Methods of Improving Motivation
- Importance of Communication in Business
- Types and Barriers of Communication

7. Work Culture, TQM & Safety

- Human relationship and Performance in Organization
- Relations with Peers, Superiors and Subordinates
- TQM concepts: Quality Policy, Quality Management, Quality system
- Accidents and Safety, Cause, preventive measures, General Safety Rules , Personal Protection Equipment(PPE)

8. Legislation

a) Intellectual Property Rights(IPR), Patents, Trademarks, Copyrights
b) Features of Factories Act 1948 with Amendment (only salient points)
c) Features of Payment of Wages Act 1936 (only salient points)

9. Smart Technology

- Concept of IOT, How IOT works
- Components of IOT, Characteristics of IOT, Categories of IOT
- Applications of IOT- Smart Cities, Smart Transportation, Smart Home, Smart Healthcare, Smart Industry, Smart Agriculture, Smart Energy Management etc.

Syllabus to be covered before IA: Chapter 1,2,3,4

RECOMMENDED BOOKS

1. Entrepreneurship Development and Management by R.K Singhal, Katson Books., New Delhi
2. Entrepreneurship Development and Management by U Saroj and V Mahendiratta, Abhishek Publications, Chandigarh
3. Entrepreneurship Development and Management by Vasant Desai, Himalaya Pub.House
4. Industrial Engineering and Management by O.P Khanna ,Dhanpat Rai and Sons
5. Industrial Engineering and Management by Banga and Sharma, Khanna Publications
6. Internet of Things by Jeeva Jose, Khanna Publications, New Delhi
7. Online Resource on Startups and other concepts
8. https://www.fundable.com/learn/resources/guides/startup

TH.2 DESIGN OF MACHINE ELEMENTS

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		**Semester**	**5th**
Total Period:	**60**	**Examination**	**3 hrs.**
Theory periods:	**4 P/W**	**I.A:**	**20**
Maximum marks:	**100**	**End Semester Examination:**	**80**

A. RATIONALE:

Machine design is the art of planning or devising new or improved machines to accomplish specific purposes. Idea of design is helpful in visualizing, specifying and selection of parts and components which constitute a machine. Hence all mechanical engineers should be conversant with the subject.

B. COURSE OBJECTIVES

At the end of the course the students will be able to

1. Understanding the behaviours of material and their uses.
2. Understanding the design of various fastening elements and their industrial uses.
3. Understanding the different failures of design elements.
4. Understanding the change of design to accomplish the different field of applications.
5. Design shafts, keys, couplings required for power transmission.
6. Design closed coil helical spring

C. CHAPTER WISE DISTRIBUTION OF PERIORDS

Sl.No.	Topic	Periods
01	INTRODUCTION	12
02	DESIGN OF FASTENING ELEMENTS	12
03	DESIGN OF SHAFT AND KEYS	12
04	DESIGN OF COUPLING	12
05	DESIGN OF CLOSED COIL HELICAL SPRING	12
	TOTAL	60

D. COURSE CONTENTS

1.0 Introduction:

1.1 Introduction to Machine Design and Classify it.
1.2 Different mechanical engineering materials used in design with their uses and their mechanical and physical properties.
1.3 Define working stress, yield stress, ultimate stress & factor of safety and stress –strain curve for M.S & C.I.
1.4 Modes of Failure (By elastic deflection, general yielding & fracture)
1.5 State the factors governing the design of machine elements.
1.6 Describe design procedure.

2.0 Design of fastening elements:

2.1 Joints and their classification.
2.2 State types of welded joints .
2.3 State advantages of welded joints over other joints.
2.4 Design of welded joints for eccentric loads.
2.5 State types of riveted joints and types of rivets.
2.6 Describe failure of riveted joints.
2.7 Determine strength & efficiency of riveted joints.
2.8 Design riveted joints for pressure vessel.
2.9 Solve numerical on Welded Joint and Riveted Joints.

3.0 Design of shafts and Keys:

3.1 State function of shafts.
3.2 State materials for shafts.
3.3 Design solid & hollow shafts to transmit a given power at given rpm based on
   a) Strength: (i) Shear stress, (ii) Combined bending tension;
   b) Rigidity: (i) Angle of twist, (ii) Deflection, (iii) Modulus of rigidity
3.4 State standard size of shaft as per I.S.
3.5 State function of keys, types of keys & material of keys.
3.6 Describe failure of key, effect of key way.
3.7 Design rectangular sunk key considering its failure against shear & crushing.
3.8 Design rectangular sunk key by using empirical relation for given diameter of shaft.
3.9 State specification of parallel key, gib-head key, taper key as per I.S.
3.10 Solve numerical on Design of Shaft and keys.

4.0 Design of Coupling:

4.1 Design of Shaft Coupling
4.2 Requirements of a good shaft coupling
4.3 Types of Coupling.
4.4 Design of Sleeve or Muff-Coupling.
4.5 Design of Clamp or Compression Coupling.
4.6 Solve simple numerical on above.

5.0 Design a closed coil helical spring:

5.1 Materials used for helical spring.
5.2 Standard size spring wire. (SWG).
5.3 Terms used in compression spring.
5.4 Stress in helical spring of a circular wire.
5.5 Deflection of helical spring of circular wire.
5.6 Surge in spring.
5.7 Solve numerical on design of closed coil helical compression spring.

Syllabus covered up to I.A-Chapters 1,2 &3

LEARNING RESOURCES

SL.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER
01	PANDYA AND SHAH	MACHINE DESIGN	CHAROTAR PP
02	R.S.KHURMI &J.K.GOPTA	A TEXT BOOK OF MACHINE DESIGN	S.CHAND
03	P.C.SHARMA &D.K AGRAWAL	A TEXT BOOK OF MACHINE DESIGN	S.K.KATARIYA
04	V.B.BHANDARI	DESIGNOF MACHINE ELEMENTS	TMH
05	S.MD.JALAUDEEN	DESIGN DATA BOOK	ANURADHA PUBLICATION

TH.3 HYDRAULIC MACHINES &INDUSTRIAL FLUID POWER

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		**Semester**	**5TH**
Total Period:	**60**	**Examination**	**3 hrs.**
Theory periods:	**4 P/W**	**Class Test:**	**20**
Maximum marks:	**100**	**End Semester Examination:**	**80**

A. RATIONALE:

Use of fluids can be realized by a group of machines called hydraulic machine and use of hydraulic control and pneumatic control system in automation and in earth movers.

B. COURSE OBJECTIVES:

At the end of the course the students will be able to

1.Distinguish the working principle of pumps and turbines
2.Explain the working of centrifugal pumps and gear pumps.
3.Compare pneumatic system with hydraulic system.
4.Draw pneumatic circuits for industrial application.
5.State the properties of hydraulic system.
6.Develop hydraulic circuit for machine tool operation.

C. CHAPTERWISE DISTRIBUTION OF PERIORDS.

SL.NO	TOPICS	PERIORDS
01	HYDRAULIC TURBINES	15
02	CENTRIFUGAL PUMPS	05
03	PNEUMATIC SYSTEM	20
04	HYDRAULIC SYSTEM	20
	TOTAL	60

D.COURSE CONTENTS

1.0 *HYDRAULIC TURBINES.*

1.1 Definition and classification of hydraulic turbines
1.2 Construction and working principle of impulse turbine.
1.3 Velocity diagram of moving blades, work done and derivation of various efficiencies of impulse turbine.
1.4 Velocity diagram of moving blades, work done and derivation of various efficiencies of Francis turbine.
1.5 Velocity diagram of moving blades, work done and derivation of various efficiencies of Kaplan turbine

1.6 Numerical on above

1.7 Distinguish between impulse turbine and reaction turbine.

2.0 CENTRIFUGAL PUMPS

2.1 Construction and working principle of centrifugal pumps

2.2 work done and derivation of various efficiencies of centrifugal pumps.

2.3 Numerical on above

3.0 RECIPROCATING PUMPS

.

3.1 Describe construction & working of single acting reciprocating pump.

3.2 Describe construction & working of double acting reciprocating pump.

3.3 Derive the formula foe power required to drive the pump (Single acting & double acting)

3.5 Define slip.

3.5 State positive & negative slip & establish relation between slip & coefficient of discharge.

3.6 Solve numerical on above

4.0 PNEUMATIC CONTROL SYSTEM

4.1 Elements –filter-regulator-lubrication unit

4.2 Pressure control valves

4.2.1 Pressure relief valves

4.2.2 Pressure regulation valves

4.3 Direction control valves

4.3.1 3/2DCV,5/2 DCV,5/3DCV

4.3.2 Flow control valves

4.3.3. Throttle valves

4.4 ISO Symbols of pneumatic components

4.5. Pneumatic circuits

4 .5.1 Direct control of single acting cylinder

4.5.2 Operation of double acting cylinder

4.5.3 Operation of double acting cylinder with metering in and metering out control

5.0 HYDRAULIC CONTROL SYSTEM

5.1 Hydraulic system, its merit and demerits

5.2 Hydraulic accumulators

5.3.1 Pressure control valves

5. 3.2 Pressure relief valves

5.3.3 Pressure regulation valves

5.3 Direction control valves

5.3.1 3/2DCV,5/2 DCV,5/3DCV

5.3.2 Flow control valves

5.3.3 Throttle valves

5.4 Fluid power pumps

5.4.1 External and internal gear pumps
5.4.2 Vane pump
5.4.3 Radial piston pumps

5.5 ISO Symbols for hydraulic components.

5.6 Actuators

5.7 Hydraulic circuits

5.7.1 Direct control of single acting cylinder
5.7.2 Operation of double acting cylinder
5.7.3 Operation of double acting cylinder with metering in and metering out control

5.8 Comparison of hydraulic and pneumatic system

Syllabus to be covered up to I.A –CHAPTER 1.,2, &3

LEARNING RESOURCES

SL.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER
01	DR.JAGDISH LAL	HYDRAULIC MACHINES	METROPOLITAN BOOK CO
02	ANDREW	HYDRAULICS	
03	K SHANMUGA, SUNDARAM	HYDRAULIC &PNEUMATIC CONTROL	S.CHAND
04	MAJUMDAR	HYDRAULIC &PNEUMATIC CONTROL	TMH
05	J.F. BLACKBURN, G.REETHOF &J.L SHEARER	FLUID POWER CONTROL	

TH.4 MECHATRONICS

Name of the Course: Diploma in Mechanical Engg.			
Course code:		Semester	5th
Total Period:	60	Examination	3 hrs.
Theory periods:	4 P/W	I.A:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Day by day, engineering and technology experiences a tremendous growth. Mechatronics plays a major role in developing engineering and technology. It can be defined as the applications of electronics and computer technology to control the motions of mechanical systems. With the help of microelectronics and sensor technology, mechatronics systems are providing high levels of precision and reliability.

B. COURSE OBJECTIVES:

At the end of the course the students will be able to

1. To study the definition and elements of mechatronics system.
2. To learn how to apply the principle of mechatronics for the development of productive systems.
3. To learn the CNC technology and applications of mechatronics in manufacturing automation.
4. Define different type of system and Sensors and solve the simple problems.
5. Explain the concept of Mechanical actuation, Electrical actuation and solve the simple problems.
6. Find out the various types of System Models & Input /Output parts and solve the problems.
7. Describe the programmable Logic Controller and develop programme in PLC.
8. To learn the Industrial robotics

C. CHAPTERWISE DISTRIBUTION OF PERIORDS

Sl No.	Topic	Periods
01	Introduction to Mechatronics	05
02	Sensors and Transducers	10
03	Actuators-Mechanical, Electrical	10
04	Programmable logic controllers	15
05	Elements of CNC Machines	15
06	Robotics	05

D.COURSE CONTENTS

1.0 *INTRODUCTION TO MECHATRONICS*

1.1 Definition of Mechatronics
1.2 Advantages & disadvantages of Mechatronics
1.3 Application of Mechatronics
1.4 Scope of Mechatronics in Industrial Sector
1.5 Components of a Mechatronics System
1.6 Importance of mechatronics in automation

2.0 SENSORS AND TRANSDUCERS

2.1Defination of Transducers

2.2 Classification of Transducers

2.3 Electromechanical Transducers

2.4 Transducers Actuating Mechanisms

2.5 Displacement &Positions Sensors
2.6 Velocity, motion, force and pressure sensors.
2.7 Temperature and light sensors.

3.0 *ACTUATORS-MECHANICAL, ELECTRICAL*

3.1 Mechanical Actuators
3.1.1 Machine, Kinematic Link, Kinematic Pair
3.1.2 Mechanism, Slider crank Mechanism
3.1.3 Gear Drive, Spur gear, Bevel gear, Helical gear, worm gear
3.1.4 Belt & Belt drive
3.1.5 Bearings

3.2 Electrical Actuator
3.2.1 Switches and relay
3.2.2 Solenoid
3.2.3 D.C Motors

3.2.4 A.C Motors

3.2.5 Stepper Motors

3.2.6 Specification and control of stepper motors

3.2.7 Servo Motors D.C & A.C

4.0 *PROGRAMMABLE LOGIC CONTROLLERS(PLC)*

4.1 Introduction

4.2 Advantages of PLC

4.3 Selection and uses of PLC

4.4 Architecture basic internal structures

4.5 Input/output Processing and Programming

4.6 Mnemonics

4.7 Master and Jump Controllers

5.0 ELEMENTS OF CNC MACHINES

5.1 Introduction to Numerical Control of machines and CAD/CAM

5.1.1 NC machines

5.1.2 CNC machines

5.1.3.CAD/CAM

5.1.3.1 CAD

5.1.3.2 CAM

5.1.3.3 Software and hardware for CAD/CAM

5.1.3.4 Functioning of CAD/CAM system

5.1.3.4 Features and characteristics of CAD/CAM system

5.1.3.5 Application areas for CAD/CAM

5.2 elements of CNC machines

5.2.1 Introduction

5.2.2 Machine Structure

5.2.3 Guideways/Slide ways

5.2.3.1 Introduction and Types of Guideways

5.2.3.2 Factors of design of guideways

5.2.4 Drives

5.2.4.1 Spindle drives

5.2.4.2 Feed drive

5.2.5 Spindle and Spindle Bearings

6.0 ROBOTICS

6.1 Definition, Function and laws of robotics

6.2Types of industrial robots

6.3 Robotic systems

6.4 Advantages and Disadvantages of robots

Syllabus to be covered up to 1st I.A : Chapters 1,2,3 & 4

LEARNING RESOURCES:

SL.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER
1	W. Bolton	Mechatronics	Pearson Education India
2	R.K Rajput	Text book of Mechatronics	S. Chand
3	R. RADHAKRISHNA, S,SUBRAMANIAN	CAD/CAM/CIM	NEW AGE INTERNATIONAL PVT.LTD
4	MIKELL GROVER	CAD/CAM	

Th.5 REFRIGERATION AND AIR CONDITIONING

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		**Semester**	**5th**
Total Period:	**60**	**Examination**	**3 hrs**
Theory periods:	**4 P/W**	**I.A:**	**20**
Maximum marks:	**100**	**End Semester Examination:**	**80**

A. RATIONALE:

Food Preservation is the basic need of food industry to improve effective utilization of food. Hence the study of Refrigeration and Air-conditioning is essential. Comfort is the basic requirement of customers and machines through air conditioning & hence learning the concept of air-conditioning and methods of air-conditioning facilities quality design of air conditioning.

B. COURSE OBJECTIVE:

At the end of the course the students will be able to

1. Explain the working of open & closed air system of air refrigeration system
2. Describe the working and construction of compressor, Condenser, evaporator, expansion valve used for air conditioning and refrigeration.
3. Explain Vapor Compression refrigeration system.
4. Explain Vapor Absorption refrigeration system.
5. Compare different refrigerants properties.
6. Describe equipment for air conditioning.
7. Explain the cooling load for the given requirement.

C. CHAPTER WISE DISTRIBUTION OF PERIODS

Sl.No.	Topic	Periods
01	**AIR REFRIGERATION CYCLE**	05
02	**SIMPLE VAPOUR COMPRESSION REFRIGERATION SYSTEM**	10
03	**VAPOUR ABSORPTION REFRIGERATION SYSTEM**	07
04	**REFRIGERATION EQUIPMENTS**	08
05	**REFRIGERANT FLOW CONTROLS, REFRIGERANTS & APPLICATION OF REFRIGERANTS**	10
06	**PSYCHOMETRICS &COMFORT AIR CONDITIONING SYSTEMS**	10
07	**AIR CONDITIONING SYSTEMS**	10
	TOTAL	60

D.COURSE CONTENTS

***1.0** AIR REFRIGERATION CYCLE.*

1.1 Definition of refrigeration and unit of refrigeration.

1.2 Definition of COP, Refrigerating effect (R.E)

1.3 Principle of working of open and closed air system of refrigeration.

1.3.1 Calculation of COP of Bell-Coleman cycle and numerical on it.

2.0 SIMPLE VAPOUR COMPRESSION REFRIGERATION SYSTEM

2.1 schematic diagram of simple vapors compression refrigeration system'

2.2 Types

2.2.1 Cycle with dry saturated vapors after compression.

2.2.2 Cycle with wet vapors after compression.

2.2.3 Cycle with superheated vapors after compression.

2.2.4 Cycle with superheated vapors before compression.

2.2.5 Cycle with sub cooling of refrigerant

2.2.6 Representation of above cycle on temperature entropy and pressure enthalpy diagram

2.2.7 Numerical on above (determination of COP,mass flow)

3.0 VAPOUR ABSORPTION REFRIGERATION SYSTEM

3.1 Simple vapor absorption refrigeration system

3.2 Practical vapor absorption refrigeration system

3.3 COP of an ideal vapor absorption refrigeration system

3.4.Numerical on COP.

4.0 REFRIGERATION EQUIPMENTS

4.1 REFRIGERANT COMPRESSORS

4.1.1 Principle of working and constructional details of reciprocating and rotary compressors.

4.1.2 Centrifugal compressor only theory

4.1.3 Important terms.

4.1.4 Hermetically and semi hermetically sealed compressor.

***4.2** CONDENSERS*

4.2.1 Principle of working and constructional details of air cooled and water cooled condenser

4.2.2 Heat rejection ratio.

4.2.3 Cooling tower and spray pond.

***4.3** EVAPORATORS*

1.6.1 Principle of working and constructional details of an evaporator.

1.6.2 Types of evaporator.

1.6.3 Bare tube coil evaporator, finned evaporator, shell and tube evaporator.

5.0 REFRIGERANT FLOW CONTROLS, REFRIGERANTS & APPLICATION OF REFRIGERANTS

5.1 EXPANSION VALVES

5.1.1 Capillary tube

5.1.2 Automatic expansion valve

5.1.3 Thermostatic expansion valve

5.2 REFRIGERANTS

5.2.1 Classification of refrigerants

5.2.2 Desirable properties of an ideal refrigerant.

5.2.3 Designation of refrigerant.

5.2.4 Thermodynamic Properties of Refrigerants.

5.2.5 Chemical properties of refrigerants.

5.2.6 commonly used refrigerants, R-11, R-12, R-22, R-134a, R-717

5.2.7 Substitute for CFC

5.3 Applications of refrigeration

5.3.1 cold storage

5.3.2 dairy refrigeration

5.3.3 ice plant

5.3.4 water cooler

5.3.5 frost free refrigerator

6.0 PSYCHOMETRICS &COMFORT AIR CONDITIONING SYSTEMS

6.1 Psychometric terms

6.2 Adiabatic saturation of air by evaporation of water

6.3 Psychometric chart and uses.

6.4 Psychometric processes

6.4.1 Sensible heating and Cooling

6.4.2 Cooling and Dehumidification

6.4.3 Heating and Humidification

6.4.4 Adiabatic cooling with humidification

6.4.5 Total heating of a cooling process

6.4.6 SHF, BPF,

6.4.7 Adiabatic mixing

6.4.8 Problems on above.

6.5 Effective temperature and Comfort chart

7.0 AIR CONDITIONING SYSTEMS

7.1 Factors affecting comfort air conditioning. .
7.2 Equipment used in an air-conditioning.
7.3 Classification of air-conditioning system
7.4 Winter Air Conditioning System
7.5 Summer air-conditioning system.
7.6 Numerical on above

Syllabus to be covered up to I.A- Chapters1.2&3.

LEARNING RESOURCES

SL.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER
01	C.P ARRORA	REFRIGERATION AND AIR CONDITIONING	TMH
02	R.S.KHURMI &J.K.GOPTA	REFRIGERATION AND AIR CONDITIONING	S.CHAND
03	P.L BALLANY	REFRIGERATION AND AIR CONDITIONING	KHANNA PUBLISHER
04	DOMKUNDRA AND ARORA	REFRIGERATION AND AIR CONDITIONING	DHANPAT RAY AND SONS

Pr.1 REFRIGERATION AND AIR CONDITIONING LAB

Name of the Course: Diploma in Mechanical Engg.			
Course code:		Semester	5th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Sessional:	25
Maximum marks:	100	End Semester Examination:	50

COURSE OBJECTIVES

At the end of the course the students will be able to

1. Study the construction features of Domestic Refrigerator, water cooler, Window Air Conditioner, Split Air Conditioner
2. Determining the capacity, COP, of Refrigerator Test Rig, Window air Conditioner, Split Air Conditioner, Water cooler.
3. Evacuating the entire system
4. Locating the leakage in refrigerating system
5. Charging of the refrigerating system

List of Practicals

1. Study the construction features of Domestic Refrigerator.
2. Study the construction features of water cooler.
3. Study the construction features of window air conditioner
4. Study the construction features of split air conditioner
5. Determine the capacity and cop of vapour compression Refrigerator test rig
6. Determine the capacity and cop of water cooler
7. Determine the capacity and cop of window air conditioner
8. Determine the capacity and cop of split air conditioner
9. Determine the capacity and cop of vapour absorption Refrigerator test rig.
10. Complete charging of a domestic refrigerator and its leak test.

Pr 2. HYDRAULIC MACHINES &INDUSTRIAL FLUID POWER LAB

Name of the Course: Diploma in Mechanical Engg.			
Course code:		Semester	5th
Total Period:	60	Examination	3 hrs.
Theory periods:	4 P/W	Sessional:	25
Maximum marks:	100	End Semester Examination:	50

COURSE OBJECTIVES

At the end of the course the students will be able to

1.0 Conducting performance test on impulse and reaction turbine

2.0 Conducting performance test on centrifugal pump

3.0 Designing &operating pneumatic circuits

4.0 Designing &operating industrial fluid power circuits

List of Practicals

1.0 Performance test on impulse turbine and to find out the efficiency

2.0 Performance test on Kaplan turbine and to find out the efficiency

3.0 Performance test on Francis turbine and to find out the efficiency

4.0 Performance test on centrifugal pump and to find out the characteristic curves

5.0 Direct operation of single &double acting pneumatic cylinder.

6.0 Operating double acting pneumatic cylinder with quick exhaust valve

7.0 Speed control double acting pneumatic cylinder using metering in and metering out circuits.

8.0 Direct operation of single &double acting hydraulic cylinder

9.0 Direct operation of hydraulic motor

10.0 Speed control double acting hydraulic cylinder using metering in & metering out circuits.

Pr.3 CAD/CAM LAB

Name of the Course: Diploma in Mechanical Engg.			
Course code:		Semester	5th
Total Period:	60	Examination	3 Hrs
Theory periods:	4 P/W	Sessional:	25
Maximum marks:	75	End Semester Examination:	50

OBJECTIVES

At the end of the course the students will be able to

1.To understand the fundamentals and use of CAD.

