RANCHI UNIVERSITY RANCHI

(