2.To conceptualize drafting and modelling in CAD.

3.To interpret the various features in the menu of solid modelling package.

4.To synthesize various parts or components in an assembly.

5.Toprepare CNC programmes for various jobs

COURSE CONTENTS

PART-A.

INTRODUCTION:

Part modelling, Datum plane, Datum plane; constraint; dimensioning; extrude; revolve; sweep; protrusion; extrusion; rib; shell; hole; round; chamfer; copy; mirror; assembly; align; orient.

EXERCISES:

2D Drawings of Rectangle, circle, polygon and its dimensioning

3D Drawings of;

1.Gib and cutter joint

2.Screw Jack;

3.Connecting Rod;

4.Bearing Block.

Print the orthographic view from the above assembled 3Ddrawing

PART-B.

CNC Programming and Machining

INTRODUCTION;

1.Study of CNC lathe, milling;

2.Study of international codes; G-Codes and M –Codes

3.Format –Dimensioning methods;

4.Programme writing –Turning Simulator-Milling simulator IS practice-commands menus

5.Editing the programme in the CNC MACHINES;

6.Execute the programme in the CNC machines;

Exercise;

1. Print the programme and make the component in the CNC machine;

2.Using canned cycle-create a part programme for thread cutting, grooving and produce component in the CNC Turning Machine

3.Using Linear interpolation and Circular Interpolation-Create a part programme for grooving and produce component in the CNC Milling Machine

Pr 4. PROJECT WORK (Phase-I)

Course code:		Semester	5th
Total Period:	60	Examination :	-
Theory periods:	4P / week	Sessional Marks	25
		TOTAL Marks	25

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of mechanical engineering practices in real life situations, so as to participate and manage a large mechanical engineering projects in future.

Entire Project shall spread over 5th and 6th Semester. Part of the Project covered in 5th Semester shall be named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real life working environment, preferably in an industrial environment.
- Develop working models or applications and implement these for the actual needs of the community/industry.
- Explain the working of industrial environment and its work ethics.
- Explain what entrepreneurship is and how to become an entrepreneur.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- Find latest ideas on robotics, automation and mechatronics based projects.

General Guidelines

The individual students have different aptitudes and strengths and also areas of interest. Project work, therefore, should match the strengths and interest of the students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (right from beginning of 5th semester). Students should be allotted a problem of interest to him/her as a project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. Preferably there should not be more than 5 students, if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

Following are the broad suggestive areas of project work

- ✓ Automobile based projects.
- ✓ Refrigeration based &Air conditioning based projects.
- ✓ Hydraulic control &Pneumatic control based automation projects
- ✓ Fabrication based projects.
- ✓ Wind mill
- ✓ Solar energy based projects.
- ✓ Thermal power plant using steam.
- ✓ Hydel power dam.
- ✓ Cooling tower.

- ✓ Solenoid based hammer.
- ✓ Unmanned railway crossing.
- ✓ Engine based air compressor.
- ✓ Mobile all round year air conditioner
- ✓ Driverless car.
- ✓ Hybrid motorbike.
- ✓ Any other areas found suitable.
- ✓ Torque testing machine.
- ✓ Spring testing machine.
- ✓ Mechanical sanitizer.
- ✓ Solar powered refrigerator.
- ✓ Door opener.

A suggestive criterion for assessing student performance by the external (preferably person from industry) andinternal (teacher) examiner is given in table below:

Sl. No.	**Performance Criteria**
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students andinvite leading Industrial organizations to such an exhibition.

Project Phase-I and Phase-II

The Project work duration shall cover 2 semesters(5^{th} and 6^{th} sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group shall be done in the beginning of 5^{th} sem under Project Phase-I. The students may be allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work upto Design of the system have to be complete in Phase-I. Execution of work may begin in Phase-I depending on the Project. Project Milestones are to be set so that progress can be tracked . In Phase-II Execution of work and Documentation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-I in 5^{th} semester there shall be one presentation by each group to mark to progress and also to judge whether the Project is moving in right direction as per the objective of the Project.

EQUIPMENT LIST

REFRIGERATION AND AIR –CONDITIONING LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	Domestic Refrigerator test rig	01 no
02	water cooler test rig	01 no
03	Window Air Conditioner test rig	01 no
04	Split Air Conditioner test rig	01 no
05	Vacuum pump set with accessories	01 no
06	Charging cylinder with accessories	02 nos
07	Halide torch or any leak tester	02 nos
08	Vapour absorption test rig	01

HYDRAULIC MACHINES & INDUSTRIAL FLUID POWER LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	Impulse turbine(PELTON WHEEL) Test Rig with arrangements to find efficiency	01no
02	Kaplan turbine Test Rig with arrangements to find efficiency	01no
03	Francis turbine Test Rig with arrangements to find efficiency	01no
04	Centrifugal pump Test Rig with arrangements to find efficiency	01no
05	Pneumatic Trainer Kit with accessories	02nos
06	Hydraulic Trainer Kit with accessories	01no
07	Manual or Digital Tachometer	05nos

CAD/CAM LAB

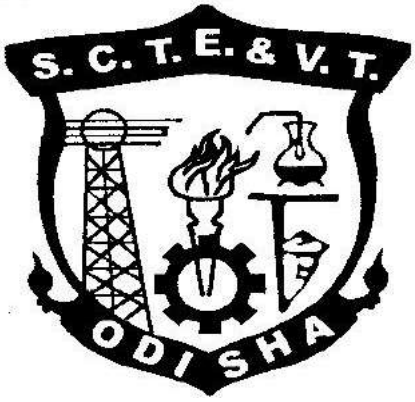
SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	DESKTOP COMPUTER with UPS	30 no
02	AUTOCAD SOFTWARE 2D/3D	01 each
03	CNC TURNING MACHINE	01 no
04	CNC MILLING MACHINE	01 no
05	PRINTER	02 nos

CURRICULLUM OF 5TH SEMESTER

For

DIPLOMA IN MINING ENGINEERING

(Effective FROM 2020-21 Sessions)



STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING,ODISHA, BHUBANESWAR

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING,ORISSA

TEACHING AND EVALUTION SCHEME FOR 5th Semester Mining Engg. (w e f 2020-21)

SUBJECT NUMBER	SUBJECT CODE	SUBJECT	Periods/Week			Evaluation Scheme			
			L	T	P	Internal assessment /Sessional	End Sem Exam	Exams (Hours)	Total
		Theory							
Th. 1		Entrepreneurship and Management & Smart Technology	4	-	-	20	80	3	100
Th .2		Mine Hazard and Safety	4	-	-	20	80	3	100
Th .3		Mine Legislation and General Safety -I	4	-	-	20	80	3	100
Th .4		Mine Machinery -I	4	-	-	20	80	3	100
Th. 5		Underground Metal Mining	4	-	-	20	80	3	100
		Total	20			100	400		500
		Practical							
Pr .1		Mine Hazard and Safety Lab	-	-	6	50	50	3	100
Pr .2		Mine Machinery -I Lab	-	-	6	50	50	3	100
Pr .3		Project Phase - I	-	-	4	50	-		50
		Student Centred Activities(SCA)	-	-	3	-	-		
		Total			19	150	100		250
		Grand Total	20		19	250	500		750

Abbreviations : L-Lecturer ,T-Tutorial ,P-Practical .Each class is of minimum 55 minutes duration.

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/Personality Development/Environmental issues /Quiz/Hobbies/Field visits/Cultural Activities/Library Studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assesment done for each of Theory subject .Sessional Marks shall be total of the performance of individual differentjobs/experiments in a subject throughout the semester

Th1. ENTREPRENEURSHIP and MANAGEMENT & SMART TECHNOLOGY

(Common to All Branches)

Theory	**4 Periods per week**	**Internal Assessment**	**20 Marks**
Total Periods	**60 Periods**	**End Sem Exam**	**80 Marks**
Examination	**3hours**	**Total Marks**	**100Marks**

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Entrepreneurship	10
2	Market Survey and Opportunity Identification(Business Planning)	8
3	Project report Preparation	4
4	Management Principles	5
5	Functional Areas of Management	10
6	Leadership and Motivation	6
7	Work Culture, TQM & Safety	5
8	Legislation	6
9	Smart Technology	6
	TOTAL	60

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students, so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. It may be further added thatan entrepreneurial mind set with managerial skill helps the student in the job market. The students can also be introduced with Startup and Smart Technology concept, which shall radically change the working environment in the coming days in the face of Industry 4.0

In this subject, the Students shall be introduced/ exposed to different concepts and Terminologies in brief only, so that he/she can have broad idea about different concepts/items taught in this subject. Solving numerical problem on any topic/item is beyond the scope of this subject.

OBJECTIVES

After undergoing this course, the students will be able to :

- Know about Entrepreneurship, Types of Industries and Startups
- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- know the management Principles and functional areas of management
- Inculcate leadership qualities to motivate self and others.
- Maintain and be a part of healthy work culture in an organisation.
- Use modern concepts like TQM
- Know the General Safety Rules
- Know about IOT and its Application in SMART Environment.

DETAILED CONTENTS

1. Entrepreneurship

- Concept /Meaning of Entrepreneurship
- Need of Entrepreneurship
- Characteristics, Qualities and Types of entrepreneur, Functions
- Barriers in entrepreneurship

- Entrepreneurs vrs. Manager
- Forms of Business Ownership: Sole proprietorship, partnership forms and others
- Types of Industries, Concept of Start-ups
- Entrepreneurial support agencies at National, State, District Level(Sources): DIC, NSIC,OSIC, SIDBI, NABARD, Commercial Banks, KVIC etc.
- Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks

2. Market Survey and Opportunity Identification (Business Planning)

- Business Planning
- SSI, Ancillary Units, Tiny Units, Service sector Units
- Time schedule Plan, Agencies to be contacted for Project Implementation
- Assessment of Demand and supply and Potential areas of Growth
- Identifying Business Opportunity
- Final Product selection

3. Project report Preparation

- Preliminary project report
- Detailed project report, Techno economic Feasibility
- Project Viability

4. Management Principles
- Definitions of management
- Principles of management
- Functions of management (planning, organising, staffing, directing and controlling etc.)
- Level of Management in an Organisation

5. Functional Areas of Management

a) Production management
    - Functions, Activities
    - Productivity
    - Quality control
    - Production Planning and control

b) Inventory Management
    - Need for Inventory management
    - Models/Techniques of Inventory management

c) Financial Management
    - Functions of Financial management
    - Management of Working capital
    - Costing (only concept)
    - Break even Analysis
    - Brief idea about Accounting Terminologies: Book Keeping, Journal entry, Petty Cash book, P&L Accounts, Balance Sheets(only Concepts)

d) Marketing Management
    - Concept of Marketing and Marketing Management
    - Marketing Techniques (only concepts)
    - Concept of 4P s (Price, Place, Product, Promotion)

e) Human Resource Management
- Functions of Personnel Management

- Manpower Planning, Recruitment, Sources of manpower, Selection process, Method of Testing, Methods of Training & Development, Payment of Wages

6. Leadership and Motivation

a) Leadership
- Definition and Need/Importance
- Qualities and functions of a leader
- Manager Vs Leader
- Style of Leadership (Autocratic, Democratic, Participative)

b) Motivation
- Definition and characteristics
- Importance of motivation
- Factors affecting motivation
- Theories of motivation (Maslow)
- Methods of Improving Motivation
- Importance of Communication in Business
- Types and Barriers of Communication

7. Work Culture, TQM & Safety
- Human relationship and Performance in Organization
- Relations with Peers, Superiors and Subordinates
- TQM concepts: Quality Policy, Quality Management, Quality system
- Accidents and Safety, Cause, preventive measures, General Safety Rules , Personal Protection Equipment(PPE)

8. Legislation

a) Intellectual Property Rights(IPR), Patents, Trademarks, Copyrights
b) Features of Factories Act 1948 with Amendment (only salient points)
c) Features of Payment of Wages Act 1936 (only salient points)

9. Smart Technology
- Concept of IOT, How IOT works
- Components of IOT, Characteristics of IOT, Categories of IOT
- Applications of IOT- Smart Cities, Smart Transportation, Smart Home, Smart Healthcare, Smart Industry, Smart Agriculture, Smart Energy Management etc.

Syllabus to be covered before IA: Chapter 1,2,3,4

RECOMMENDED BOOKS

1. Entrepreneurship Development and Management by R.K Singhal, Katson Books., New Delhi
2. Entrepreneurship Development and Management by U Saroj and V Mahendiratta, Abhishek Publications, Chandigarh
3. Entrepreneurship Development and Management by Vasant Desai, Himalaya Pub.House
4. Industrial Engineering and Management by O.P Khanna ,Dhanpat Rai and Sons
5. Industrial Engineering and Management by Banga and Sharma, Khanna Publications
6. Internet of Things by Jeeva Jose, Khanna Publications, New Delhi
7. Online Resource on Startups and other concepts
8. https://www.fundable.com/learn/resources/guides/startup

Th.2. MINE HAZARD AND SAFETY

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

RATIONALE

As a Mining Engineer, one must be thoroughly conversant with various sources of mining hazards as also the remedial measures needed to be undertaken toavoid any mishap and able to understand total operation of rescue and recovery.

OBJECTIVES

After completion of the subject, students will be able to:

- Testing of different mine gases. Physiological effect on miners, detection of fire damp by flame safety lamp, explains the method of gas testing by CO-detectors & methanometer.
- Explain how firedamp is emitted in mines.
- Explain causes of mine fires & spontaneous heating.
- Define explosion, explain causes & elaborate necessary steps required for prevention of coal dust & firedamp explosion.
- Define mine inundation, explain causes & elaborate necessary preventive measures required.
- Describe lighting arrangement, lighting standards explain glare & its effect
- Explain the effect of noise & vibration on miners & mine structures & other surface structure.
- Explain rescue and recovery work when mine hazard occurs.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Mine gases & gas testing	6
2	Emission of firedamp in U/g coal mines	6
3	Mine fires & spontaneous heating	10
4	Mine Explosion	10
5	Mine Inundation	8
6	Mine lighting & Illumination	5
7	Noises & Vibration	5
8	Mine Rescue and Recovery	10
	Total	60

COURSE CONTENTS

1. Mine gases & gas testing
   - Composition of atmospheric air. Different mine gases, their properties and physical effects .
   - State fire damps, black damp, stink damp, white damp and after damp in mines.
   - Describe flame safety lamp & its working principle.
   - Explain gas testing by flame safety lamp by accumulation test & percentage test.
   - State precaution for gas testing.
   - Describe various parts of flame safety lamp, special features.
   - State limitations of flame safety lamp.

2. Emission of firedamp in U/g workings
   - Describe gradual exudation, blower & outbursts of firedamp in U/g workings.

3. Define fires & spontaneous heating
   - Define incubation period
   - Define spontaneous heating and its causes and effects.
   - State preventive measures against spontaneous heating.
   - Explain CO/O_2 ratio & CO_2/O_2 ratio.

4. Mine Explosion
   - Describe coal dust explosion & fire damp explosion with their causes & prevention.
   - State inflammability of coal dust & fire damp.
   - Explain Coward's diagram.
   - State prevention, suppression & treatment of dust.
   - Describe sampling of dust in Mines.
   - Stone dust barrier.

5. Mine Inundation
   - State sources of water in mines & its danger.
   - State precaution against inundation.
   - Describe burnside safety boring apparatus.
   - State precaution while approaching water logged area.
   - Describe water dams- its construction & design. (Without derivation of formula)
   - Explain water danger plan.
   - Statutory provision for working near water body.

6. Mine lighting & illumination
   - Define illumination and its units.
   - Standards of lighting at different parts of mine as per mine regulation.

7. Noise and Vibration .
   - Explain the effect of noise & vibration on miners & mine structures & other surface structure with respect to statutory provision.

8. Mine Rescue and Recovery
   - Proto-IV, Proto-V, Drager BG-174, Self rescuer, Smoke helmet, Gas mask.
   - Construction of Rescue brigade and their role in rescue and recovery operation.
   - Mine Rescue rules 1985 Annexure I,II,III.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2,3,4

Learning Resourses:		
Sl. No.	Title of the Book	Name of Authors
1	Mine Ventilation	G B Mishra
2	EMT - II	D J Deshmukh
3	Coal Mine Practices	E Mason
4	UMS Vol - I	
5	Coal mine Regulations - 2017	
6	Mine Rescue	M A Ramlu

Th. 3. MINE LEGISLATION & GENERAL SAFETY-I

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

RATIONALE

Since Mining operations involve frequent accidents, it is very important for a mining engineer to be thoroughly conversant with various acts & rules framed for providingsafety to workers.

OBJECTIVES

On completion of the course, students will be able to :

- Describe various aspects of Mines Act 1952.
- Describe various aspects of Mines Rule 1955.
- Describe various aspects of Coal Mines Regulations 2017.
- Describe various aspects of Mines Rescue Rules 1985.
- Describe various aspects of Indian Explosive Rules 2008.
- Describe various aspects of Central Electricity Authority 2010.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Mines Act 1952	14
2	Mines Rules 1955	10
3	Coal Mines Regulations 2017	18
4	Mine Rescue Rules 1985	5
5	Indian Explosive Rule 2008	7
6	Central Electricity Authority 2010	6
	Total	60

COURSE CONTENTS

1. Mines Act 1952
   - Discuss various provisions of Mines Act 1952.

2. Mines Rules 1955
   - Discuss various provisions of Mines Rule 1955.

3. Coal Mines Regulation 2017
   - Discuss various Provisions of C.M.R. 2017.

4. Mines Rescue Rules 1985
   - Discuss various provisions of Mines Rescue Rules 1985.

5. Indian Explosive Rules 2008
   - Discuss various provisions of Indian Explosive Rules 2008.

6. Central Electricity Authority 2010
   - Discuss various provisions of Central Electricity Authority 2010.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2

Learning Resourses		
Sl. No.	Title of the Book	Name of Authors
1	Mines Act - 1952	
2	Mines Rules - 1955	
3	Coal Mine Regulations - 2017	
4	Mines Rescue Rules - 1985	
5	Indian Explosive Rules - 2008	
6	Central Electricity Authority - 2010	

Th.4. MINE MACHINERY – I

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

RATIONALE

It is imperative that a Mining Engineer should be thoroughly conversant withvarious types of machine used in mining operations.

OBJECTIVES

On completion of the subject, students will be able to:

- Describe type & construction of wire, their uses, maintenance & related calculation.
- Describe different types of transportation methods in mines.
- Explain headgear's functions & its design factors.
- Describe constructional & safety features of cage and shaft.
- Describe different profiles of winding drum, various safety devices & related calculations.
- Describe different types of friction winding & its function.
- Explain skip-winding arrangements.
- Draw various arrangements at pit top & pit bottom layouts.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Wire ropes	12
2	Rope Haulage	14
3	Headgear	5
4	Cage & shaft fittings	6
5	Winding drum	6
6	Friction Winding	5
7	Skip Winding	6
8	Pit top & Bottom Layout	6
	Total	60

COURSE CONTENTS

1. Wire Ropes

- State the types of wire ropes used in Mines.
  - Describe constructional features of wire ropes & lay of wire ropes.
- Define factor of safety to wire ropes nominal & actual factor of safety of wire ropes.
  - State factors influencing the F.O.S.
- State efficiency of rope construction, space factor & cross sectional area rope.
- State factors affecting deterioration of ropes.
- Describe care & maintenance of ropes.
- State & describe testing & examination of wire ropes.
- Give the procedure of splicing of wire rope
- Describe rope capel for haulage winding & recapping.

2. Rope Haulage

- Transportation in mines by rope haulage.
- State type of rope haulage.
- Describe various types of rope haulage with simple sketches.
- State & describe different type of safety devices on rope haulage roadways.
- State & describe different types of clips & couplings.

3. Headgear

- State function of headgear.
- Describe constructional features of headgear pulley.
- Define angle of fleet.

4. Cage and shaft fittings

- Describe cage, cage suspension gear, detaching hooks & its function, safety catch at headgear & keps.
- State types of guide.
- State & describe rigid guide, flexible shoes, guide rope suspension & tensioning arrangement.

5. Winding drum

- State different profiles of winding Drum.
- Describe different types of winding brake.
- Describe various types of safety devices on winding system.

6. Friction Winding

- State & describe principle & constructional features of ground-mounted & tower-mounted koepe winder.
- State advantages & disadvantages of koepe winding.
- Describe multirope system of koepe winding.

7. Skip winding

- Describe constructional features bottom discharge skip, Top discharge skip.
- Compare skip winding cage winding.

8. Pit top & Pit bottom circuit layout

- State factors affecting pit top & pit bottom layouts.
- Describe different types of pit top & pit bottom car/tub circuit layouts.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2.3.4

Learning Resourses		
Sl. No.	Title of the Book	Name of Authors
1	Mine Hoisting	M A Ramulu
2	SME Mining Engg Handbook	
3	Material Handling in Mines,IIT KGP	
4	EMT III	D.J.Desmukh
5	Mine Transport	N.T Kerlin
6	UMS Volume	

Th. 5. UNDERGROUND METAL MINING

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

RATIONALE

As Mining Engineer, one should have the knowledge in fundamental principles ofgeneration in underground metal mines.

OBJECTIVES

On completion of the subject, students will be able to :

- Describe various methods to access an ore body.
- Explain various methods of development used in underground metal mines.
- Compare between coal & metal mining.
- Explain various stopping methods used in u/g metal mines.
- Stone Drifting.
- Explain causes & prevention of rock burst.
- Describe about face mechanization.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Access to ore body	5
2	Development in underground metal mines	12
3	Comparative study between Coal & Metal Mining	3
4	Stoping Method	18
5	Stone Drifting.	7
6	Rock burst.	5
7	Face mechanization	10
	Total	60

COURSE CONTENTS (Based on specific objectives)

1. Access to ore body
- Classify modes of entries – Adits , inclines and shafts ,applicability of entries.

2. Development in underground Metal Mine.
- Explain formation of blocks of mineral deposit.

- Explain level interval
- Describe
- Open raising method
- Two compartment method
- Jora raise lift
- Long hole drilling method./Vertical Crater retreat (VCR) method.
- Alimak raise climber
- Raise borer.
- Development of Ore passe system.

3. Give a comparative study between coal and metal Mining.

4. Stoping methods.

- Classify stoping methods with application and factors affecting methods of stopping.
- Preparatory arrangement for stoping.
- Describe the following methods with layout including drilling, blasting, transportation and supports.
- Open stoping.
- Open stoping with pillar support.
- Shrinkage stoping.
- Cut & fill stoping.
- Square set stoping.
- Block caving.
- Sub-level caving.
- Top slicing.

5. Stone Drifting

- Describe conventional methods of drifting. Find out direction gradient of drift. Describe drilling and blasting, support, transportation, drainage, ventilation and lighting arrangements, organization and supervision in mechanised method of drifting.

6. Rock Burst

- Explain causes and prevention of rock burst.

7. Face mechanization

- Describe use of jumbo drill with air leg.
- Describe various Loading & Transportation System like
- L.H.D., L.P.D.T.(Low Profile Dump Truck), rocker shovel, spiral chutes and draw points, Scraper etc.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3

Learning Resourses		
Sl. No.	Title of the Book	Name of Authors
1	SME Mining Engineering Hand Book Vol.I & II-1993 edition.	
2	Metal Mining	Chacharker
3	Mining Engineering Hand Book	Peele
4	EMT Vol.II	D.J.Desmukh
5	Mining Ground control	Prof. B.S. Verma
6	Rock Mechanics	Jermic
7	Rock Mechanics	Jugger & Cook
8	Metalliferous Mining	Higam
9	Underground Mining Method	Bullock.

Pr.1 MINING HAZARDS & SAFETY LAB

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	90	End Examination	50
Practical Periods:	6P/week	Sessional	50
		Total	100

A. RATIONALE:

As a Mining Engineer, one must be thoroughly conversant with various sources of mining hazards as also the remedial measures needed to be undertaken toavoid any mishap and able to understand total operation of rescue and recovery.

B. OBJECTIVES:

On completion of lab students will able to :

- Develop a clear idea about Methanometer & CO detector.
- Know details about procedure of analysis of gases by halden & Orsat apparatus.
- Sample the dust particles by using Gravimetric dust Sampler.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Estimation of CH_4 in air sample using flame safety lamp and methanometer.	18
2	Study & use of different types of methonometer.	10
3	Determination of CO by using CO-dectector.	6
4	Determination of CO_2 in air sampling by CO_2 detectors	10
5	Gas analysis by (I) Orsat apparatus.	8
6	Haldane apparatus for gas analysis.	8
7	Study & uses of Konimeter.	6
8	Sampling of dust by gravimetric dust sampler.	10
9	Study of Rescue Apparatus	6
10	Multi gas Detector (NOx, H_2S, CO, CO_2)	8
	Total	90

C. COURSE CONTENT.

- Estimation of CH_4 in air sample using flame safety lamp and detection by a methanometer.
  - Accumulation & percentage test of CH_4 by flame safety lamp.

- Study & use of different types of methonometer.
- Determination of CO by using CO-dectector.
- Determination of CO_2 in air sampling by CO_2 detectors.
- Gas analysis by (I) Orsat apparatus.
- Haldane apparatus for gas analysis.
- Study & uses of Konimeter.
- Sampling of dust by gravimetric dust sampler.
- Study of Rescue Apparatus.
- Multi gas Detector (NOx, H_2S, CO, CO_2

Pr.2. MINE MACHINERY – I LAB.

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	90	End Examination	50
Practical Periods:	6P/week	Sessional	50
		Total	100

RATIONALE

It is imperative that a Mining Engineer should be thoroughly conversant withvarious types of machine used in mining operations.

OBJECTIVES:

On completion of lab students will able to :

- Develop a clear idea about Wire rope,rope splicing & capeling.
- Know details about Safety hook,keps & rope guides.
- Generate a clear idea about head gear structure,suspension gear & winding drum.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Study of Wire rope.	8
2	Study of rope splicing.	8
3	Study of rope capel.	8
4	Study of safety hook.	10
5	Study of keps.	8
6	Study of guide in shaft.	8
7	Study of clips used in endless rope haulage.	8
8	Model Development of Headgear Structure.	8
9	Model Development of Suspension Gear.	8
10	Model Development of different types of winding drum.	8
11	Model development of different types of safety devices used inhaulage.	8
	Total	90

COURSE CONTENT.

- Study of Wire rope.
- Study of rope splicing.

- Study of rope cappel.
- Study of safety hook.
- Study of keps.
- Study of guide in shaft.
- Study of clips used in endless rope haulage.
- Model Development of Headgear Structure.
- Model Development of Suspension Gear.
- Model Development of different types of winding drum.
- Model development of different types of safety devices used in haulage roadways.

Pr 3. PROJECT WORK (Phase-I)

Name of the Course: Diploma in Mining			
Course code:		Semester	5th
Total Period:	60	Examination :	-
Theory periods:	4P / week	Sessional Marks	50
		TOTAL Marks	50

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Mining Engineering and practices in real life situations, so as to participate and manage a Mining projects in future.

Entire Project shall spread over 5th and 6th Semester. Part of the Project covered in 5th Semester shall be named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience in Mines operation and management.
- To develop the skill of writing Project Report

General Guidelines

The individual students have different aptitudes and strengths and also areas of interest. Project work, therefore, should match the strengths and interest of the students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (right from beginning of 5th semester). Students should be allotted a problem of interest to him/her as a project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. Preferably there should not be more than 5 students, if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

A suggestive criterion for assessing student performance by the external (preferably personfrom industry) and internal (teacher) examiner is given in table below:

Sl. No.	Performance Criteria
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type ofproject work.
It is proposed that the institute may organize an annual exhibition of the project work doneby the students and invite leading Industrial organisations to such an exhibition.

Project Phase-I and Phase-II

The Project work duration shall cover 2 semesters(5^{th} and 6^{th} sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group shall be done in the beginning of 5^{th} sem under Project Phase-I. The students may be allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work including Design of the system have to be complete in Phase-I. Project Milestones are to be set so that progress can be tracked . In Phase-II detailed work, Testing, Documentation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.
At the end of Project Phase-I in 5^{th} semester there shall be one presentation by each group to mark to progress and also to judge whether the Project is moving in right direction as per the objective of the Project.

Equipment List

MINE HAZARD AND SAFETY LAB

(a) GL50 and GL60 flame safety lamp.
(b) MSA D6 Methanometer.
(c) CO detector.
(d) CO2 detector.
(e) Orsat apparatus
(f) Konometer.
(g) GDS dust sampler.
(h) Multigas detector
(i) Hygrometer.
(j) Haldane apparatus.
(k) DRAGER BG174 self-contained breathing apparatus.
(l) Self-contained open circuit breathing apparatus.
(m) Face mask for rescue apparatus.

MINE MACHINERY –I LAB

(a) Pieces of standard and non standard Rope.
(b) Model of rope splicing.
(c) Rope splicing tools.
(d) King detaching safety hook.
(e) Ormoured safety hook.
(f) Model of Keps.
(g) Models of rope guide and rigid guide.
(h) Rope guide and rigid guide shoe.
(i) Model of different types of clips such as cam clip, small man clip, lashing chain, Screw clip.
(j) Model of headgear structure.
(k) Models of cylindrical drum, conical drum, bi cylindro conical drum.
(l) Models of different types of safety devices used in haulage rode way such as Back stay, Drop warrick, Runaway switches, Stop block, Monkey Catches.

CURRICULLUM OF 6TH SEMESTER

For

DIPLOMA IN MECHANICAL ENGINEERING

(Effective FROM 2020-21 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING,ODISHA, BHUBANESWAR

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 6th Semester (Mechanical Engg.) (wef 2020-21)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		INDUSTRIAL ENGINEERING & MANAGEMENT	4		-	20	80	3	100
Th.2		AUTOMOBILE ENGINEERING AND HYBRID VEHICLES	4		-	20	80	3	100
Th.3		POWER STATION ENGINEERING	4		-	20	80	3	100
Th.4		ELECTIVE (any One)	4			20	80	3	100
Th.4(a)		COMPOSITE MATERIALS							
Th.4(b)		ADVANCE MANUFACTURING PROCESSES							
Th.4(c)		INDUSTRIAL ROBOTICS & AUTOMATION							
		Total	**16**			**80**	**320**	**-**	**400**
		Practical							
Pr.1		AUTOMOBILE ENGINEERING LAB	-	-	4	50	50	3	100
Pr.2		POWER STATION ENGINEERING LAB	-	-	4	25	50	3	75
Pr.3		PROJECT WORK PHASE -II		-	10	50	100	3	150
Pr.4		LIFE SKILL	-	-	2	25	-	-	25
		STUDENT CENTERED ACTIVITIES (SCA)			3				
		Total	**-**	**-**	***23***	***150***	***200***	**-**	***350***
		Grand Total	**16**	**-**	**23**	**230**	**520**	**-**	**750**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration									
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%									
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM /Idea Tinkering and Innovation Lab Practice etc. ,Seminar and SCA shall be conducted in a section.									

There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester

TH1. INDUSTRIAL ENGINEERING & MANAGEMENT

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Main objective of Mechanical Engineering is to produce goods and services for benefit to mankind. Such productions are done utilizing various resources like Men, Materials, machines and Money. Industrial engineering and quality control is the subject which allows optimized use of such resources and hence very important for a mechanical engineer.

B. *COURSE OBJECTIVES:*

After undergoing this course, the students will be able to:

1. Identify the place for a new plant set up and systematic arrangement of machinery and shop for smooth production.
2. Take right decisions to optimize resources utilizations by improving productivity of the lands ,buildings,people,material,machines,money,methods and management effectively.
3. Understanding of stock management and maintenance to reduce plant ideal time.
4 To use the charts to record the quality of products.
5. To eliminate unproductive activities under the control of the management, supervisor, worker and the design of products and processes.

C. CHAPTER WISE DISTRIBUTION OF PERIORDS

Sl No.	Topic	Periods
1	**PLANT ENGINEERING**	10
2	**OPERATIONS RESEARCH**	10
3	**INVENTORY CONTROL**	10
4	**INSPECTION AND QUALITY CONTROL**	15
5	**PRODUCTION PLANNING AND CONTROL**	15

D. COURSE CONTENT

1. *PLANT ENGINEERING:*

1.1 Selection of Site of Industry.
1.2 Define plant layout.
1.3 Describe the objective and principles of plant layout.
1.4 Explain Process Layout, Product Layout and Combination Layout.
1.5 Techniques to improve layout.
1.6 Principles of material handling equipment.
1.7 Plant maintenance.

1.7.1 Importance of plant maintenance.
1.7.2 Break down maintenance.
1.7.3 Preventive maintenance.
1.7.4 Scheduled maintenance.

2. *OPERATIONS RESEARCH:*

2.1 Introduction to Operations Research and its applications.
2.2 Define Linear Programming Problem,
2.3Solution of L.P.P. by graphical method.
2.4 Evaluation of Project completion time by Critical Path Method and PERT (Simple problems)-
2.5Explain distinct features of PERT with respect to CPM.

3. *INVENTORY CONTROL:*

3.1 Classification of inventory.
3.2 Objective of inventory control.
3.3 Describe the functions of inventories.
3.4 Benefits of inventory control.
3.5 Costs associated with inventory.
3.6 Terminology in inventory control
3.7 Explain and Derive economic order quantity for Basic model. (Solve numerical)
3.8 Define and Explain ABC analysis.

4. INSPECTION AND QUALITY CONTROL:

4.1Define Inspection and Quality control.
4.2Describe planning of inspection.
4.3 Describe types of inspection.
4.4 Advantages and disadvantages of quality control.
4.5 Study of factors influencing the quality of manufacture.
4.6 Explain the Concept of statistical quality control, Control charts (X, R, P and C - charts).
4.7 Methods of attributes.
4.8 Concept of ISO 9001-2008.
4.9.1 Quality management system, Registration /certification procedure.
4.9.2 Benefits of ISO to the organization.
4.9.3 JIT, Six sigma,7S, Lean manufacturing
4.9.4 Solve related problems.

5.0 *PRODUCTION PLANNING AND CONTROL*

5.1 Introduction
5.2 Major functions of production planning and control
5.3 Methods of forecasting
5.3.1 Routing
5.3.2Scheduling
5.3.3 Dispatching
5.3.4 Controlling
5.4 Types of production
5.4.1 Mass production
5.4.2 Batch production
5.4.3 Job order production
5.5 Principles of product and process planning.

Syllabus to be covered before IA: Chapter 1,2,3

Learning Resources:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	O.P.KHANNA	INDUSTRIAL ENGINEERING & MANAGEMENT	DHANPAT RAI & SONS
2	MARTAND TELSANG	INDUSTRIAL ENGG & PRODUCTION MANAGEMENT	S.CHAND
3	M.MAHAJAN	STATISTICAL QUALITY CONTROL	DHANPAT RAI &SONS
4			

TH.2 AUTOMOBILE ENGINEERING AND HYBRID VEHICLES

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Automobiles are the principal mode of transport system. Their manufacture and maintenance gives a major scope for employment. Many entrepreneur pass outs go for servicing of automobiles or trading/ manufacturing of auto components. Thus automobile engineering is an important subject to be in the regular curriculum of the mechanical engineering.

B. *COURSE OBJECTIVES:*

At the end of the course the students will be able to:

- Understand automobile chassis, transmission, breaking and fuel system etc.
- Understand the basics of electric vehicle kinematics.
- Understand the concepts of hybrid electric vehicles.

C.TOPIC WISE DISTRIBUTION OF PERIODS

Sl No.	Topic	Periods
1	Introduction & Transmission System	12
2	Braking system	5
3	Ignition & Suspension System	10
4	Cooling and Lubrication	8
5	Fuel system	10
6	Hybrid and Electric Vehicles	15

C.COURSE CONTENTS

1.0 INTRODUCTION & TRANSMISSION SYSTEM:

1.1 Automobiles: Definition, need and classification: Layout of automobile chassis with major components (Line diagram)
1.2 Clutch System: Need, Types (Single & Multiple) and Working principle with sketch
1.3 Gear Box: Purpose of gear box, Construction and working of a 4 speed gear box
1.4 Concept of automatic gear changing mechanisms
1.5 Propeller shaft: Constructional features
1.6 Differential: Need, Types and Working principle

2.0 BRAKING SYSTEM:

2.1 Braking systems in automobiles: Need and types
2.2 Mechanical Brake
2.3 Hydraulic Brake
2.4 Air Brake
2.5 Air assisted Hydraulic Brake
2.6 Vacuum Brake

3.0 IGNITION & SUSPENSION SYSTEM:

3.1 Describe the Battery ignition and Magnet ignition system

3.2 Spark plugs: Purpose, construction and specifications

3.3 State the common ignition troubles and its remedies

3.4 Description of the conventional suspension system for Rear and Front axle

3.5 Description of independent suspension system used in cars (coil spring and tension bars)

3.6 Constructional features and working of a telescopic shock absorber

4.0 COOLING AND LUBRICATION:

4.1 Engine cooling: Need and classification

4.2 Describe defects of cooling and their remedial measures

4.3 Describe the Function of lubrication

4.4 Describe the lubrication System of I.C. engine

5.0 FUEL SYSTEM:

5.1 Describe Air fuel ratio

5.2 Describe Carburetion process for Petrol Engine

5.3 Describe Multipoint fuel injection system for Petrol Engine

5.4Describe the working principle of fuel injection system for multi cylinder Engine 5.5 Filter for Diesel engine

5.6 Describe the working principle of Fuel feed pump and Fuel Injector for Diesel engine

6.0 ELECTRIC AND HYBRID VEHICLES:

6.1 Introduction, Social and Environmental importance of Hybrid and Electric Vehicles

6.2 Description of Electric Vehicles, operational advantages, present performance and applications of Electric Vehicles

6.3 Battery for Electric Vehicles, Battery types and fuel cells

6.4 Hybrid vehicles, Types of Hybrid and Electric Vehicles: Parallel, Series, Parallel and Series configurations;6.5 Drive train

6.6 Solar powered vehicles

D.SYLLABUS COVERED UP TO I.A-CHAPTERS 1,2 &3

E.LEARNING RESOURCES:

Sl. No.	*Name of Authors*	*Title of the Book*	*Name of the Publisher*
1	R.B.Gupta	Automobile Engineering	Satya Prakashan
2	Dr Kirpal Singh	Automobile Engineering Vol- I & II	Standard Publishers
3	C.P.Nakra	Automobile Engineering	Dhanpat Rai Publication
4	W.H.Course	Automotive Engine	McGraw Hill
5	Iqbal Hussain	Electric & Hybrid Vehicles – Design Fundamentals	CRC Press, 2
6 A.K. Babu		Statistical Electric & Hybrid Vehicles	Khanna Publishing House, New Delhi, 2018

TH.3 POWER STATION ENGINEERING

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

A. *RATIONALE:*

Bulk powers used in industries and for domestic purposes are generated in power stations. A large number of diverse and specialized equipment and system are used in a power plant should have this important subject in mechanical engineering.

B. *COURSE OBJECTIVES:*

At the end of the course the students will be able to:

- Understand the generation of power by utilizing various energy sources.
- Understand the use of steam, its operation in thermal power stations.
- Understand the nuclear energy sources and power developed in nuclear power station.
- Understand the basics of diesel electric power station and hydroelectric power station.
- Understand the basics of gas turbine power station
-

C.TOPIC WISE DISTRIBUTION OF PERIODS

Sl No.	Topic	Periods
1	**INTRODUCTION**	05
2	**THERMAL POWER STATIONS**	20
3	**NUCLEAR POWER STATIONS**	10
4	**DIESEL ELECTRIC POWER STATIONS**	10
5	HYDEL POWER STATIONS	10
6	GAS TURBINE POWER STATIONS	05

D.COURSE CONTENTS:

1.0 INTRODUCTION:

1.1 Describe sources of energy.
1.2 Explain concept of Central and Captive power station.
1.3 Classify power plants.
1.4 Importance of electrical power in day today life.
1.5 Overview of method of electrical power generation.

2.0 *THERMAL POWER STATIONS:*

2.1 Layout of steam power stations.

2.2 Steam power cycle. Explain Carnot vapour power cycle with P-V, T-s diagram and determine thermal efficiency.

2.3 Explain Rankine cycle with P-V, T-S & H-s diagram and determine thermal efficiency, Work done, work ratio, and specific steam Consumption.

2.4 Solve Simple Problems.

2.5. List of thermal power stations in the state with their capacities.

2.6 Boiler Accessories: Operation of Air pre heater, Operation of Economiser, Operation Electrostatic precipitator and Operation of super heater. Need of boiler mountings and operation of boiler

2.7 Draught systems (Natural draught, Forced draught & balanced draught) with their advantages & disadvantages.
2.8 Steam prime movers: Advantages & disadvantages of steam turbine, Elements of steam turbine, governing of steam turbine. Performance of steam turbine: Explain Thermal efficiency, Stage efficiency and Gross efficiency.
2.9 Steam condenser: Function of condenser, Classification of condenser. function of condenser auxiliaries such as hot well, condenser extraction pump, air extraction pump, and circulating pump.
2.10 Cooling Tower: Function and types of cooling tower, and spray ponds
2.11 Selection of site for thermal power stations.

***3.0** NUCLEAR POWER STATIONS:*

3.1 Classify nuclear fuel (Fissile & fertile material)
3.2 Explain fusion and fission reaction.
3.3 Explain working of nuclear power plants with block diagram .
3.4 Explain the working and construction of nuclear reactor .
3.5 Compare the nuclear and thermal plants.
3.6 Explain the disposal of nuclear waste.
3.7 Selection of site for nuclear power stations.
3.8 List of nuclear power stations.

***4.0** DIESEL ELECTRIC POWER STATIONS:*

4.1 State the advantages and disadvantages of diesel electric power stations.
4.2 Explain briefly different systems of diesel electric power stations: Fuel storage and fuel supply system, Fuel injection system, Air supply system, Exhaust system, cooling system, Lubrication system, starting system, governing system.
4.3 Selection of site for diesel electric power stations.
4.4 Performance and thermal efficiency of diesel electric power stations.

***5.0** HYDEL POWER STATIONS:*

5.1 State advantages and disadvantages of hydroelectric power plant.
5.2 Classify and explain the general arrangement of storage type hydroelectric project and explain its operation.
5.3 Selection of site of hydel power plant.
5.4 List of hydro power stations with their capacities and number of units in the state.
5.5 Types of turbines and generation used.
5.6 Simple problems.

6.0 GAS TURBINE POWER STATIONS
6.1 Selection of site for gas turbine stations.
6.2 Fuels for gas turbine
6.3 Elements of simple gas turbine power plants
6.4 Merits, demerits and application of gas turbine power plants.

Syllabus covered up to I.A-Chapters 1,2 &3

E.LEARNING RESOURCES:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	R.K Rajput	Power Plant Engineering	Laxmi Publication
2	P.K.NAG	Power Plant Engineering	TMH
3	Nag pal G,R	Power plant Engineering	Khanna Publisher
4	P.C.SHARMA	Power Plant Engineering	S.K KATARIA &SONS

Th-4a-COMPOSITE MATERIALS (ELECTIVE)

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

RATIONALE: Composite material is the advanced engineering material and plays an importantRole in design of engineering products.it is s.a valuable subject for mechanical engineer

COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the basic concept of composite materials
- Understand the Classification of Composites
- Understand the Mechanical Properties of Composites
- Understand the Laminates
- Understand the Joining Methods and Failure Theories.

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Introduction	15
2	Classification of Composites	8
3	Mechanical Properties of Composites	12
4	Laminates	15
5	Joining Methods and Failure Theories	10

CHAPTERS

1.0 *Introduction:*

1.1 Classifications of Engineering Materials, Concept of composite materials.

1.2 Matrix materials, Functions of a Matrix, Desired Properties of a Matrix, Polymer Matrix (Thermosets and Thermoplastics), Metal matrix, Ceramic matrix, Carbon Matrix, Glass Matrix etc.

1.3 Types of Reinforcements/Fibers: Role and Selection or reinforcement materials.

1.4 Types of fibers, Glass fibers, Carbon fibers, Aramid fibers , Metal fibers, Alumina fibers, Boron Fibers, Silicon carbide fibers, Quartz and Silica fibers, Multiphase fibers, Whiskers, Flakes etc.,

1.5 Mechanical properties of fibers.

2.0 *Classification of Composites:*

2.1 Classification based on Matrix Material: Organic Matrix composites, Polymer matrix composites (PMC), Carbon matrix Composites or Carbon-Carbon Composites, Metal matrix composites (MMC), Ceramic matrix composites (CMC).

2.2 Classification based on reinforcements: Fiber Reinforced Composites, Fiber Reinforced Polymer (FRP) Composites, Laminar Composites, Particulate Composites.

2.3 Comparison with Metals, Advantages & limitations of Composites.

3.0 *Mechanical Properties of Composites:*

3.1 Geometrical aspects – volume and weight fraction.

3.2 Unidirectional continuous fiber, discontinuous fibers, Short fiber systems, woven

reinforcements – Mechanical Testing.

3.3 Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

4.0 *Laminates:*

4.1 Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Computation of Stresses.

4.2 Types of Laminates - Symmetric Laminates, Antisymmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Cross-ply Laminate, Angle ply Laminate. Orthotropic Laminate.

4.3 Laminate Moduli, Hydrothermal Stresses.

5.0 *Joining Methods and Failure Theories:*

5.1 Joining –Advantages and disadvantages of adhesive and mechanically fastened joints.

5.2 Typical bond strengths and test procedures.

Syllabus covered up to I.A-Chapters 1, 2 & 3

E.LEARNING RESOURCES:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	A.K Bhargava	Engineering Materials: Polymers, Ceramics and Composites	Prentice Hall India
2	G. Dieter	Mechanical Metallurgy	Mc-Graw Hill
3	R.F. Speyer	Thermal Analysis of Materials	Marcel Decker

TH 4b ADVANCE MANUFACTURING PROCESSES

Theory	**4 Periods per week**	**Internal Assessment**	**20 Marks**
Total Periods	**60 Periods**	**End Sem Exam**	**80 Marks**
Examination	**3hours**	**Total Marks**	**100Marks**

RATIONALE:

Advance manufacturing processes is the field of production by advance nontraditional methods which give the conversion of raw materials into finished product..

COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the working principle of modern machining processes.
- Understand the Plastic Processing
- Understand the additive manufacturing process
- Understand the Special Purpose Machines
- Understand the Maintenance of Machine Tools

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Modern Machining Processes	20
2	Plastic Processing	10
3	Additive Manufacturing Process	15
4	Special Purpose Machines	7
5	Maintenance of Machine Tools	8

DETAILED CONTENTS

1.0 Modern Machining Processes:

1.1 Introduction – comparison with traditional machining.

1.2 Ultrasonic Machining: principle, Description of equipment, applications.

1.3 Electric Discharge Machining: Principle, Description of equipment, Dielectric fluid, tools (electrodes), Process parameters, Output characteristics, applications.

1.4 Wire cut EDM: Principle, Description of equipment, controlling parameters; applications.

1.5 Abrasive Jet Machining: principle, description of equipment, Material removal rate, application.

1.5 Laser Beam Machining: principle, description of equipment, Material removal rate, application.

1.6 Electro Chemical Machining: principle, description of equipment, Material removal rate, application.

1.7 Plasma Arc Machining – principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications.

1.8 Electron Beam Machining - principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications.

2.0 Plastic Processing:

2.1 Processing of plastics.

2.2 Moulding processes: Injection moulding, Compression moulding, Transfer moulding.

2.3 Extruding; Casting; Calendering.

2.4 Fabrication methods-Sheet forming, Blow moulding, Laminating plastics (sheets, rods & tubes), Reinforcing.

2.5 Applications of Plastics.

3.0 Additive Manufacturing Process:

3.1 Introduction, Need for Additive Manufacturing

3.2 Fundamentals of Additive Manufacturing, AM Process Chain

3.3 Advantages and Limitations of AM, Commonly used Terms

3.4 Classification of AM process, Fundamental Automated Processes, Distinction between AM and CNC, other related technologies.

3.5 Application –Application in Design, Aerospace Industry, Automotive Industry, Jewelry Industry, Arts and Architecture. RP Medical and Bioengineering Applications.

3.6 Web Based Rapid Prototyping Systems.

3.7 Concept of Flexible manufacturing process, concurrent engineering, production tools like capstan and turret lathes, rapid prototyping processes.

4.0 Special Purpose Machines (SPM):

4.1 Concept, General elements of SPM, Productivity improvement by SPM, Principles of SPM design.

5.0 Maintenance of Machine Tools:

5.1 Types of maintenance, Repair cycle analysis, Repair complexity, Maintenance manual, Maintenance records, Housekeeping. Introduction to Total Productive Maintenance (TPM).

Syllabus covered up to I.A-Chapters 1,2 &3

E.LEARNING RESOURCES:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	O.P.KHANNA	Production technology –Vol-II	Dhanpat Rai Publication
2	B.S. Raghuwanshi	Workshop Technology, Vol – II	Dhanpat Rai Publication
3	HMT, Bangalore	Production Technology	Tata Mc-Graw Hill
4	1. Chua C.K., Leong K.F. and LIM C.S,	Rapid prototyping: Principles and Applications	WORLD SCIENTIFIC PUBLICATION,THIRD EDITION,2010
5	Stephen F. Krar & Arthur Gil	Exploring Advanced Manufacturing Technologies	1. Industrial Press

TH.4(c) INDUSTRIAL ROBOTICS & AUTOMATION (Elective)

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Today's manufacturing units are using robots as substitute for workers working in hazardous atmosphere. Any automation found are using robots which are known as industrial robots and helps in mass production and assembling parts to make a finished product. So to meet the need of the day this Subject should be included in the syllabus of mechanical engineering of diploma stream.

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COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the basic concepts, parts of robots and types of robots.
- Understand the various drive systems for robot, sensors and their applications in robots and programming of robots.
- Understand the robots according to its usage.
- Understand the various applications of robots, justification and implementation of robot.
- Conceptualize automation and understand applications of robots in various industries.

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Fundamentals of Robotics	10
2	Robotic Drive System and Controller	12
3	Sensors	8
4	Introduction to Machine Vision	10
5	Robot kinematics and Robot Programming	15
6	Automation & Industrial Applications	5

CHAPTERS

1.0 *Fundamentals of Robotics:*

1.1 Definition; Robot anatomy (parts) and its working.

1.2 Robot Components: Manipulator, End effectors; Construction of links, Types of joints.

1.3 Classification of robots; Cartesian, Cylindrical, Spherical, Scara, Vertical articulated.

1.4 Structural Characteristics of robots; Mechanical rigidity; Effects of structure on control work envelope and work Volume.

1.5 Robot work Volumes, comparison.

1.6 Advantages and disadvantages of robots.

2.0 *Robotic Drive System and Controller:*

2.1 Actuators; Hydraulic, Pneumatic and Electrical drives; Linear actuator; Rotary drives.

2.2 AC servo motor; DC servo motors and Stepper motors; Conversion between linear and rotary motion.

2.3 Feedback devices; Potentiometers; Optical encoders; DC tachometers.

2.4 Robot controller; Level of Controller; Open loop and Closed loop controller.
2.5 Microprocessor based control system; Robot path control: Point to point, Continuous path control and Sensor based path control; Controller programming.

3.0 *Sensors:*

3.1 Requirements of a sensor.
3.2 Principles and Applications of the following types of sensors: Position sensors (Encoders, Resolvers, Piezo Electric); Range sensors (Triangulation Principle, Structured lighting approach).
3.3 Proximity sensing; Force and torque sensing.

4.0 *Introduction to Machine Vision:*

4.1 Robot vision system (scanning and digitizing image data); Image processing and analysis.
4.2 Cameras (Acquisition of images); Videocon camera (Working principle & construction).
4.3 Applications of Robot vision system: Inspection, Identification, Navigation & serving.

5.0 *Robot kinematics and Robot Programming:*

5.1 Forward Kinematics; Inverse Kinematics and Differences.
5.2 Forward Kinematics and Reverse Kinematics of Manipulators with Two Degrees of Freedom (In 2 Dimensional); Deviations and Problems.
5.3 Teach Pendant Programming; Lead through programming; Robot programming Languages; VAL Programming.
5.4 Motion Commands; Sensor Commands; End effecter commands; and Simple programs.

6.0 *Automation & Industrial Applications:*

6.1 Basic elements of automated system, advanced automation functions, levels of automation.
6.2 Application of robots in machining; welding; assembly and material handling.

Syllabus covered up to I.A-Chapters 1, 2 & 3

E.LEARNING RESOURCES:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	Saeed B. Niku	Introduction to Robotics: Analysis, Systems, Applications	Pearson Education Inc.New DELHI 2006
2	M.P. Groover	Industrial Robotics: Technology, Programming and Applications	Tata Mc Graw Hill Co,2001
3	Fu K S Gonzalz R Cand Lee C S G	Robotics control,sensing,visionand intelligence	1. Mc-Graw Hill Book Co, 1987.
4	Ganesh S. Hedge	A Text book on Industrial Robotics	1. , Laxmi Publications Pvt. Ltd., New Delhi,
5	S.R. Deb & Sankha Deb	Robotics Technology and Flexible Automation Robot	1. Tata McGraw-Hill, 2010.

Pr.1 AUTOMOBILE ENGINEERING LAB

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Practical periods:	4 P/W	Sessional	50
Maximum marks:	100	End Semester Examination:	50

COURSE OBJECTIVES

At the end of the course the students will be able to

List of Practical .

1. Study of Automobile chassis.
2. Study the differential mechanism of the Tractor.
3. Study the hydraulic braking system of automobile.
4. Study Study the cut section model of carburetor solex type and maruti car type.
5. Study the fuel pump cut section model.
6. Study the actual cut section of gear box.
7. Study of actual car engine.

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Practical periods:	4 P/W	Sessional	25
Maximum marks:	75	End Semester Examination:	50

COURSE OBJECTIVES

At the end of the course the students will be able to

List of Practical

Experiment 01-To study the modern steam power plant with model.
Experiment 02-To determine the various efficiencies of steam turbine.
Experiment 03-To study the cooling tower.
Experiment 04-Study of jet condenser.
Experiment 05-Study of De-lavel turbine.
Experiment 06-To study the spring loaded safety valve.
Experiment 07-To study the following steam generators (boilers)models.

a) Lancashire boiler.

b) Cornish boiler.

c)Babcock & Wilcox Boiler.

d)Vertical water tube boiler.

Pr3. PROJECT Phase - II

Name of the Course: Diploma in Mechanical Engineering			
Course code:		Semester	6th
Total Period:	150	Examination	3 hrs
Lab. periods:	10 P / week	Sessional	50
Maximum marks:	150	End Sem Examination	100

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Mechanical engineering and practices in real life situations, so as to participate and manage a large Mechanical engineering projects, in future. Entire Project spreads over 5th and 6th Semester. Part of the Project covered in 5th Semester was named as *Project Phase-I* and balance portion to be covered in 6th Semester shall benamed as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Develop software packages or applications and implement these for the actual needs of the community/industry.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience in Project design.
- To develop the skill of writing Project Report

Project Phase-I and Phase-II

The Project work duration covers 2 semesters(5th and 6th sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group was done in the beginning of 5th semester under Project Phase-I. The students were allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work and Design of the system also have to be complete in Phase-I. Development may also begin in this phase. Project Milestones are to be set so that progress can be tracked .

In Phase-II Development, Testing, Documentation and Implementation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-II in 6th semester there shall be one presentation by each group on whole Project work undertaken by them.

A suggestive criterion for assessing student performance by the external (preferably personfrom industry) and internal (teacher) examiner is given in table below:

Sl. No.	Performance Criteria
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations to such an exhibition.

The Project Report need to be prepared as per standard format and following is the indicative format. The Teacher Guide may make minor alteration keeping the sense in tact.

Organization of Project Report

1. Cover page:
   It should contain the following (in order)
   (i) Title of the Project
   (ii) —Submitted in partial fulfillment of the requirements for the Diploma in <BranchName>‖
   (iii) By Name of the Student(s)
   (iv) Logo of the Institution
   (v) Branch Name/Depart Name and Institution Name with Address
   (vi) Academic Year
2. 1st Inner page
   Certificate:
   It should contain he following
   —This is to certify that the work in this Project Report entitled <Project Title> by <Name of student(s)> has been carried out under my supervision in partial fulfillment of the requirements for the Diploma in <Branch Name>‖ during session <session > in
   <Branch /Department Name> of <Institute name> and this work is the original workof the above student(s).

   Seal and signature of the Supervisor/Guide with date
3. 2nd Inner Page
   Acknowledgement by the Student(s)
4. Contents.
5. Chapter wise arrangement of Reports
6. Last Chapter: Conclusion
   It should contain
   (i) Conclusion
   (ii) Limitations
   (iii) Scope for further Improvement
7. References

Pr-4 LIFE SKILL

(Common to All Branches)

Practical	**2 Periods per week**	**Sessional**	**25 Marks**
Total Periods	**30 Periods**	**Total Marks**	**25 Marks**

Objective: After completion of this course the student will be able to**:**

- Develop team spirit i.e. concept of working in team
- Apply problem solving skills for a given situation
- Use effective presentation techniques
- Apply task management techniques for given projects
- Enhance leadership traits
- Resolve conflict by appropriate method
- Survive self in today's competitive world
- Face interview without fear

DETAIL CONTENTS:

1. SOCIAL SKILL

Society, Social Structure, Develop Sympathy and Empathy Swot Analysis – Concept, How to make use of SWOT

Inter personal Relation**:** Sources of conflict, Resolution of conflict ,Ways to enhance interpersonal relation

2. PROBLEM SOLVING

Steps of Problem solving**:**

- Identify and clarify the problem,
- Information gathering related to problem,
- Evaluate the evidence,
- Consider alternative solutions and their implications,
- Choose and implement the best alternative,
- Review
- Problem solving techniques:

1) Trial and error, 2) Brain storming, 3) Lateral (Out of Box) thinking

3. PRESENTATION SKILL

Body language , Dress like the audience

Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech.

Use of AV aids such as Laptop with LCD projector, white board etc.

4. GROUP DISCUSSION AND INTERVIEW TECHNIQUES

Group Discussion:

Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making

Interview Technique :

Dress, Posture, Gestures, facial expression, Approach Tips for handling common questions.

5. WORKING IN TEAM

Understand and work within the dynamics of a groups. Tips to work effectively in teams,

Establish good rapport, interest with others and work effectively with themto meet common objectives,

Tips to provide and accept feedback in a constructive and considerate way ,

Leadership in teams, Handling frustrations in group.

6. TASK MANAGEMENT

Introduction, Task identification, Task planning ,organizing and execution, Closing the task

PRACTICAL

List of Assignment: *(Any Five to be performed including Mock Interview)*

1. SWOT analysis:-

Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Followingpoints will be useful for doing SWOT.

a) Your past experiences,
b) Achievements,
c) Failures,
d) Feedback from others etc.

2. Solve the True life problem assigned by the Teacher.

3. Working in a Team

Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slum area, social activities like giving cloths to poor etc.(One activity per group where Team work shall be exhibited)

4. Mock Interview

5. Discuss a topic in a group and prepare minutes of discussion.

6. Deliver a seminar for 5 minutes using presentation aids on the topic given by your teacher.

7. Task Management

Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management (with Break up into sub tasks and their interdependencies and Time)

Note: -1. Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic.

Note: -2. The following Topics may be considered for Seminar/GD in addition to other Topics at the discretion of the Teacher.

(Comparison with developed countries, Occupational Safety, Health Hazard, Accident & Safety, First-Aid, Traffic Rules, Global Warming, Pollution, Environment, Labour Welfare Legislation, Labour Welfare Acts, Child Labour Issues, Gender Sensitisation ,Harassment of Women at Workplace)

METHODOLOGY:

The Teacher is to explain the concepts prescribed in the contents of the syllabus and then assign different Exercises under Practical to the students to perform.

Books Recommended:-

Sl.No	Name of Authors	Title of the Book	Name of the Publisher
01	E.H. Mc Grath , S.J	Basic Managerial Skills for All	PHI
02	Lowe and Phil	Creativity and problem solving	Kogan Page (I) P Ltd
03	Adair, J	Decision making & Problem Solving	Orient Longman
04	Bishop , Sue	Develop Your Assertiveness	Kogan Page India
05	Allen Pease	Body Language	Sudha Publications Pvt. Ltd.

EQUIPMENT LIST

AUTOMOBILE ENGINEERING LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	Chassis of a car	01 no
02	Differential of a Tractor	01 no
03	Hydraulic brake system of a car working model	01 no
04	Solex carburetor	01 no
05	Maruty car type carburetor	01 no
06	Cut section of a fuel pump	01no
07	New car engine	01 no
08	Gear box	01no

POWER STATION ENGINEERING LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	Stainless steel steam turbine test rig 01Kw 3000RPM	01no
02	Cooling Tower Apparatus or model	01no
03	Jet Condenser apparatus or model	01no
04	De Lavel turbine	01no
05	Spring loaded safety valve	02nos
06	Lancashire boiler model	01no
07	Babcock and Wilcox boiler model	01nos
08	Cornish boiler model	01no
09	Vertical water steam boiler model	01no

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 6TH SEMESTER MINING ENGINEERING(wef 2020-21)

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Mine Machinery -II	4			20	80	3	100
Th.2		Mine Geology -II	4			20	80	3	100
Th.3		Mine Legislation & General Safety - II	4			20	80	3	100
Th.4 Elective (Any One)		(a)Mineral Dressing (b)Advanced Mine Survey (c) Material handling & Logistics	4			20	80	3	100
		Total	*16*			*80*	*320*		*400*
		Practical							
Pr.1		Mine Geology -II Lab			6	25	50	3	75
Pr.2		Mine Machinery -II Lab			6	50	50	3	100
Pr.3		Project Phase -II			6	50	100	3	150
Pr.4		Life Skill			2	25	-	-	25
		Student Centred Activities(SCA)			3				
		Total			*23*	*150*	*200*		*350*
		Grand Total	**16**		**23**	**230**	**520**		**750**

Abbreviations: L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM/Idea Tinkering and Innovation Lab Practice etc., Seminar and SCA shall be conducted in a section.

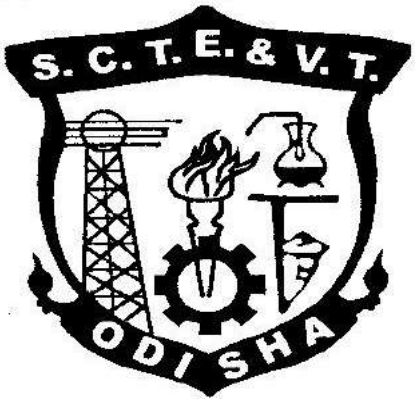
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester

CURRICULLUM OF 6TH SEMESTER

For

DIPLOMA IN MINING ENGINEERING

(Effective FROM 2020-21 Sessions)



STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING,ODISHA, BHUBANESWAR

Th.1. MINE MACHINERY – II

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

RATIONALE

It is imperative that a Mining Engineer should be thoroughly conversant withvarious types of machine used in mining operations.

OBJECTIVES

On completion of the subject, students will be able to:

- Describe various underground face machineries & its applicability.
- Describe various opencast machineries & its applicability.
- Describe various types of pump & its applicability.
- Describe various types of Bore hole pumps & its application.
- Elaborate details about pipes and valves used in mine.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Underground face machineries	15
2	Opencast machineries	15
3	Mine Pumps	20
4	Bore hole pump	5
5	Pipes and valves	5
	Total	60

COURSE CONTENTS (Based on specific objectives)

1. Underground face machineries.

- Electric coal drill
  - Describe constructional features, operation, principle & use of electric coal drill.
- State types of drill rods & drill bits used in electric coal drill.
  - Describe basic constructional features of gathering arm loader, scraper loader, side discharge loader & load & haul loader.
- Describe basic constructional features & operation principle of jack hammer drill & air leg rock drill.
- Describe basic constructional features & operation principle of road header & Shearer loader.

2. Opencast machineries

- Describe basic constructional features of surface miner, dragline, shovel & backhoe, bucket wheel excavator.
- Describe basic constructional features of dumper, dozer, scraper & roadgrader.

3. Mine Pumps.

- Classify mine pumps.
- Describe constructional features, working & use of ram pumps.
- Centrifugal & turbine pumps.
- Describe constructional features of centrifugal & turbine pumps.
- State principle of centrifugal & turbine pumps & its applicability.
- Explain balancing the axial thrust of turbine pumps.
- Draw characteristic curves for turbine pumps.
- Solve numerical problems on centrifugal & turbine pumps.
- Describe constructional features and working principle & use of roto pump (screw pump)
- Describe constructional features & working principle of sinking pump.
- State procedure of suspension in shaft.

4. Bore hole pump

- Describe constructional features & working of bore hole pump.
- State installation of bore hole pump.

5. Pipes and valves

- State types of pipe & valves used in Mines.
- Describe constructional features of various type of valves.
- State & describe different types of pipe joints.
- Describe support of laying main pipe in shaft.
- Discuss the Pipe line layout.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3

RECOMMENDED BOOKS

- Electrical equipment in Mine – H. Cotton
- Winning and Working of Iron Ore – Desmukh & Desmukh
- E.M.T. Vol.-III – D.J.Desmukh

Th.2. MINING GEOLOGY-II

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

RATIONALE

In majority of the cases, materials that need to be explored comprise rocks &minerals. It is therefore, essential for an engineer to have basic knowledge of mining geology.

OBJECTIVES

On completion of the paper, students will be able to:

- Outline the importance of Stratigraphy & Geological time Scale in the study of geology.
- The major Groups & economic minerals associated with them that form the basis for the study of stratigraphy.
- Describe the use, origin mode of occurrence & distribution of fossil fuels & where to look for them.
- Explain the fundamental principles that underline the search for economic minerals. He will achieve a certain amount of clarity in using geological, geophysical & geochemical methods for looking for important mineral deposits.
- Develop a comprehensive idea regarding mineralogy mode of occurrence, uses & distribution of ores.
- Undertake sampling work according to BIS specification.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Stratigraphy	12
2	Fossil Fuels	12
3	Prospecting & Exploration	12
4	Economic Geology	12
5	Sampling	12
	Total	60

COURSE CONTENTS (Based on specific objectives)

1. Stratigraphy

- Describe the principles of stratigraphy.
- Describe the geological time Scale.
- Describe the stratigraphic sequence, lithology, distribution & economic mineral deposits of Iron Ore series, Cuddpah Supergroup, Vindhyan supergroup & gondwana super group.

2. Fossil fuels

- Coal
  - Describe the different ranks of coal.
  - Describe different grades of coal like A,B,C,D.
  - Describe the various theories accounting for the origin of coal.
  - Describe various important lower gondwana Coalfields of India.
- Petroleum
  - Describe the organic & inorganic theories accounting for the origin of petroleum.
  - Define oil pool & oil trap.
  - Describe process of accumulation of oil.
  - Describe favorable conditions for accumulation of oil.
  - Describe different important oil fields in India.

3. Prospecting & exploration.

- Define prospecting.
- Differentiate between prospecting & exploration.
- Use of multi shot camera for borehole direction test.
- Enumerate & describe various criteria for geological exploration.
- Describe various methods of Geophysical prospecting.
- Explain Geochemical prospecting.
- Differentiate between biogeochemical & geo botanical prospecting.

4. Economic Geology

- Define ore & gangue.
- Define tenor & grade.
- Describe the mineralogy, mode of occurrence, distribution & use of iron ore deposits in India.
- Describe the mineralogy, mode of occurrence, & description of Chromites deposits in India & its uses.
- Describe the mineralogy, mode of occurrence & distribution of copper deposits in India & uses of this metal.
- Describe the mineralogy, mode of occurrence, distribution of lead & zinc deposits in India & the uses of these metals.
- UNFC (United Nation Framework of Classification) code of classification ofreserves.

5. Sampling

- Define sampling, outline the method of preparation of samples for assay.
- Explain sampling
- Describe the different methods of sampling as outlined by Bureau of
  - Indian Standards. (BIS)

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3.

RECOMMENDED BOOKS

- Geology of India & Burma – M.S. Krishnan
- An Introduction to geology of Coal & coalfields of India – N.L.Sharma,K.S.V.Ram
- Geology of petroleum – A.I.Levorsen
- Geological prospecting & Exploration – V.K.Kreiter
- A Hand Book of economic geology – A.K.Sen, P.K.Guha
- Mineral Economics – R.K. Sinha, N.L.Sharma

Th.3. MINE LEGISLATION & GENERAL SAFETY-II

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

CHAPTER	TOPIC	PERIODS
1	M.M.R. 1961	15
2	Mines V.T.Rules 1966	4
3	Mines Creche Rules	4
4	Maternity Benefit Act	4
5	Mines Accident & Safety	15
6	Forest Conservation Act (FCA) 1980	3
7	Environmental Protection Act 1986	5
8	MMRD & MCR	5
9	Classified circulars (DGMS)	5
	Total	60

RATIONALE

Since Mining operations involve frequent accidents, it is very important for a mining engineer to be thoroughly conversant with various acts & rules framed for providingsafety to workers.

OBJECTIVES

On completion of the above topics, students will be able to :

- Describe various aspects of M.M.R. 1961.
- Describe various aspects of Mines Vocational Training Rules 1966.
- Describe various aspects of Mines Creche Rules 1966.
- Describe various aspects of Maternity Benefit Act.
- Describe various aspects of Mines Accident & Safety.
- Describe various aspects of Forest Conservation Act (FCA) 1980.
- Describe various aspects of Environmental Protection Act 1986.

COURSE CONTENTS (Based on specific objectives)

1. Metalliferous Mines Regulations 1961

- Discuss various provisions of Metalliferous Mines Regulations 1961.

2. Mines V.T. Rules 1966

- Discuss various provisions of Mines V.T. Rules 1966.

3. Mines Creche Rules 1966

- Discuss various provisions of Mines Creche Rules 1966.

4. Maternity Benefit Act

- Discuss various provisions of Maternity Benefit Act.

5. Mines Accident & Safety

- Discuss their classification, causes & prevention.
- Develop concept about accident cost, accident report, procedure for conducting an enquiry to ascertain the causes of accidents.
- Discuss procedure for investigation & reporting Mine accident, accident proneness, fatality rate, frequency rate & severity rate.
- Explain role of supervision in accident prevention, accident due to opencast workings, statistical analysis of accidents, accident statistics, its head & method of data processing.
- Develop basis concepts of safety, safety & productivity, safety consciousness & safety campaign, safety organization, safety audit.
- Describe rules of safety committee.
- Explain the role of workmen inspectors.
- Discuss terms like industrial fatigue, preventive maintenance, productive equipments & duties of Safety Officer.

6. Forest Conservation Act (FCA) 1980.

- Discuss various provisions of Forest Conservation Act (FCA) 1980.

7. Environmental Protection Act 1986

- Discuss various provisions of Environmental Protection Act 1986.

8. MMRD Act & MCR Rules

- Various provisions of Mineral conservation & exploitation.
- National Mineral policy.

9. Classified Circulars (DGMS)

- As amended up-to-date.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3,4.

RECOMMENDED BOOKS

- M.M.R.- 1961
- Mines V.T.Rules- 1966
- Mines Creche Rules- 1966
- Maternity Benefit Act
- Pit Head bath Rules
- Worker's compassion Act
- Environmental Protection Act-1986
- DGMS Circulars

Th.4 (a). MINERAL DRESSING (ELECTIVE)

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

CHAPTER	TOPIC	PERIODS
1	Introduction	2
2	Unit Operations	6
3	Grinding	6
4	Lab. Sizing	6
5	Industrial Screening	6
6	Gravity Concentration	6
7	Heavy Media Separation	8
8	Floatation	10
9	Magnetic & Electrostatic Separators	10
	Total	60

RATIONALE

In case of metalliferous mines, the ultimate goal is the extraction of metals. Priorto sending ores into the process of extraction, it requires dressing for removal of desirable gangue minerals as far as possible. So a Mining Engineer, specially attached to metalliferous mines should have some basic concepts about mineral dressing.

OBJECTIVES

On completion of the subject, students will be able to:

- Comprehend physical & chemical properties of ores, know the application in mineral dressing.
- Explain the principle of operation of Blake & Dodge jaw crushers, Gyratory Cone crushers, roll crushers.
- Explain the principle of ball mill, open circuit & close circuit Grinding.
- Explain the principle of lab.sizing.
- Explain the principle of operation of industrial screening. Comprehend the principle of operation of classifiers & their application in the field.
- Comprehend elementary idea about gravity concentration.
- Explain the principle of operation of heavy media separation.
- Comprehend elementary principle of floatation process.
- Explain the principle & application of magnetic separators.

COURSE CONTENTS (Based on specific objectives)

1. Introduction

- Describe the objective & scope of application of mineral dressing in surface &u/g mines.

2. Unit operations

- Explain the principle of Blake & dodge jaw crushers, gyratory & cone crushers, roll crusher.

3. Grinding

- Explain the principle of ball mill operation, open circuit grinding, close circuit grinding, dry & wet grinding.

4. Explain the procedure for size analysis & use of standard screen as alsoscreening techniques employed.

5. Industrial screening

- Explain the principle of industrial screening, type of screening (without calculation)
- Explain the operation of classifier & their application.

6. Gravity concentration

- Explain the general principles of wilfly table & its operation.
- Develop elementary idea regarding the operation jigs.

7. Heavy media separation

- Explain the fundamental principle of heavy media separation – Chanceprocess.

8. Floatation

- Comprehend elementary principle of froth floatation, practical utility of frother, collection, modifiers & depressants.
- Describe & illustrate floatation cell.

9. Magnetic & Electrostatic Separators

- Explain the principle of operation of magnetic & electrostatic separators.
- Describe the application of separators in mineral dressing.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3,4.

RECOMMENDED BOOKS

- Principles of Mineral Dressing- Gaudin A.M.
- Hand Book of Mineral Dressing Ores & Minerals – A.E.Taggart
- Mineral Processing Technology – B.A.Wills.

Th.4. (b). ADVANCED MINES SURVEY (ELECTIVE)

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Spherical Trigonometry	15
2	Field Astronomy	12
3	Elements of Photogrametry	12
4	Global Positioning System	11
5	Total Station	10
	Total	60

RATIONALE

A Mining engineer entrusted with the responsibility of supervising mine survey works should be through conversant with the latest developments techniques employed inmine surveying.

OBJECTIVES

After the completion of the subject, students will develop the fundamentalconcepts about
:

- Spherical Trigonometry.
- File Astronomy.
- Elements of Photogrametry.
- Global Positioning System.
- Total Station

COURSE CONTENTS (Based on specific objectives)

1. Spherical Trigonometry.

- Define some common terms used in Spherical Trigonometry like Sphere. Great circle , Small circle, Side of a triangle , Angle of a Triangle, Spherical axes, Spherical Triangle, Right Angled Triangle.
- Convert rectangular to Sperical coordinates.
- Define convergence of meridian and parallel of latitude.

2. Field Astronomy.

- Define some terms used in field astronomy like, Celestial Sphere, Celestial Latitude, Celestial Longitude, Azimuth, Hour angle, Declination , Altitude, Zenith, Nadir, Right Ascension, Celestial Meridian, Celestial Equator, Zenith Distance, Vertical Circle, Celestial Horizon.
- Astronomical Triangle etc. Discuss different astronomical coordinates for heavenly bodies.
- Determine apparent time , Meantime, Sidereal time, Standard Time, Relation between different types of time.
- Determine latitude , Longitude, Time and azimuth of a place .

3. Element of Photogrammetry.

- Know the Photo theodolite.
- Define camera axis, Picture Plane, Principal points, Focal Length, Nodal Point, Prospective centre, Principal Distance, Principal Plane, Print, Isocentre in terrestrial Photogrammetry.
- Explain fundamental principles behind stereo phtogrammetry.
- Define vertical photograph , Tilted Photograph, Oblique photograph, Prospective projection, Explosure station, Flying height focal length, Principal Point, Nadir Point, Ground Nadir Point, Till, Principle plane, Principle Line, Isocentre, Azimuth of Principle Plane, Horizontal Point .Find out the scale of Photography.

4. Global Positioning System.

- Define Global Positioning System. Explain the Principle of working of the system in brief.
- Outline the application of GPS in Mining Engineering.

5. Total Station.

- Identify different components of Total Station.
- Describe the applications of Total Station in Mines.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2.

RECOMMENDED BOOKS

- Surveying VOL.-III by Dr. B. C. Punmia
- Modern concept of Mine Surveying by Prof. Alam Chand.

Th.4. (c). MATERIAL HANDLING AND LOGISTICS (ELECTIVE)

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

CHAPTER	TOPIC	PERIODS
1	Introduction to surface & Underground haulage system	10
2	Conveyors	8
3	Locomotive haulage	12
4	Aerial ropeways	5
5	Introduction of hydraulic transportation	10
6	Man riding haulage	5
7	Spiral chutes	5
8	Flow of materials in bins, bunkers	5
	Total	60

RATIONALE

A Mining Engineer entrusted with the responsibility of supervising material handling in a mine should have specialized knowledge in this area including transportation inmines.

OBJECTIVES

On completion of the subject, students will be able to:

- Classify underground & surface transportation system in mines.
- Describe various types of conveyor & its design.
- Explain various types of locomotive haulage used in underground mines.
- Describe aerial ropeway & its applicability.
- Describe hydraulic transportation in mines.
- Explain man riding haulage system.
- Explain spiral chute.
- Describe flow of materials in bins & bunkers.

COURSE CONTENTS (Based on specific objectives)

1. Introduction to surface & underground haulage system

- Classify underground & surface haulage system.
- State factors affecting design of a haulage system.
- Find out the capacity of a haulage system in a given production.

2. Conveyors

- Classification of Conveyors.
- State factors affecting design of belt conveyor, cable belt conveyor and steel cord conveyors.
- Find out carrying capacity of belt conveyor, cable belt conveyor & steel cordconveyor.
- Describe constructional features of belt conveyor & cable belt conveyor.
- Describe formula to calculate drive capacity of belt conveyor & cable belt conveyor.

3. Locomotive haulage

- State different types of locomotive haulage.
- Describe basic constructional features of trolley wire, compressed air , diesel & battery locomotives.
- State applicability, merits & demerits of locomotives.
- Describe safety devices of diesel locomotive including flame trap around exhaust conditioner box.
- Solve numerical problems.

4. Aerial ropeways

- Classify aerial ropeways.
- State applicability of aerial ropeways.
- Describe constructional features of bicable and twin cable ropeways.
- Describe loading, unloading & angle stations bicable & thin cable ropeways.

5. Hydraulic transportation of solids

- Define hydraulic transportation.
- Discuss theory of hydraulic transportation of solids in mines (without derivation)
- Design the hydraulic transportation system.
- State applicability, advantages & disadvantages of hydraulic transportation in Mines.

6. Man riding haulage

- State different types of man riding system.
- Describe constructional features of monorail, deorail & flight chairs & conveyor system.

7. Spiral Chutes

- State capability of spiral chutes.
- Explain working principle of spiral chutes.
- Describe constructional features of spiral chutes.

8. Flow of materials in bins, bunkers

- Describe bins & bunkers.
- Explain flow of materials in bins & bunkers.
- Design bunkers & bins for a given production.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3,4.

RECOMMENDED BOOKS

- Mining Machinery – T. Bryson
- Material Handling in Mines IIT Kharagpur journal
- Mine Transport – N.T.Kerlin
- EMT Vol.-III – D.J.Desmukh
- S.M.E. Mining Engineering Hand Book

Pr.1 . MINING GEOLOGY-II LAB

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Lab Periods	: 6 Periods/week	Sessional	: 25
Total Periods	: 90	End Semester Examination	: 50
Examination	: 3 Hours	Maximum Marks	: 75

Topic wise Distribution of Periods

CHAPTER	TOPIC	PERIODS
1	Megascopic identification of Igneous rocks	15
2	Megascopic identification of Sedimentary rocks	15
3	Megascopic identification of Metamorphic rocks	15
4	Interpretation of contour maps	15
5	Interpretation of geological maps	15
6	Describe the specific gravity of small specimen	15
	Total	90

- Megascopic identification of Igneous rocks in hand specimens.
- Megascopic identification of Sedimentary rocks in hand specimens.
- Megascopic identification of Metamorphic rocks in hand specimens.
- Interpretation of contour maps and preparation of the profile section for it.
- Interpretation of geological maps and preparation of the profile Section for it.
- Describe the specific gravity of small specimen by Joley's spring balance.

Pr.2. MINE MACHINERY – II LAB.

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Lab Periods	: 6 Periods/week	Sessional	: 50
Total Periods	: 90	End Semester Examination	: 50
Examination	: 3 Hours	Maximum Marks	: 100

Topic wise Distribution of Periods

CHAPTER	TOPIC	PERIODS
1	Study of Centrifugal Pumps.	9
2	Study of Turbine Pumps.	9
3	Study of Roto Pump.	9
4	Study of Sinking Pump.	9
5	Study of electric coal drills & its accessories.	9
6	Study of Jack Hammer Drill with air leg.	9
7	Study of scrapper & shaker conveyor	9
8	Study of scrapper loader.	9
9	Model Development of Gathering arm loader.	9
10	Study of Electric Coal Drill.	9
	Total	90

- Study of Centrifugal Pumps.
- Study of Turbine Pumps.
- Study of Roto Pump.
- Study of Sinking Pump.
- Study of electric coal drills & its accessories.
- Study of Jack Hammer Drill with air leg.
- Study of scrapper & shaker conveyor.
- Study of scrapper loader.
- Model Development of Gathering arm loader.
- Study of Electric Coal Drill.

Pr3. PROJECT PHASE - II

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Lab Periods	: 6 Periods/week	Sessional	: 50
Total Periods	: 90	End Semester Examination	: 100
Examination	: 3Hours	Maximum Marks	: 150

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Mechanical engineering and practices in real life situations, so as to participate and manage a large Mechanical engineering projects, in future. Entire Project spreads over 5th and 6th Semester. Part of the Project covered in 5th Semester was named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Develop software packages or applications and implement these for the actual needs of the community/industry.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience in Project design.
- To develop the skill of writing Project Report

Project Phase-I and Phase-II

The Project work duration covers 2 semesters(5th and 6th sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group was done in the beginning of

5th semester under Project Phase-I. The students were allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work and Design of the system also have to be complete in Phase-I. Development may also begin in this phase. Project Milestones are to be set so that progress can be tracked .

In Phase-II Development, Testing, Documentation and Implementation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-II in 6th semester there shall be one presentation by each group on whole Project work undertaken by them.

A suggestive criterion for assessing student performance by the external (preferably personfrom industry) and internal (teacher) examiner is given in table below:

Sl. No.	**Performance Criteria**
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations to such an exhibition.

The Project Report need to be prepared as per standard format and following is the indicative format. The Teacher Guide may make minor alteration keeping the sense in tact.

Organization of Project Report

1. Cover page:

   It should contain the following (in order)

   (i) Title of the Project

   (ii) —Submitted in partial fulfillment of the requirements for the Diploma in

<Branch Name>‖

(iii) By Name of the Student(s)

(iv) Logo of the Institution

(v) Branch Name/Depart Name and Institution Name with Address

(vi) Academic Year

2. 1st Inner page

   Certificate:

   It should contain he following

   —This is to certify that the work in this Project Report entitled <Project Title> by <Name of student(s)> has been carried out under my supervision in partial fulfillment of the requirements for the Diploma in <Branch Name>‖ during session <session > in <Branch /Department Name> of <Institute name> and this work is the original workof the above student(s).

   Seal and signature of the Supervisor/Guide with date

3. 2nd Inner Page

   Acknowledgement by the Student(s)

4. Contents.

5. Chapter wise arrangement of Reports

6. Last Chapter: Conclusion

   It should contain

   (i) Conclusion

   (ii) Limitations

   (iii) Scope for further Improvement

7. References

Pr-4 LIFE SKILL

(Common to All Branches)

Practical	**2 Periods per week**	**Sessional**	**25 Marks**
Total Periods	**30 Periods**	**Total Marks**	**25 Marks**

Objective: After completion of this course the student will be able to**:**

- Develop team spirit i.e. concept of working in team
- Apply problem solving skills for a given situation
- Use effective presentation techniques
- Apply task management techniques for given projects
- Enhance leadership traits
- Resolve conflict by appropriate method
- Survive self in today's competitive world
- Face interview without fear

DETAIL CONTENTS:

1. SOCIAL SKILL

Society, Social Structure, Develop Sympathy and Empathy Swot Analysis – Concept, How to make use of SWOT

Inter personal Relation**:** Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relation

2. PROBLEM SOLVING

Steps of Problem solving**:**

- Identify and clarify the problem,
- Information gathering related to problem,
- Evaluate the evidence,
- Consider alternative solutions and their implications,
- Choose and implement the best alternative,
- Review
- Problem solving techniques:

1) Trial and error, 2) Brain storming, 3) Lateral (Out of Box) thinking

3. PRESENTATION SKILL

Body language , Dress like the audience

Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech.

Use of AV aids such as Laptop with LCD projector, white board etc.

4. GROUP DISCUSSION AND INTERVIEW TECHNIQUES

Group Discussion:

Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making

Interview Technique :

Dress, Posture, Gestures, facial expression, Approach

Tips for handling common questions.

5. WORKING IN TEAM

Understand and work within the dynamics of a
groups.Tips to work effectively in teams,
Establish good rapport, interest with others and work effectively with
themto meet common objectives,
Tips to provide and accept feedback in a constructive and considerate way ,
Leadership in teams, Handling frustrations in group.

6. TASK MANAGEMENT

Introduction, Task identification, Task
planning ,organizing and execution,
Closing the task

PRACTICAL

List of Assignment: *(Any Five to be performed including Mock Interview)*

a. SWOT analysis:-
Analyse yourself with respect to your strength and weaknesses, opportunities andthreats. Following points will be useful for doing SWOT.

a) Your past experiences,
b) Achievements,
c) Failures,
d) Feedback from others etc.

b. Solve the True life problem assigned by the Teacher.

3. Working in a Team

Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slum area, social activities like giving cloths to poor etc.(One activity per group where Team work shall be exhibited)

4. Mock Interview

5. Discuss a topic in a group and prepare minutes of discussion.

6. Deliver a seminar for 5 minutes using presentation aids on the topic given by yourteacher.

7. Task Management

Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management (with Break up into sub tasks and their interdependencies and Time)

Note: -1. Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic.

Note: -2. The following Topics may be considered for Seminar/GD in addition to other Topics at the discretion of the Teacher.

(Comparison with developed countries, Occupational Safety, Health Hazard, Accident & Safety, First-Aid, Traffic Rules, Global Warming, Pollution, Environment, Labour Welfare Legislation, Labour Welfare Acts, Child Labour Issues, Gender Sensitisation ,Harassment of Women at Workplace)

METHODOLOGY:

The Teacher is to explain the concepts prescribed in the contents of the syllabus and then assign different Exercises under Practical to the students to perform.

Books Recommended:-

Sl.No	Name of Authors	Title of the Book	Name of the Publisher
01	E.H. Mc Grath , S.J	Basic Managerial Skills forAll	PHI
02	Lowe and Phil	Creativity and problem solving	Kogan Page (I) P Ltd
03	Adair, J	Decision making & Problem Solving	Orient Longman
04	Bishop , Sue	Develop Your Assertiveness	Kogan Page India
05	Allen Pease	Body Language	Sudha Publications Pvt. Ltd.

EQUIPMENT LIST

DETAILS OF INSTRUMENTS / SAMPLES/ SPECIMENS - GEOLOGY LABORATORY

SUBJECT NO / SUBJECT CODE -PR.1. MINING GEOLOGY-II LAB

The following instruments / samples/ specimens are required for Geology laboratory based on the **6th Semester Mining Engineering Syllabus.**

CHAPTER	TOPIC	ITEM	SPECIFICATION	QUANTITY
1	Megascopic identification of Igneous rocks	Igneous rocks in hand specimen	Common Igneous Rocks in hand specimen along with specimen trey and primary information about the rock specimen.	30 Nos of different Igneous rock specimen
2	Megascopic identification of Sedimentary rocks	Sedimentary rocks in hand specimen	Common Sedimentary Rocks in hand specimen along with specimen trey and primary information about the rock specimen.	30 Nos of different Sedimentary rock specimen
3	Megascopic identification of Metamorphic rocks	Metamorphic rocks in hand specimen	Common Metamorphic Rocks in hand specimen along with specimen trey and primary information about the rock specimen.	30 Nos of different Metamorphic rock specimen
4	Interpretation of contour maps	Contour maps	Different topographic map worksheet with scale for Interpretation and preparation of the profile section for it.	10 nos of different topographic/contour map
5	Interpretation of geological maps	Geological Maps	Different geological map worksheet with scale for Interpretation and preparation of the profile section for it.	10 nos of different geological map
6	Describe the specific gravity of small specimen	Joley's spring balance	The Jolly balance consists essentially of a spring fastened at the top to a movable arm. At the lower end, the spring is provided with two small pans, one suspended beneath the other. The lower pan is kept always immersed to the same depth in water, while the other one hangs in the air. On the upright standard behind the spiral is a mirror on which is engraved or painted a scale of equal parts. The specific gravity of an object, typically a solid, is determined by noting the amount of lengthening of the spring when the object is resting	01 no

			in the upper pan in air (w), and the amount when it is in the lower pan and immersed in water (w'). The specific gravity is then w / (w - w').	

Pr.2. MINE MACHINERY – II LAB.

SL NO.	EQUIPMENT	NO. OF EQUIPMENT/15 STUDENTS
1	Centrifugal Pump.	1
2	Turbine Pump.	1
3	Roto Pump./Screw pump	1
4	Sinking Pump./Submersible pump	1
5	electric coal drills & its accessories.	1
6	Jack Hammer Drill with air leg.	1
7	Working model of scrapper & shaker conveyor	1
8	Working model of scrapper loader.	1
9	Working model of Gathering arm loader.	1
10	Electric Coal Drill.	1

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela MargVasant Kunj, New Delhi-110067
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

F.No. Eastern/2017/1-3394807991 Date: 30-Apr-2017

To,
The Commissioner cum Secretary,
Deptt. Of Higher & Technical Education,
Govt. of Orissa, Orisas Sectt.
Bhubaneshwar-751001

Sub: Letter of Approval for New Institute 2017-18

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2016 notified by the Council vide notification number F.No.AB/AICTE/REG/2016 dated 30/11/2016 and other notifications, as applicable and published from time to time, I am directed to convey the approval to

Permanent Id	1-3394807991	Application Id	1-3394807991
Name of the Institute	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	Institute Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034
Name of the Society/Trust	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT	Society/Trust Address	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institute Type	Unaided - Private	Region	Eastern

to conduct following courses with the intake indicated below for the academic year 2017-2018

	Application Id : 1-3394807991								
S. No.	Programme	Shift	Level	Course	Full/Part Time	Affiliating Body	Intake approved for 2017-18	PIO/FN/Gulf Quota	NRI
1	ENGINEERING AND TECHNOLOGY	1st Shift	DIPLOMA	MINING ENGINEERING	FULL TIME	Directorate of Technical Education , Odisha	60	NA	NA
2	ENGINEERING AND TECHNOLOGY	1st Shift	DIPLOMA	MECHANICAL ENGINEERING	FULL TIME	Directorate of Technical Education , Odisha	60	NA	NA

Note: The approval is valid for two years from the date of issue of this letter only for getting affiliation with respective University/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET) (as applicable) and fulfilling State Govt. requirements for admission. If institution is unable to start in the academic session 2017-18 due to reason mentioned above, the institution will have to apply On-line on AICTE web portal in next academic session for continuation of approval.

The Society/Trust/Institution shall obtain necessary affiliation / permission from the concerned affiliating University**/** Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET)(as applicable) as per the prescribed schedule of the University/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET)(as applicable) Admission authority etc. The Applicant Society/Trust/Institution shall send information about commencement of the above courses to AICTE. In case the Institution is not in a position to commence the above mentioned courses for whatever reason during the two years period from the date of issue of this letter, the approval

becomes invalid and the applicant Society/Trust/Institution shall make fresh application to AICTE for grant of approval as per the norms prevailing at that time.

All Institutions shall fulfill the following general conditions:

1. The management shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the Council from time to time and for meeting recurring expenditure.

2. The admission shall be made only after adequate infrastructure and all other facilities, including the availability / recruitment of the required faculty are provided as per norms and guidelines of the AICTE.

3. The admissions shall be made in accordance with the regulations notified by the Council from time to time.

4. The curriculum of the course, the procedure for evaluation / assessment of students shall be in accordance with the norms prescribed by the AICTE and concerned affiliating university/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET) (as applicable) wherever applicable.

5. The management of the Institution shall not close the Institution or the institution shall not discontinue any course(s) or start any new course(s) or alter intake capacity of seats without the prior approval of the Council.

6. No excess admission shall be made by the Institution over and above the approved intake under any circumstances. In case any excess admission is reported to the Council, appropriate action as per the notified regulations shall be initiated against the Institution.

7. The institutions shall not have any collaborative arrangements with any Indian and / or Foreign Universities for conduct of technical courses other than those approved by AICTE without obtaining prior approval from AICTE. In case any violation is reported to the Council, appropriate action as per the notified regulations shall be initiated against the Institution.

8. The Institution shall not conduct any course(s) in the field of technical education in the same premises / campus and / or in the name of the Institution without prior permission / approval of AICTE. If found so, appropriate action as per the notified regulations shall be initiated against the Institution.

9. The institution shall not conduct any non-technical course (s) in the same premises under any circumstances. In case any violation is reported to the Council, appropriate action as per the notified regulations shall be initiated against the Institution.

10. The institution shall operate only from the approved location, and that the institution shall not open any off campus study centers / extension centers directly or in collaboration with any other institution / university / organization for the purpose of imparting technical education without obtaining prior approval from the AICTE. If found so, appropriate action as per the notified regulations shall be initiated against the Institution.

11. The tuition and other fees shall be charged as prescribed by the Competent Authority within the overall criteria prescribed by the Council from time to time. No capitation fee shall be charged from the students / guardians of students in any form. If found so, appropriate action as per the notified regulations shall be initiated against the Institution.

12. The accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the Council or anybody or persons authorized by it.

13. The Director / Principal and the teaching and other staff shall be appointed in given time frame and selection shall be done according to procedures, qualifications and experience prescribed by the Council from time to time and pay scales are as per the norms prescribed by the Council from time to time.

14. The technical institution shall publish an information booklet before commencement of the academic year giving details regarding the institution and courses / programs being conducted and details of infrastructural facilities including faculty etc. in the form of mandatory disclosure. The information booklet may be made available to the stakeholders of the technical education. The mandatory disclosure information, as per directions in the AICTE website / Approval Process Handbook, shall be put on the Institution Website. The information shall be revised every year with updated information about all aspects of the institution.

15. It shall be mandatory for the technical institution to maintain a Website providing the prescribed information. The Website information must be continuously updated as and when changes take place.

16. If a technical Institution fails to disclose the information or suppress and / or misrepresent the information, appropriate action as per the notified regulations shall be initiated against the Institution.

17. AICTE may carry out random inspections round the year for verifying the status of the Institutions to ensure maintenance of norms and standards.

18. AICTE may also conduct inspections with or without notifying the dates to verify specific complaints, to verify adherence to AICTE norms & standards, and to verify any mis-representation, violation of norms & standards, mal-practices etc.

19. The Institution by virtue of the approval given by Council shall not automatically become claimant to any grant-in-aid from the Central or State Government.

20. In the event of a student / candidate withdrawing before the starting of the course, the wait listed candidates should be given admission against the vacant seat. The entire fee collected from the student, after a deduction of the processing fee of not more than Rs. 1000/- (Rupees one thousand only) shall be refunded and returned by the Institution / University/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET)(as applicable) to the student / candidate withdrawing from the program. It would not be permissible for Institutions and Universities to retain the School / Institution Leaving Certificates in original to force retention of admitted students.

21. The Institute shall take appropriate measures for prevention of ragging in any form, in the light of AICTE regulation "Prevention and Prohibition of Ragging in Technical Institutions, Universities including Deemed to Universities imparting technical education" Regulation 2009 (F.No. 37-3/Legal/AICTE/2009 dated 01/07/2009). In case of failure to prevent the instances of ragging by the Institutions, the Council shall take appropriate action as per the notified regulations.

The Management of the Institute shall strictly follow further conditions as may be specified by the Council from time to time. The Council may withdraw the approval, in case it observe any violation of the above conditions and / or non-adherence to the norms and standards prescribed by the Council, mis-representation of facts and submitting factually in correct information to it.

Prof. Alok Prakash Mittal
Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**

All India Council for Technical Education
College of Leather Technology Campus
Block LB, Sector III, Salt Lake City
Kolkata - 700 098, West Bengal

2. **The Director Of Technical Education**,**
Odisha

3. **The Registrar**,**
Directorate of Technical Education , Odisha

4. **The Principal / Director,**
IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,
KANSBAHAL,SUNDERGARH,
Odisha,770034

5. **The Secretary / Chairman,**
INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,
KANSBAHAL,SUNDERGARH,
Odisha,770034

6. **Guard File(AICTE)**

Note: ** - Approval letter copy will not be communicated through post/email. However, provision is made in the portal for downloading Approval letter through Authorized login credentials allotted to concerned DTE/Registrar.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2018-19

Extension of Approval (EoA)

F.No. Eastern/1-3510694625/2018/EOA Date: 04-Apr-2018

To,

The Commissioner cum Secretary,
Deptt. Of Higher & Technical Education,
Govt. of Orissa, Orisas Sectt.
Bhubaneshwar-751001

Sub: Extension of Approval for the Academic Year 2018-19

Ref: Application of the Institution for Extension of approval for the Academic Year 2018-19

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2016 notified by the Council vide notification number F.No.AB/AICTE/REG/2016 dated 30/11/2016 and amended on December 5, 2017 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-3394807991	**Application Id**	1-3510694625
Name of the Institute	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institute Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institute Type	Unaided - Private	**Region**	Eastern

Opted for Change from Women to Co-Ed and vice versa	No	**Change from Women to Co-Ed and vice versa Approved or Not**	NA
Opted for Change of Name	No	**Change of Name Approved or Not**	NA
Opted for Change of Site	No	**Change of Site Approved or Not**	NA
Opted for Conversion from Degree to Diploma or vice versa	No	**Conversion for Degree to Diploma or vice versa Approved or Not**	NA
Opted for Organization Name Change	No	**Change of Organization Name Approved or Not**	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2018-19

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2018-19	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status	Foreign Collaboration /Twining Program Approval Status*
ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	MINING ENGINEERING	FT	Directorate of Technical Education , Odisha	60	NA	NA	NA
ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	MECHANICAL ENGINEERING	FT	Directorate of Technical Education , Odisha	60	NA	NA	NA

+FT –Full Time,PT-Part Time

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

1. The Regional Officer,
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

2. The Director Of Technical Education**,
   Odisha

3. The Registrar**,
   Directorate of Technical Education , Odisha

4. The Principal / Director,
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,
   KANSBAHAL,SUNDERGARH,
   Odisha,770034

5. The Secretary / Chairman,
   INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,
   KANSBAHAL,SUNDERGARH,
   Odisha,770034

6. Guard File(AICTE)

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

****** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2019-20

Extension of Approval (EoA)

F.No. Eastern/1-4260070928/2019/EOA Date: 10-Apr-2019

To,

The Commissioner cum Secretary,
Deptt. Of Higher & Technical Education,
Govt. of Orissa, Orisas Sectt.
Bhubaneshwar-751001

Sub: Extension of Approval for the Academic Year 2019-20

Ref: Application of the Institution for Extension of approval for the Academic Year 2019-20

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2018 notified by the Council vide notification number F.No.AB/AICTE/REG/2018 dated 31/12/2018 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-3394807991	**Application Id**	1-4260070928
Name of the Institute	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institute Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institute Type	Unaided - Private	**Region**	Eastern

Opted for Change from Women to Co-Ed and vice versa	No	**Change from Women to Co-Ed and vice versa Approved or Not**	NA
Opted for Change of Name	No	**Change of Name Approved or Not**	NA
Opted for Change of Site/Location	No	**Change of Site/Location Approved or Not**	NA
Opted for Conversion from Degree to Diploma or vice versa	No	**Conversion for Degree to Diploma or vice versa Approved or Not**	NA
Opted for Organization Name Change	No	**Change of Organization Name Approved or Not**	NA
Opted for Merger of Institution	No	**Merger of Institution Approved or Not**	NA
Opted for Introduction of New Program/Level	No	**Introduction of Program/Level Approved or Not**	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2019-20

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2019-20	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
Engineering And Technology	1st	Diploma	Mining Engineering	FT	Directorate of Technical Education , Odisha	60	NA	NA
Engineering And Technology	1st	Diploma	Mechanical Engineering	FT	Directorate of Technical Education , Odisha	60	NA	NA

+FT –Full Time,PT-Part Time

Deficiencies Noted based on Self Disclosure

Particulars	Deficiency
Other Facilities Deficiency	
Fire and Safety Certificate	*Yes*

***Please refer Deficiency Report for details**

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY is hereby informed to submit the compliance of the deficiencies mentioned above to the Regional Office within a period of **6 months** from the date of issuance of this letter failing which the council shall initiate strict action as defined in Approval Process Handbook 2019-20 during the subsequent Academic Year.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

It is mandatory to comply all the essential requirements as given in APH 2019-20(appendix 6)

NOTE: If the State Government / UT / DTE / DME has a reservation policy for admission in Technical Education Institutes and the same is applicable to Private & Self-financing Technical Institutions, then the State Government / UT/ DTE / DME shall ensure that 10 % of Reservation for EWS would be operational from the Academic year 2019-20 without affecting the percentage reservations of SC/ST/OBC/General . However, this would not be applicable in the case of Minority Institutions referred to the clause (1) of Article 30 of Constitution of India.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Odisha**

2. **The Registrar**,**
   Directorate Of Technical Education , Odisha

3. **The Principal / Director,**
   Iipm School Of Engineering & Technology
   At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
   Kansbahal,Sundergarh,
   Odisha,770034

4. **The Secretary / Chairman,**
   Indian Institute For Production Management
   At / Po. Kansbahal, Dt.Sundargarh, Odisha 770034.
   Kansbahal,Sundergarh,
   Odisha,770034

5. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

****** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2020-21

Extension of Approval (EoA)

F.No. Eastern/1-7014103254/2020/EOA Date: 30-Apr-2020

To,

Sub: Extension of Approval for the Academic Year 2020-21

Ref: Application of the Institution for Extension of Approval for the Academic Year 2020-21

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2020 notified by the Council vide notification number F.No. AB/AICTE/REG/2020 dated 4th February 2020 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-3394807991	**Application Id**	1-7014103254
Name of the Institute	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institute Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,,770034
Institute Type	Private-Self Financing	**Region**	Eastern

To conduct following Courses with the Intake indicated below for the Academic Year 2020-21

Program	Level	Course	Affiliating Body (University /Body)	Intake Approved for 2019-20	Intake Approved for 2020-21	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
ENGINEERING AND TECHNOLOGY	DIPLOMA	MINING ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	No
ENGINEERING AND TECHNOLOGY	DIPLOMA	MECHANICAL ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	No

It is mandatory to comply with all the essential requirements as given in APH 2020-21 (Appendix 6)

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2020-21 is implemented without affecting the reservation percentages of SC/ ST/ OBC/ General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years beginning with the Academic Year 2020-21

2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time now amalgamated as total intake shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2020-21 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook. All such Institutions/ Universities shall have to create the necessary Faculty, Infrastructure and other facilities WITHIN 2 YEARS to fulfil the norms based on the Affidavit submitted to AICTE.

3. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

4. Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 373/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Odisha**

2. **The Principal / Director,**
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
   Kansbahal,Sundergarh,
   Odisha,770034

3. **The Secretary / Chairman,**
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034
   KANSBAHAL,SUNDERGARH
   ,770034

4. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

5. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

****** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of Education, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2021-22

Extension of Approval (EoA)

F.No. Eastern/1-9318290242/2021/EOA Date: 25-Jun-2021

To,

The Commissioner cum Secretary,
Deptt. Of Higher & Technical Education,
Govt. of Orissa, Orisas Sectt.
Bhubaneshwar-751001

Sub: Extension of Approval for the Academic Year 2021-22

Ref: Application of the Institution for Extension of Approval for the Academic Year 2021-22

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations, 2021 Notified on 4th February, 2020 and amended on 24th February 2021 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to:

Permanent Id	1-3394807991	**Application Id**	1-9318290242
Name of the Institution /University	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institution /University Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institution /University Type	Private-Self Financing	**Region**	Eastern

To conduct following Programs / Courses with the Intake indicated below for the Academic Year 2021-22

Program	Level	Course	Affiliating Body (University /Body)	Intake Approved for 2020-21	Intake Approved for 2021-22	NRI Approval Status	FN / Gulf quota/ OCI/ Approval Status
ENGINEERING AND TECHNOLOGY	DIPLOMA	MINING ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	NA
ENGINEERING AND TECHNOLOGY	DIPLOMA	MECHANICAL ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	NA

It is mandatory to comply with all the essential requirements as given in APH 2021-22 (Appendix 6)

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2019-20 is implemented without affecting the reservation percentages of SC/ ST/ OBC/ General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years.

2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time now amalgamated as total intake shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2021-22 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook.

3. Strict compliance of Anti-Ragging Regulation, Establishment of Committee for SC/ ST, Establishment of Internal Complaint Committee (ICC), Establishment of Online Grievance Redressal Mechanism, Barrier Free Built Environment for disabled and elderly persons, Fire and Safety Certificate should be maintained as per the provisions made in Approval Process Handbook and AICTE Regulation notified from time to time.

4. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy ** to:

1. **The Director of Technical Education**, Odisha**

2. **The Principal / Director,**
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
   Kansbahal,Sundergarh,
   Odisha,770034

3. **The Secretary / Chairman,**
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034
   KANSBAHAL,SUNDERGARH
   Odisha,770034

4. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

5. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/ .

****** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

This is a computer generated Statement. No signature Required

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT,

KANSBAHAL

AUDITED ACCOUNTS
FOR THE YEAR ENDED 31ST MARCH, 2020.

K.D. LATH & CO.
CHARTERED ACCOUNTANTS
UDITNAGAR, ROURKELA-769012.

K.D. LATH & CO.
CHARTERED ACCOUNTANTS
(FRN : 306011E)

Office : Uditnagar, Rourkela - 769 012, Phone : 0661-2500717, E-mail : sudhirlath@gmail.com

INDEPENDENT AUDITOR'S REPORT

To The Members

Report on the audit of the financial statements

Opinion

We have audited the financial statements of **Indian Institute for Production Management, Kansbahal** which comprise the balance sheet at 31st March 2020, the income and expenditure account and Receipt and Payment Account for the year then ended, and notes to the financial statements including a summary of significant accounting policies.

In our opinion, the accompanying financial statements gives a true and fair view of the financial position of the entity as at 31st March, 2020, and of its excess of its expenditure over Income for the year then ended in accordance with the Accounting Standards issued by the Institute of Chartered Accountants of India (ICAI).

Basis for opinion

We conducted our audit in accordance with the Standards on Auditing (SAs) issued by ICAI. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the entity in accordance with the ethical requirements that are relevant to our audit of the financial statements and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with the aforesaid accounting Standard, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the entity's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the entity or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the entity's financial reporting process

K.D. LATH & CO.
CHARTERED ACCOUNTANTS
(FRN : 306011E)
Office : Uditnagar, Rourkela - 769 012, Phone : 0661-2500717, E-mail : sudhirlath@gmail.com

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

For K.D Lath and Co.
Chartered Accountants
FRN-306011E

(Sudhir Lath)
Membership No. 059396
(Partner)

Rourkela
Dated: 23 SEP 2020
UDIN:

UDIN : 20059396AAAALZ4667

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

BALANCE SHEET AS AT 31ST MARCH 2020

	Sch. No.	(Fig. in Rs.) 31.03.2020	(Fig. in Rs.) 31.03.2019
CAPITAL FUND & LIABILITIES			
Capital Fund	I	653,21,614	653,21,614
Current Liabilities	II	48,01,077	48,51,376
Provision for bad & doubtful receivable (Created out of permissible accumulated surplus and not debited to Income & Expenditure A/c)	XIII	19,873	19,873
Excess of Income over Expenditure	XIV	519,59,091	575,66,403
		1221,01,655	**1277,59,266**
ASSETS & PROPERTIES			
Fixed Assets	III		
Gross Block		1242,46,180	1216,58,693
Less : Depreciation		757,49,240	719,01,672
Net Block		484,96,940	497,57,021
Current Assets			
Investments	IV	271,93,520	335,78,559
Fees Receivable	V (A)	281,15,649	210,24,942
Interest Receivable	V (B)	2,88,044	4,10,247
Deposits and Advances	VI	47,69,886	47,02,148
Income Tax Deducted at Source		123,17,395	149,36,428
Cash and Bank Balance	VII	9,20,221	33,49,921
		1221,01,655	**1277,59,266**
Notes to Accounts	XV		

AUDITORS
In terms of our report of even date

For K. D. Lath & Co.
Chartered Accountants
FRN : 306011E

S. LATH, Partner
Membership No. 59396

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

UDIN : 20059396AAAAL24667

MEMBER
GOVERNING COUNCIL

PROF.(DR) S.K.GHOSE
Actg. Director

Date: 23 SEP 2020
Place: Rourkela

Manager
(Accounts)

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2020

	Sch.No.	(Fig. in Rs.) 31.03.2020	(Fig. in Rs.) 31.03.2019
INCOME			
Training fees		69,69,086	84,37,348
Practical Training Fees		96,60,376	79,27,649
Education Fees	VIII	233,39,796	176,50,362
Other Receipts	IX	31,09,513	25,89,398
Total Income		**430,78,771**	**366,04,757**
EXPENDITURE			
Employee Cost	X	262,74,714	200,70,589
Hostel expenses		13,68,654	11,73,188
Honorarium & Conveyance to Guest Faculty		10,51,750	4,94,128
Other revenue expenses	XI	161,43,397	126,26,490
Depreciation	III	38,47,568	36,58,533
Total Expenditure		**486,86,083**	**380,22,928**
Net Excess of Expenditures over Income		**(56,07,312)**	**(14,18,171)**

AUDITORS

In terms of our report of even date
For K. D. Lath & Co.
Chartered Accountants
FRN : 306011E

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

S. LATH, Partner
Membership No. 59396

UDIN : 20059396AAAALZ4667

Date: 23 SEP 2020
Place: Rourkela

MEMBER
GOVERNING COUNCIL

PROF.(DR) S.K.GHOSE
Actg. Director

Manager
(Accounts)

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedules annexed to and forming part of accounts	**(Fig. in Rs.)** 31.03.2020	**(Fig. in Rs.)** 31.03.2019
I. CAPITAL FUND		
ICICI Bank Limited (Formerly The Industrial Credit & Investment Corporation of India Limited)	609,00,000	609,00,000
Hindustan Motors Limited	75,000	75,000
Steel Authority of India Limited (Rourkela Steel Plant)	7,50,000	7,50,000
National Engineering Co.	1,07,081	1,07,081
KCL Charitable Trust (Urban)	50,000	50,000
Donation in kind received from U.K.	19,39,533	19,39,533
Usha Martin Industries Limited	5,00,000	5,00,000
Larsen & Toubro Limited	10,00,000	10,00,000
	653,21,614	**653,21,614**
II. CURRENT LIABILITIES		
Retention Money	38,173	38,173
Dual Degree MBA Fees Refundable	1,89,000	1,89,000
Training & other Fees received in advance	4,60,774	4,60,774
Education & Other Fees received in advance	48,200	1,46,486
Liabilities for expenses	23,94,291	26,33,759
Statutory Dues Payable	5,86,644	4,82,519
TDS Payable	68,737	61,407
Caution Money	10,15,258	8,39,258
	48,01,077	**48,51,376**

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

MEMBER
GOVERNING COUNCIL

PROF.(DR) S.K.GHOSE
Actg. Director

Manager
(Accounts)

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedule annexed to and forming part of accounts
SCHEDULE - III Fixed Assets as on 31.03.2020

(Fig. in Rs.)

Particulars	C O S T				D E P R E C I A T I O N					Net	
	At Opening 01.04.19	Additions	Deletion	At Closing 31.03.20	At Opening 01.04.19	For the year	Deletion	Rate %	At Closing 31.03.20	Value as on 31.03.20	Value as on 31.03.19
Building	391,21,993			391,21,993	106,35,421	6,41,398	0	1.64	112,76,819	278,45,174	284,86,572
Landscaping	3,44,768			3,44,768	1,88,050	5,655	0	1.64	1,93,705	1,51,063	1,56,718
Machinery and Laboratory equipments	476,04,094	8,81,700		484,85,794	370,80,228	13,26,758	0	5.28	384,06,986	100,78,808	105,23,866
Airconditioning & Electrical equipments	72,26,676			72,26,676	43,87,202	3,19,001	0	5.28	47,06,203	25,20,473	28,39,474
Furniture and Fixtures	57,72,075	1,66,900		59,38,975	32,28,944	1,59,206		3.39	33,88,150	25,50,825	25,43,131
Office Equipment	37,09,110	8,42,285		45,51,395	28,08,094	1,62,761	0	5.28	29,70,855	15,80,540	9,01,016
Gym Equipment	2,79,081			2,79,081	44,205	14,735	0	5.28	58,940	2,20,141	2,34,876
Intercom Installation	8,87,497			8,87,497	8,19,714	33,615	0	5.28	8,53,329	34,168	67,783
Vehicles	46,66,233			46,66,233	29,84,510	4,90,195		14.62	34,74,705	11,91,528	16,81,723
Library Books	32,62,288			32,62,288	21,14,153	3,19,334		20.00	24,33,487	8,28,801	11,48,135
Computer	84,64,878	6,96,602		91,61,480	76,11,151	3,74,910	0	16.21	79,86,061	11,75,419	8,53,727
Building WIP	3,20,000			3,20,000			0			3,20,000	3,20,000
Total	**1216,58,693**	**25,87,487**	**0**	**1242,46,180**	**719,01,672**	**38,47,568**	**0**		**757,49,240**	**484,96,940**	**497,57,021**
Previous year	**1194,04,020**	**22,54,673**	**0**	**1216,58,693**	**682,43,139**	**36,58,533**	**0**		**719,01,672**	**497,57,021**	**511,60,881**

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

PROF.(DR) S.K.GHOSE
Actg. Director

MEMBER
GOVERNING COUNCIL

Manager
(Accounts)

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL
Schedules annexed to and forming part of accounts

	(Fig. in Rs.) 31.03.2020	(Fig. in Rs.) 31.03.2019
IV. INVESTMENTS		
Fixed deposits with S.B.I.	63,88,719	59,93,499
Fixed deposits with UCO Bank KBL	125,61,825	194,43,448
Investment wih ICICI Prudential Corporate Bond Fund	40,00,000	40,00,000
Fixed deposits with S.B.I, KBL	42,42,976	41,41,612
	271,93,520	**335,78,559**
V (A). FEES RECEIVABLES		
Education Fees Receivable (PGDEM / ADMM / AIMA)	5,71,713	6,88,695
Education Fees Receivable (BBA/MFC)	89,41,122	93,48,468
Education Fees Receivable (MBA)	78,27,061	49,84,420
Training Fees Receivable	8,79,424	1,04,805
Practical Training Fees Receivable	40,08,716	44,48,566
Mess Fee Receivable - MCL Participants	1,58,314	1,58,314
Fees Receivable - Diploma	57,29,299	12,75,400
Fees Receivable - Others	-	16,274
	281,15,649	**210,24,942**
V (B). INTEREST RECEIVABLE		
Interest Receivable on Investments	2,76,140	3,98,343
Interest receivable on SD	11,904	11,904
	2,88,044	**4,10,247**
VI. DEPOSITS & ADVANCES		
Security Deposits & EMD	37,39,694	34,71,973
Sundry Advances	8,29,195	10,23,213
Prepaid Expenses	2,00,997	2,06,962
	47,69,886	**47,02,148**
VII. CASH AND BANK BALANCE		
UCO Bank, Kansbahal, SB - 3410	26,896	2,95,456
UCO Bank, Kansbahal, SB - 1192	46,596	6,71,270
UCO Bank, Kansbahal, SB - 6851	97,156	2,39,761
SBI, Rourkela, SB Account - 9593	2,86,546	8,58,661
ICICI Bank Limited, Rourkela - 2319	35,847	34,323
ICICI Bank Limited, Rourkela - 0226	27,965	26,777
SBI, Kansbahal, SB Account - 3414	1,28,797	9,79,624
SBI, Kansbahal, SB Account - 4544	56,785	79,967
SBI, Kbl - Seminar Account, SB Account - 3930	68,721	66,434
Cash In Hand	1,44,912	97,648
	9,20,221	**33,49,921**

PROF.(DR) S.K.GHOSE
Actg. Director

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

MEMBER
GOVERNING COUNCIL

Manager
(Accounts)

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedules annexed to and forming part of accounts	**(Fig. in Rs.) 31.03.2020**	**(Fig. in Rs.) 31.03.2019**
VIII. EDUCATION FEES		
Course Fees- Academic	83,14,700	52,53,100
Course Fees- Accomodation/Transportation/TRG/Blezer	24,81,872	13,76,268
Course fees-Diploma in Mechanical	46,08,730	31,90,776
Course fees-Diploma in Mining	26,05,800	14,93,000
Education Fees-BBA	47,21,279	43,61,707
Education Fees-MFC	-	12,03,239
Education Fees (PGDM-AIMA)	6,07,415	7,72,272
	233,39,796	**176,50,362**
IX OTHER RECEIPTS		
Sundry Receipts	3,81,493	67,558
House rent from Staff	2,07,050	1,97,186
Interest on Fixed Deposit	20,48,500	19,69,449
Interest from Bank	62,075	1,09,286
Interest on SD	12,736	13,227
Interest on Income tax refund	3,97,659	2,32,692
	31,09,513	**25,89,398**
X EMPLOYEE COST		
Salary	211,51,202	161,85,150
Employers Contribution to P. F. (Govt.)	20,94,948	15,74,113
Employer's Contribution to ESI	1,55,947	1,32,787
Leave Travel Allowances (Assistance)	6,72,488	11,19,715
Leave Salary	1,86,567	2,90,224
Employees welfare	13,35,577	2,97,628
Gratuity	2,81,545	4,70,972
Ex-Gratia	3,96,440	-
	262,74,714	**200,70,589**
XI OTHER REVENUE EXPENSES		
Traveling & Vehicle running expenses	33,08,034	28,02,593
Program Promotion Expenses	6,17,606	2,10,788
Festival & Function	5,76,209	3,44,490
Fees and Subscription	8,93,430	3,46,875
Insurance	3,16,785	3,07,476
Electricity charges	9,90,894	9,50,241
Repairs and Maintenance		
Machinery & Laboratory Equipments	1,45,064	1,84,743
Office Equipments and Furnitures	5,64,448	4,04,726
Estate Maintenance	19,51,513	22,93,852
Security Services	7,95,283	6,93,185
Hostel Services	15,62,078	5,15,641
House Rent	-	2,08,000
Printing and Stationery	3,41,166	3,31,961
Telephone, Fax, e-mail and internet	6,60,284	5,78,108
WDA Laboratory Expense	3,39,200	2,89,200
Legal Matters Fees	3,44,020	2,38,860
Statutory Dues Payments	7,00,429	4,90,202
Seminar & study visit expenses	7,16,196	2,98,910
Uniform expenses	3,87,834	-
Sundry Expenses **(Sch. No. XII)**	9,32,924	11,36,639
	161,43,397	**126,26,490**

PROF.(DR) S.K.GHOSE
Actg. Director

MEMBER
GOVERNING COUNCIL

Manager
(Accounts)

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedules annexed to and forming part of accounts	(Fig. in Rs.) 31.03.2020	(Fig. in Rs.) 31.03.2019
XII. DETAILS OF SUNDRY EXPENSES		
Water Charges	1,26,000	1,26,000
Newspaper and Magazines and e-journal	1,67,504	1,75,180
Bank Charges	5,168	6,741
Recruitment Expenses	1,36,488	2,530
Staff Training Expenses	1,480	1,50,956
Campus Drive Expense	23,920	33,672
Payment to Auditors :		
Audit Fees (IIPM, SOM & SET)	65,000	65,000
Income Tax Matters	10,000	10,000
Audit Expenses (IIPM & SOM)	10,100	7,400
GST Audit Fees	10,000	-
Transit House Expenses	62,206	81,568
Service Charges-Doctor.	24,000	24,000
Dish Antina Serv.chgs	67,944	55,520
Laboratory Expenses	4,743	7,992
Advertising Expenses & Newsletter	52,900	74,960
Postage and Courier	58,362	38,703
Conveyance Expenses	9,341	8,002
Discount Allowed	985	12,237
Other Expenses	96,783	2,56,178
	9,32,924	**11,36,639**
XIII. PROVISION FOR BAD & DOUBTFUL RECEIVABLE		
Financial Year 2010-2011	19,873	19,873
	19,873	**19,873**
XIV. EXCESS OF INCOME OVER EXPENDITURE		
Balance as per last year	575,66,403	589,84,574
Add: Excess of expenditure over income during the year	(56,07,312)	(14,18,171)
	519,59,091	**575,66,403**

PROF.(DR) S.K.GHOSE
Actg. Director

MEMBER
GOVERNING COUNCIL

Manager
(Accounts)

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

NOTES TO ACCOUNTS **Schedule-XV**

1. Significant Accounting Policies

a. **Basis of Accounting**

The financial statements have been prepared on historical cost convention. The institution follows the mercantile system of accounting and recognises the expenditure and income on accrual basis.

b. **Investments**

Long Term investments are carried at cost. However, permanent diminution in value thereof is provided for.

c. **Fixed Assets**

Fixed assets are recorded at cost of acquisition or construction. Cost includes all expenditure incurred to bring the asset to its working condition for the intended use of the concerned assets.

d. **Depreciation**

Depreciation is being provided in Straight Line Method as per Society Policies.

e. **Retirement Benefits**

Provident Fund & ESI is a defined contribution scheme and the contributions as required by the statute made to the Recognized Provident Fund & ESI are charged to Income and Expenditure Account.

Gratuity is accounted for as and when paid.

f. **Income Tax**

The Society is registered with the Income Tax Authorities u/s 10(23C)(vi) of Income Tax Act, 1961 vide registration no 2008-09/20572-26dated 10.02.2009 and hence the Income of the Society is exempt underIncome Tax. The PAN of the society is AAAAI0103M.

2. Previous year figures have been rearranged / regrouped wherever necessary.

PROF (DR) S.K.GHOSE
Actg. Director

MEMBER
GOVERNING COUNCIL

Manager (Accounts)

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

INDIAN INSTITUTE FOR

PRODUCTION MANAGEMENT

KANSBAHAL

AUDITED ACCOUNTS (CONSOLIDATED)
FOR THE
YEAR ENDED 31ST MARCH 2019

K.D. LATH & CO.
CHARTERED ACCOUNTANTS
UDITNAGAR ROURKELA-769012

K.D. LATH & CO.
CHARTERED ACCOUNTANTS
(FRN : 306011E)

Office : Uditnagar, Rourkela - 769 012. Phone : 0661-2500717. E-mail : sudhirlath@gmail.com

INDEPENDENT AUDITORS' REPORT

We have audited the attached Balance Sheet as on 31st March 2017 and the Income & Expenditure Account for the period April'18 to March'19 of **Indian Institute for Production Management, Kansbahal** and report that:

We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purpose of audit. In our opinion, proper books of accounts have been kept by the institute, so far as appear from our examination of such books. The Balance Sheet and Income and Expenditure Account dealt with by the report are in agreement with the books of accounts.

In our opinion and to the best of our information and explanations given to us, the said account gives a true and fair view:

i) In case of the Balance Sheet, of the state of affairs of the Institute as at 31st March, 2019

ii) In case of the Income and Expenditure account, the excess expenditure over income of the Institute for the year ended on that date.

For K. D. Lath & Co.
Chartered Accountants
FRN : 306011E

S. LATH, Partner
Membership No. 59396

ROURKELA

DATE: 19 SEP 2019

UDIN : 19059396AAAAEN7479

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL
BALANCE SHEET AS AT 31ST MARCH 2019

	Sch. No.	(Fig. in Rs.) 31.03.2019	(Fig. in Rs.) 31.03.2018
CAPITAL FUND & LIABILITIES			
Capital Fund	I	65,321,614	65,321,614
Current Liabilities	II	4,851,376	6,094,085
Provision for bad & doubtful receivable (Created out of permissible accumulated surplus and not debited to Income & Expenditure A/c)	XIII	19,873	168,933
Excess of income Over Expenditure	XIV	57,566,403	58,984,574
		127,759,266	**130,569,206**
ASSETS			
Fixed Assets			
Gross Block	III	121,658,693	119,404,020
Less : Depreciation		71,901,672	68,243,139
Net Block		49,757,021	51,160,881
Investments	IV	33,988,806	35,271,133
Fees Receivable	V	21,024,942	20,910,016
Deposits and advances	VI	4,702,148	5,207,928
Income Tax Deducted at Source		14,936,428	16,055,082
Cash and bank balance	VII	3,349,921	1,964,166
		127,759,266	**130,569,206**

PROF.(DR) S.K.GHOSE
Actg. **Director**

MEMBER
GOVERNING COUNCIL

Manager (Accounts)

AUDITORS
In terms of our report of even date

For K. D. Lath & Co.
Chartered Accountants
FRN : 306011E

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

S. LATH, Partner
Membership No. 59396

UDIN : 19059396AAAA EM7479
19 SEP 2019

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL
INCOME AND EXPENDITURE ACCOUNT FOR
THE YEAR ENDED 31ST MARCH 2019

	Sch.No.	(Fig. in Rs.) 31.03.2019	(Fig. in Rs.) 31.03.2018
INCOME			
Training fees		8,437,348	8,729,546
Practical Training Fees		7,927,649	8,417,081
Education Fees	VIII	17,650,362	18,794,346
Other Receipts	IX	2,589,398	3,455,182
Total Income		**36,604,757**	**39,396,155**
EXPENDITURE			
Employee Cost	X	20,070,589	20,931,546
Hostel expenses		1,173,188	846,449
Honorarium & Conveyance to Guest Faculty		494,128	721,641
Other revenue expenses	XI	12,626,490	13,598,406
Depreciation	III	3,658,533	3,556,708
Total Expenditure		**38,022,928**	**39,654,750**
Net Excess of Expenditures over Income		**(1,418,171)**	**(258,595)**

PROF.(DR) S.K.GHOSE
Actg. **Director**

MEMBER
GOVERNING COUNCIL

Manager (Accounts)

AUDITORS

In terms of our report of even date

For K. D. Lath & Co.
Chartered Accountants
FRN : 306011E

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

S. LATH, Partner
Membership No. 59396

UDIN : 19059396AAAA EN7479

19 SEP 2019

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedules annexed to and forming part of accounts	(Fig. in Rs.) 31.03.2019	(Fig. in Rs.) 31.03.2018
I. CAPITAL FUND		
ICICI Bank Limited (Formerly The Industrial Credit & Investment Corporation of India Limited)	60,900,000	60,900,000
Hindustan Motors Limited	75,000	75,000
Steel Authority of India Limited Rourkela Steel Plant	750,000	750,000
National Engineering Co.	107,081	107,081
KCL Charitable Trust (Urban)	50,000	50,000
Donation in kind received from U.K.	1,939,533	1,939,533
Usha Martin Industries Limited	500,000	500,000
Larsen & Toubro Limited	1,000,000	1,000,000
	65,321,614	**65,321,614**
II. CURRENT LIABILITIES		
Retention Money	38,173	38,173
Dual Degree MBA Fees Refundable	189,000	189,000
Training & other Fees received in advance	460,774	460,774
Education & Other Fees received in advance	146,486	257,810
Liabilities for expenses	2,633,759	3,331,319
Statutory Dues Payable	482,519	896,226
TDS Payable	61,407	198,525
Caution Money	839,258	722,258
	4,851,376	**6,094,085**

Actg.
PROF.(DR) S.K.GHOSE
Director

MEMBER
GOVERNING COUNCIL

Manager (Accounts)

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedule annexed to and forming part of accounts
SCHEDULE - III Fixed Assets as on 31.03.2019

(Fig. in Rs.)

Particulars	C O S T				D E P R E C I A T I O N					Net	
	At Opening 01.04.18	Additions	Deletion	At Closing 31.03.19	At Opening 01.04.18	For the year	Deletion	Rate %	At Closing 31.03.19	Value as on 31.03.19	Value as on 31.03.18
Building	39,121,993			39,121,993	9,994,023	641,398	-	1.64	10,635,421	28,486,572	29,127,970
Landscaping	344,768			344,768	182,395	5,655	-	1.64	188,050	156,718	162,373
Machinery and Laboratory equipments	46,731,815	872,279		47,604,094	35,770,310	1,309,918	-	5.28	37,080,228	10,523,866	10,961,505
Airconditioning & Electrical equipments	7,226,676			7,226,676	4,067,389	319,813	-	5.28	4,387,202	2,839,474	3,159,287
Furniture and Fixtures	5,659,875	112,200		5,772,075	3,071,677	157,267		3.39	3,228,944	2,543,131	2,588,198
Office Equipment	3,611,645	97,465		3,709,110	2,654,268	153,826	-	5.28	2,808,094	901,016	957,377
Gym Equipment	279,081.00			279,081.00	29,470.00	14,735.00	-	5.28	44,205	234,876.00	249,611.00
Intercom Installation	887,497			887,497	785,098	34,616	-	5.28	819,714	67,783	102,399
Vehicles	4,666,233			4,666,233	2,453,244	531,266		14.62	2,984,510	1,681,723	2,212,989
Library Books	2,507,864	754,424		3,262,288	1,932,847	181,306		20.00	2,114,153	1,148,135	575,017
Computer	8,366,573	98,305		8,464,878	7,302,418	308,733	-	16.21	7,611,151	853,727	1,064,155
Building WIP		320,000		320,000			-			320,000	
Total	**119,404,020**	**2,254,673**	**-**	**121,658,693**	**68,243,139**	**3,658,533**	**-**		**71,901,672**	**49,757,021**	**51,160,881**
Previous year	**115,791,315**	**4,557,758**	**945,053**	**119,404,020**	**65,388,270**	**3,556,708**	**701,839**		**68,243,139**	**51,160,881**	**50,403,045**

Acty. PROF.(DR) S.K.GHOSE
Director

MEMBER
GOVERNING COUNCIL

Manager (Accounts)

Note :-

1. Depreciation is calculated in straight line method as per FAMS

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedules annexed to and forming part of accounts	(Fig. in Rs.) 31.03.2019	(Fig. in Rs.) 31.03.2018
IV. INVESTMENTS		
Fixed deposits with S.B.I.	5,993,499	5,951,548
Fixed deposits with UCO Bank KBL	19,443,448	18,845,073
Investment wih ICICI Prudential Corporate Bond Fund	4,000,000	4,000,000
Fixed deposits with S.B.I, Kbl	4,141,612	6,000,000
Interest Receivable on Investments	398,343	462,608
Interest receivable on SD	11,904	11,904
	33,988,806	**35,271,133**
V. FEES RECEIVABLES		
Education Fees Receivable (PGDEM / ADMM / AIMA)	688,695	728,548
Education Fees Receivable (BBA/MFC)	9,348,468	8,422,836
Education Fees Receivable (MBA)	4,984,420	4,029,068
Training Fees Receivable	104,805	2,073,901
Practical Training Fees Receivable	4,448,566	3,523,775
Mess Fee Receivable - MCL Participants	158,314	158,314
Fees Receivable - Diploma	1,275,400	1,957,300
Fees Receivable - Others	16,274	16,274
	21,024,942	**20,910,016**
VI. LOANS, DEPOSITS & ADVANCES		
Security Deposits & EMD	3471973	3363843
Sundry Advances	1,023,213	1,648,414
Prepaid Expenses	206962	195671
	4,702,148	**5,207,928**
VII. CASH AND BANK BALANCE		
UCO Bank, Kansbahal, SB Account	1,206,487	354,088
SBI, Rourkela, SB Account	858,661	401,912
ICICI Bank Limited, Rourkela	61,100	295,573
SBI, Kansbahal, SB Account	1,059,591	681,471
SBI, Kbl - Seminar Account (IIPM - SOM), SB Account	66,434	54,470
Cash In Hand	97,648	176,652
	3,349,921	**1,964,166**

PROF.(DR) S.K.GHOSE
Actg. Director

MEMBER
GOVERNING COUNCIL

Manager (Accounts)

K. D. LATH & CO. CHARTERED ACCOUNTANTS UDITNAGAR ROURKELA

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedules annexed to and forming part of accounts	(Fig. in Rs.) 31.03.2019	(Fig. in Rs.) 31.03.2018
VIII. EDUCATION FEES		
Course Fees- Academic	5,253,100	5,242,820
Course Fees- Accomodation/Transportation/TRG/Blezer	1,376,268	912,400
Course fees-Diploma in Mechanical	3,190,776	1,793,400
Course fees-Diploma in Mining	1,493,000	877,200
Education Fees-BBA	4,361,707	4,902,936
Education Fees-MFC	1,203,239	4,038,200
Education Fees (PGDM-AIMA)	772,272	1,027,390
	17,650,362	**18,794,346**
IX OTHER RECEIPTS		
Sundry Receipts	67,558	71,051
House rent from Staff	197,186	199,833
Interest on Fixed Deposit	1,969,449	2,467,690
Interest from Bank	109,286	139,314
Interest on SD	13,227	13,227
Interest on Income tax refund	232,692	530,301
Profit/ (Loss) on Sale of Assets		33,766
	2,589,398	**3,455,182**
X EMPLOYEE COST		
Salary	16,185,150	15,916,816
Employers Contribution to P. F. (Govt.)	1,574,113	1,474,539
Employer's Contribution to ESI	132,787	110,756
Leave Travel Allowances (Assistance)	1,119,715	945,201
Leave Salary	290,224	377,823
Employees welfare	297,628	1,695,979
Gratuity	470,972	410,432
	20,070,589	**20,931,546**
XI OTHER REVENUE EXPENSES		
Traveling & Vehicle running expenses	2,802,593	2,805,783
Conveyance Expenses	8,002	19,297
Electricity charges	950,241	1,053,646
Repairs and Maintenance		
Machinery & Laboratory Equipments	184,743	139,862
Office Equipments and Furnitures	404,726	422,427
Estate Maintenance	2,293,852	3,292,084
Security Services	693,185	1,189,896
Hostel Services	515,641	472,746
House Rent	208,000	548,000
Printing and Stationery	331,961	228,695
Postage and Courier	38,703	34,441
Telephone, Fax, e-mail and internet	578,108	452,469
WDA Laboratory Expense	289,200	158,794
Advertising Expenses & Newsletter	74,960	150,564
Legal Matters Fees	238,860	228,872
Seminar & study visit expenses	298,910	-
Uniform expenses		154,078
Labrotory Expenses	7,992	57,191
Discount Allowed	12,237	4,642
Sundry Expenses (**Sch. No. XII**)	2,694,576	2,184,919
	12,626,490	**13,598,406**

PROF.(DR) S.K.GHOSE
Actg. Director

MEMBER
GOVERNING COUNCIL

Manager (Accounts)

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL
Schedules annexed to and forming part of accounts

	(Fig. in Rs.) 31.03.2019	(Fig. in Rs.) 31.03.2018
XII. DETAILS OF SUNDRY EXPENSES		
Insurance	307,476	125,648
Water Charges	126,000	166,000
Newspaper and Magazines and e-journal	175,180	229,186
Fees and Subscription	346,875	402,681
Bank Charges	6,741	6,055
Recruitment Expenses	2,530	25,852
Staff Training Expenses	150,956	73,200
Festival & Function	344,490	174,166
Campus drive expense	33,672	13,000
Payment to Auditors :		
Audit Fees (IIPM, SOM & SET)	65,000	60,000
Income Tax Matters	10,000	10,000
Audit Expenses (IIPM & SOM)	7,400	15,530
Transit House Expenses	81,568	65,521
Service Charges-Doctor.	24,000	24,000
Dish Antina Serv.chgs	55,520	50,803
Program Promotion Expenses	210,788	195,292
Statutory Dues Payments	526,953	334,520
Other Expenses	219,427	213,465
	2,694,576	**2,184,919**
XIII. PROVISION FOR BAD & DOUBTFUL RECEIVABLE		
Financial Year 2009-2010		30572
Financial Year 2010-2011	19873	138361
	19,873	**168,933**
XIV. EXCESS OF INCOME OVER EXPENDITURE		
Balance as per last year	58,984,574	59,243,169
Add: Excess of income over expenditure during the year	(1,418,171)	(258,595)
	57,566,403	**58,984,574**

Actg. **PROF.(DR) S.K.GHOSE**
Director

MEMBER
GOVERNING COUNCIL

Manager (Accounts)

K. D. LATH & CO. * UDITNAGAR ROURKELA * CHARTERED ACCOUNTANTS

NOTES ON ACCOUNTS

1. SIGNIFICANT ACCOUNTING POLICIES

a) Account has been maintained on accrual basis of accounting.

b) Depreciation is being provided in Straight Line Method as per FAMS

c) Gratuity is accounted for as and when paid.

2. Previous year figures have been rearranged / regrouped wherever necessary

PROF (DR) S.K.GHOSE
Director

MEMBER
GOVERNING COUNCIL

Manager (Accounts)

K. D. LATH & CO.
UDITNAGAR
ROURKELA
CHARTERED ACCOUNTANTS

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
Kansbahal

Audited Statement of Account of 2017-18 (Income & Expenditure Statement for complete year)					
Income			Expenditure		
Sl. No.	Details	Amount	Sl. No.	Details	Amount
1	Tuition Fees	2,490,600	1	Salary	502,989
2	Other fee/amount collected from students	342,800	2	Administrative expenses	474,493
3	Grants from Govt. / Private agencies		3	Training and Development	
4	Grants / Contribution from other sources (Management)		4	Laboratory consumables	57,191
5	Scholarships received		5	Library	
6	Other income	7,167	6	Travel	59,711
			7	Fees Paid to University/ Board/ Government/AICTE/UGC	103,700
			8	Repairs and Maintenance	286,965
			9	Scholarships/ Concessions/ Fellowships/Honorarium etc., awarded/incurred(other than Govt. grants)	58,250
			10	Expenditure of grants received from Govt. / Private agencies	
			11	Depreciation	11,654
			12	Any other expenditure	
			13	Excess of Income over Expendiutures	1,285,614
	Total	2,840,567		Total	2,840,567

Auditors'
Verified and Found Correct

For K. D. Lath & Co.
Chartered Accountants
FRN : 306011E

S. LATH, Partner
Membership No. 59396

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

Principal

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

Date:13.12.2018
Place: Rourkela

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

KANSBAHAL

AUDITED ACCOUNTS
FOR THE
YEAR ENDED 31ST MARCH 2018

K.D. LATH & CO.
CHARTERED ACCOUNTANTS
UDITNAGAR ROURKELA-769012

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
KANSBAHAL
BALANCE SHEET AS AT 31st March 2018

	Sch. No.	31.03.2018 (Fig. in Rs.)	31.03.2018 (Fig. in Rs.)
CAPITAL FUND & LIABILITIES			
Current Liabilities	VII	12,77,241	-
Excess of income Over Expenditure	VIII	12,85,615	-
		25,62,856	-
ASSETS			
Fixed Assets			
Gross Block		5,55,806	-
Less : Depreciation		11,654	-
Net Block		**5,44,152**	-
Fees Receivable		19,57,300	-
Cash and bank balance	VI	61,403	-
		25,62,856	-

PROF.(DR) N NAYAK
Director

MANAGEMENT IN CHARGE
GOVERNING BODY

Manager(Accounts)

AUDITORS
Verified & found correct

For K. D. Lath & Co.
Chartered Accountants
FRN : 306011E

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

S. LATH, Partner
Membership No. 59396

28 SEP 2018

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
KANSBAHAL
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31.03.2018

PARTICULARS	Sch. No.	(Fig. in Rs.) 31.03.2018	(Fig. in Rs.) 31.03.2017
INCOME			
Course Fees- Mechanincal Engg		17,93,400	-
Course Fees- Mining		6,97,200	-
Hostel Fees- Mining		1,80,000	-
Uniform Fees		1,62,800	-
Miscellaneous Receipts	I	7,167	-
Total Income		**28,40,567**	-
EXPENDITURE			
Salaries/Ex gratia/PLP/Leave Salary/Gratuity		5,02,989	-
Conveyance		91	-
Honorarium To Guest Faculties		58,250	-
Traveling Expenses		59,620	-
Employers Contribution To PF		10,080	-
Electricity Expenses		87,024	-
Hostel Expenses		48,239	-
Printing & Stationery		21,504	-
Repair & Maintenance		26,635	-
Legal Matters		936	-
Depreciation	III	11,654	-
Other Revenue Expenses	II	7,27,931	-
Total Expenditure		15,54,953	-
Net Excess of Income over Expenditure		12,85,614	-

PROF.(DR) N NAYAK
Director

MANAGEMENT IN CHARGE
GOVERNING BODY

Manager(Accounts)

AUDITORS
Verified & found correct

For K. D. Lath & Co.
Chartered Accountants
FRN : 306011E

K. D. LATH & CO. UDITNAGAR ROURKELA CHARTERED ACCOUNTANTS

S. LATH, Partner
Membership No. 59396

28 SEP 2018

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
KANSBAHAL

Schedule annexed to and forming part of accounts
SCHEDULE - III OF Fixed Assets as on 31.03.2018

Particulars		C O S T				D E P R E C I A T I O N					NET	NET
							For the year					
	Rate %	At Opening 01.04.17	Additions	Transfer	At Closing 31.03.18	At Opening 01.04.17	Additions	Adjmts (+)/(-)	Total	At Closing 31.03.18	Value as on 31.03.18	Value as on 31.03.17
Furniture and Fixtures	3.39%	-	62,000		62,000	-	620	-	620	620	61,380	-
Office Equipment	5.28%	-	50,522		50,522	-	1,002	-	1,002	1,002	49,520	-
Laborotory Equipment	5.28%	-	4,03,708		4,03,708	-	7,624	-	7,624	7,624	3,96,084	-
Computer	16.21%	-	39,576		39,576	-	2,408		2,408	2,408	37,168	-
Total		-	5,55,806	-	5,55,806	-	11,654	-	11,654	11,654	5,44,152	-
Previous figure		-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-

Note :-

1. Depreciation is calculated in straight line method as per FAMS.

PROF.(DR) N NAYAK
Director

MANAGEMENT IN CHARGE
GOVERNING BODY

K. D. LATH & CO.
UDITNAGAR
ROURKELA
CHARTERED ACCOUNTANTS

Manager(Accounts)

IPM SCHOOL OF ENGINEERING & TECHNOLOGY
KANSBAHAL

Schedule annexed to and forming part of accounts	(Fig. in Rs.) 31.03.2018	(Fig. in Rs.) 31.03.2017
SCHD I		
Miscellaneous Receipts		
Interest From SB Accounts	3,267	-
Other Receipts	3,900	-
TOTAL	7,167	-
SCHD II		
Other Revenue Expenses		
Audit Fees & Expenses	10,000	-
Bank Charges	122	-
Estate Maintenance	2,60,330	-
Fees & Subscription	1,03,700	-
Festival & Function Expenses	18,620	-
General Expenses	7,102	-
Internet Expenses	24,470	-
Promotional Expenses for students	18,980	
Postage/Courier Expenses	2,693	-
Laboratary Expenses	57,191	
Security Services	93,050	-
Telephone/Fax/E-Mail Expenses	11,063	-
Transit House Expense	5,124	-
Uniform Expenses	49,300	
Hostel Services Staff Expenses	34,406	
House Rent	18,800	-
Water Charges	12,980	-
TOTAL	7,27,931	-

PROF.(DR) N NAYAK
Director

MANAGEMENT IN CHARGE
GOVERNING BODY

K. D. LATH & CO.
UDITNAGAR
ROURKELA
CHARTERED ACCOUNTANTS

Manager(Accounts)

PM SCHOOL OF ENGINEERING & TECHNOLOGY
ANSBAHAL

Schedules annexed to and forming part of accounts

	(Fig. in Rs.) 31.03.2018	(Fig. in Rs.) 31.03.2017
VI CASH AND BANK BALANCES		
UCO Bank, Kansbahal	20,280	-
Cash In Hand	41,123	-
	61,403	-
VII CURRENT LIABILITIES		
(A) Refundable to Students		
Caution Deposits	37,000	-
(B) Other Liabilities		
Liabilities for expenses	20,750	-
Salary Payable	43,205	-
IIPM School Of Management	79,737	-
Indian Institute Of Production Management	10,96,549	-
Total	**12,77,241**	-
VIII Excess of Income over Expenditure		
Balance as per last year	-	-
Add: Excess of Expenditure over income	12,85,614	-
	12,85,614	-

PROF.(DR) N NAYAK
Director

MANAGEMENT IN CHARGE
GOVERNING BODY

Manager (Accounts)

K. C. LATH & CO.
UDITNAGAR, ROURKELA
CHARTERED ACCOUNTANTS

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA

ରାଜ୍ୟ ବୈଷୟିକ ଶିକ୍ଷା ଓ ପ୍ରଶିକ୍ଷଣ ପରିଷଦ, ଓଡ଼ିଶା

SCTE(D)95/2010
Letter No.1341.../**dt** 4/4/19

To,
The Principals,
All Engineering Schools and Polytechnics.

Sub:- Approved Academic Calendar for the academic session 2019-20.

Sir,

In inviting a reference to the subject cited above, I am to enclose here with the approved Academic Calendar for the academic session 2019-20 of Diploma Course duly approved by the DTE&T, Odisha, Cuttack vide letter number 5797 dt. 27.3.2019 for circulation among all concerned.

Encl: - As above.

Yours faithfully,

Controller of Examinations.

ACADEMIC CALENDAR FOR THE SESSION 2019-20

Sl.No.	Activity	1st Semester	3rd /5th /7th (PT) Semester
1	Internship for 2nd/4th /6th sem. appeared students		1.6.2019 to 29.6.2019
2	Induction Programme for 1st semester Diploma Courses & Coverage of Bridge Course	05.08.2019 to 14.8.2019	-
3	Commencement of Semester Classes	16.8.2019	15.7.2019
4	Readmission	-	Upto 15.7.2019
	Reporting Readmission Data to SCTEVT online		Upto 22.7.2019
5	Issue of SCTE&VT Registration Numbers	15.9.2019	15.9.2019(3rd sem LE students)
6	Semester Exams Registration(Regular students)	3rd week of September 2019	3rd week of September 2019
7	1st Internal Assesment for 5th Sem.	-	3rd Week of August 2019
8	2nd Internal Assesment/ Internal Test for 1st & 3rd Sem	4th week of October 2019	3rd week of September 2019
9	Puja Holidays	5.10.2019 to 12.10.2019	5.10.2019 to 12.10.2019
10	Closing of Attendance	30.11.2019	31.10.2019
11	Tentative Date of Semester Examination	10.12.2019 (1st & 4th B))	15.11.2019 (3rd, 5th,7th, 2nd(B) &6th(B))
Sl.No.	**Activity**	**2nd Semester**	**4th/6th/8th(PT) Semester**
12	Commencement of Classes	2.1.2020	2.12.2019
13	X'Mas Holidays		25.12.2019 to 31.12.2019
14	Readmission	Upto 16.1.2020	Upto 16.12.2019
15	Reporting Readmission Data to SCTEVT online	Upto 24.1.2020	Upto 23.12.2019
16	Semester Exams Registration(Regular students)	1st week of February 2020	1st week of January 2020
17	1st Internal Assesment for 6th sem.		3rd Week of Jan. 2020
18	2nd Internal Assesment for 6th sem./ Internal Assesment for 2nd/4th Sem.	4th week of Feb 2020	4th week of Feb 2020
19	Closing of Attendance	30.4.2020	31.3.2020
20	Branch Change of 2nd sem. Students by Principals	31.3.2020	-
21	Tentative Date of Semester Examination	7.5.2020 (2nd & 3rd (B))	10.4.2020 (4th, 6th,8th, 1st(B) &5th(B)
22	Tentative Date of Publication of Results	31.7.2020	30.6.2020

NB:

1. There shall be 39 periods of class per week and each of minimum 55 minutes duration for 1st/2nd/3rd/4th/5th/6th /7th(PT)/8th(PT)semester.
2. Principals are required to arrange extra classes during Holidays and Off hours, wherever necessary, to complete the coverage of syllabus in time.
3. Annual Athletic Meet, Annual Cultural Meet may be conducted on suitable dates during Even semesters.
4. The Internship Policy of AICTE is to be scrupulously followed and to be arranged by Institution. Induction Programme for 1st semester students is to be implemented as per AICTE APH 2019-20.

4/9/19

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA

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No. 1567 Date. 24/9/2021

To

The Principals of all Polytechnics & PDIS Institutions

Sub: Academic Calendar for 2021-22

Sir,

With reference to the above subject, I am to enclose herewith the Academic Calendar for 2021-22 session with due approval from DTE&T, Odisha vide letter No. 10017 dt.23.9.2021 of Dy. Director(TT) for further action at your end. The Academic Calendar is subject to last minute change upon instructions from AICTE/Govt.

Yours faithfully

Encl: as above

24/9/21

Controller of Examinations

Memo No. 1568 Date 24/9/2021

Copy to DTE&T, Odisha, Cuttack for kind information .

24/9/21

Controller of Examinations

Memo No. 1569 Date 24/9/2021

Copy to Additional Secretary, SD&TE Department, Govt. of Odisha for kind information .

24/9/21

Controller of Examinations

ACADEMIC CALENDAR of Diploma and PDIS courses for the Session 2021-22

Sl.No	Activity	1st Semester	3rd /5th /7th (PT) Semester
1	Induction Programme for 1st semester Diploma Courses & Coverage of Bridge Course	8.10.2021	-
2	Commencement of Semester Classes	25.10.2021 (PDIS course 16.11.2021)	1.10.2021
3	Readmission at Institute Level	-	1.10.2021 to 16.10.2021
4	Reporting Readmission Data to SCTEVT online	-	18.10.2021 to 25.10.2021
5	Puja Holidays	11.10.2021 to 18.10.2021	11.10.2021 to 18.10.2021
6	Issue of SCTE&VT Registration Numbers	15.12.2021	1.12.2021(3rd sem LE students)
7	Semester Exams Registration(Regular students)	4th week of Dec. 2021	2nd week of Dec. 2021
8	Internal Assessment for 1st , 3rd & 5thSem (Last date)	1st week of Jan. 2022	1st week of Dec. 2021
9	Closing of Attendance	31.1.2022	8.1.2022
10	X'Mas Holidays	-	-
11	Tentative Date of Semester Examination	8.2.2022	18.1.2022
Sl.No	**Activity**	**2nd Semester**	**4th/6th/8th(PT) Semester**
12	Commencement of Classes	24.2.2022	3.2.2022
13	Readmission	24.2.2022 to 7.3.2022	3.2.22 to 17.2.2022
14	Reporting Readmission Data to SCTEVT online	8.3.22 to 15.3.2022	18.2.22 to 25.2.2022
15	Semester Exams Registration(Regular students)	2nd week of April 2022	4th week of March 2022
16	Internal Assesment	3rd week of April 2022	3rd week of March 2021
17	Closing of Attendance	24.5.2022	30.4.2021
18	Branch Change of 2nd sem. Students by Principals	Up to 31.3.2022	-
19	Reporting Branch Change case to SCTE&VT online	2.4.2022 to 9.4.2022	-
20	Tentative Date of Semester Examination	5.6.2022	8.5.2022
21	Tentative Date of Publication of Results	31.8.2022	31.7.2022
22	Internship and Summer Break for Students	18.6.2022 to 30.6.2022	1.6.2022 to 30.6.22
23	Tentative date for starting of next Session		1/7/2022

1. There shall be 39 periods of class per week and each of minimum 55 minutes duration for all semesters.
2. Principals are to arrange extra classes during Holidays and Off hours, wherever necessary, to complete the syllabus in time.
3. Annual Athletic Meet, Annual Cultural Meet may be conducted subject to Covid restriction
4. The Internship Policy of AICTE is to be scrupulously followed and to be arranged at Institution level. Induction Programme for 1st semester students is to be implemented as per AICTE Guidelines subject to covid restriction.
5. Activities of Academic Calendar are subject to last minute change due to Covid19 Pandemic restrictions of Govt and/or instructions from AICTE and other contingencies.
6. Online mode of Classes may be adopted during the period for which Physical mode of classes are restricted by Govt. due to Covid19 Pandemic.

24/9

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY KANSBAHAL

Branch: MINING — **TIMETABLE** — **Semester: 1st**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	Comp App.	Engg. Math-I	Engg. Mechanics	Engg. Physics	LUNCH	Computer Application Lab		
TUE	Engg. Physics	Engg. Mechanics	Comp App.	Engg. Math-I		Workshop Practice		
WED	Engg. Math-I	Comp App.	ENGG PHYSICS LAB			Engg. Physics	SEMINAR	
THU	Engg. Mechanics	Engg. Math-I	ENGG PHYSICS LAB			QIP/INDUSTRY EXPERT TALK		
FRI	Comp App.	Engg. Math-I	Engg. Mechanics	Comp Appl Lab		Engg. Math-I(T)	SEMINAR	
SAT	Engg. Physics	SCA				Workshop Practice		

Branch: MINING — **TIMETABLE** — **Semester: 2nd**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	Comm English	Engg. Math-II	BEE	ENGG.CHEM LAB	LUNCH	Engg. Math-II	SEMINAR	
TUE	Engg. Chemistry	BEE	COMM. ENGLISH LAB			ENGINEERING DRAWING		
WED	Engg. Math-II	Comm English	Engg. Chemistry	BEE		Engg. Math-II (T)	SEMINAR	
THU	BEE	Engg. Chemistry	Engg. Math-II	Comm English		SCA		
FRI	Engg. Chemistry	Engg. Math-II	COMM. ENGLISH LAB			QIP/INDUSTRY EXPERT TALK		
SAT	Comm English	ENGINEERING DRAWING				ENGG. CHEMISTRY LAB		

Branch: MINING — **TIMETABLE** — **Semester: 3rd**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	SMT	MS-I	MG-I	MOM	LUNCH	MINE SURVEY-I LAB		
TUE	MS-I	MG-I	MOM	EVS		MINE GEOLOGY-I LAB		
WED	MG-I	MOM	EVS	MS-I		MECHANICAL OPERATION IN MINES LAB		
THU	MOM	EVS	SMT	MG-I		MINE SURVEY-I LAB		
FRI	EVS	SMT	MS-I	SCA		MINE GEOLOGY-I LAB		
SAT	SMT	MECHANICAL OPERATION IN MINES LAB				QIP/SEMINAR/INDUSTRY EXPERT TALK		

Branch: MINING — **TIMETABLE** — **Semester: 4th**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	MS-II	ELECTRICAL EQUIPMENT IN MINES LAB			LUNCH	QIP/INDUSTRY EXPERT TALK		
TUE	EEM	MINE VENTILATION LAB				MINE SURVEY- II LAB		
WED	MV	UCM	MS-II	EEM		MINE VENTILATION LAB		
THU	EEM	MS-II	MV	UCM		ELECTRICAL EQUIPMENT IN MINES LAB		
FRI	UCM	MV	TECHNICAL SEMINAR			MINE SURVEY- II LAB		
SAT	MS-II	EEM	UCM	MV		SCA		

Branch: MINING — **TIMETABLE** — **Semester: 5th**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	EMST	MLGS-I	Project Phase-I		LUNCH	MINE HAZARD & SAFETY LAB		
TUE	MHS	MLGS-I	MM-I	UMM		QIP/SEMINAR/INDUSTRY EXPERT TALK		
WED	MLGS-I	MM-I	UMM	MHS		MINE MACHINERY-I LAB		
THU	MM-I	UMM	EMST	MLGS-I		MINE HAZARD & SAFETY LAB		
FRI	UMM	EMST	MHS	MM-I		MINE MACHINERY-I LAB		
SAT	EMST	MHS	Project Phase-I			SCA		

Branch: MINING — **TIMETABLE** — **Semester: 6th**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	MM-II	Project Phase-II			LUNCH	MINE GEOLOGY-II LAB		
TUE	MG-II	MD	MG-II	MLGS-II		MINE MACHINERY-II LAB		
WED	MLGS-II	MM-II	LIFE SKILL			QIP/SEMINAR/INDUSTRY EXPERT TALK		
THU	MD	MG-II	MD	MLGS-II		MINE GEOLOGY-II LAB		
FRI	MM-II	Project Phase-II				SCA		
SAT	MG-II	MD	MLGS-II	MM-II		MINE MACHINERY-II LAB		

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY KANSBAHAL

Branch: MECHANICAL — **TIMETABLE** — **Semester: 1st**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	Comp App.	Engg. Math-I	Engg. Mechanics	Engg. Physics	LUNCH	Computer Application Lab		
TUE	Engg. Physics	Engg. Mechanics	Comp App.	Engg. Math-I		Workshop Practice		
WED	Engg. Math-I	Comp App.	ENGG PHYSICS LAB			Engg. Physics	SEMINAR	
THU	Engg. Mechanics	Engg. Math-I	ENGG PHYSICS LAB			QIP/INDUSTRY EXPERT TALK		
FRI	Comp App.	Engg. Math-I	Engg. Mechanics	Comp Appl Lab		Engg. Math-I(T)	SEMINAR	
SAT	Engg. Physics	SCA				Workshop Practice		

Branch: MECHANICAL — **TIMETABLE** — **Semester: 2nd**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	Comm English	Engg. Math-II	BEE	ENGG.CHEM LAB	LUNCH	Engg. Math-II	SEMINAR	
TUE	Engg. Chemistry	BEE	COMM. ENGLISH LAB			ENGINEERING DRAWING		
WED	Engg. Math-II	Comm English	Engg. Chemistry	BEE		Engg. Math-II (T)	SEMINAR	
THU	BEE	Engg. Chemistry	Engg. Math-II	Comm English		SCA		
FRI	Engg. Chemistry	Engg. Math-II	COMM. ENGLISH LAB			QIP/INDUSTRY EXPERT TALK		
SAT	Comm English	ENGINEERING DRAWING				ENGG. CHEMISTRY LAB		

Branch: MECHANICAL — **TIMETABLE** — **Semester: 3rd**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	PT	SOM	EM	TE-I	LUNCH	MECHANICAL ENGG. DRAWING		
TUE	SOM	EM	TE-I	EVS		WORKSHOP-II		
WED	EM	TE-I	EVS	PT		MECHANICAL ENGG. LAB-I		SCA
THU	TE-I	EVS	SOM	SCA		WORKSHOP-II		
FRI	EVS	SOM	EM	PT		MECHANICAL ENGG. LAB-I		SCA
SAT	PT	MECHANICAL ENGG. DRAWING				QIP/SEMINAR/INDUSTRY EXPERT TALK		

Branch: MECHANICAL — **TIMETABLE** — **Semester: 4th**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	TOM	FM	TOM	MT	LUNCH	QIP/INDUSTRY EXPERT TALK		
TUE	MT	TE-II	FM	SCA		THEORY OF MACHINE & MEASUREMENT LAB		
WED	FM	TOM	TECHNICAL SEMINAR			MECHANICAL ENGG. LAB-II		
THU	TE-II	MT	SCA			WORKSHOP-III		
FRI	TOM	FM	MT	TE-II		MECHANICAL ENGG. LAB-II		
SAT	TE-II	WORKSHOP-III				THEORY OF MACHINE & MEASUREMENT LAB		

Branch: MECHANICAL — **TIMETABLE** — **Semester: 5th**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	EMST	DME	HMIF	MCT	LUNCH	RAC	REFRIGERATION & AC LAB	
TUE	DME	HMIF	CAD/CAM LAB			QIP/SEMINAR/INDUSTRY EXPERT TALK		
WED	HMIF	MCT	REFRIGERATION & AC LAB			PROJECT PHASE-I		SCA
THU	MCT	RAC	EMST	SCA		DME	HMIF POWER LAB	
FRI	RAC	EMST	HMIF POWER LAB			SCA	PROJECT PHASE-I	
SAT	EMST	DME	HMIF	RAC		MCT	CAD/CAM LAB	

Branch: MECHANICAL — **TIMETABLE** — **Semester: 6th**

TIME / DAYS	9:30AM-10:25AM	10:25AM-11:20AM	11:20AM-12:15PM	12:15PM-01:10PM	01:10PM-01:45PM	01:45PM-02:40PM	02:40PM-03:35PM	03:35PM-04:30PM
MON	IEM	PSE	AUTOMOBILE ENGG. LAB		LUNCH	LIFE SKILL	PROJECT WORK PHASE-II	
TUE	AEHV	AMP	AEHV	SCA		POWER STATION ENGG LAB		LIFE SKILL
WED	PSE	IEM	PSE	SCA		QIP/SEMINAR/INDUSTRY EXPERT TALK		
THU	AMP	AEHV	IEM	SCA		PROJECT WORK PHASE-II		
FRI	IEM	PSE	POWER STATION ENGG LAB			AMP	PROJECT WORK PHASE-II	
SAT	AEHV	AMP	AUTOMOBILE ENGG. LAB			PROJECT WORK PHASE-II		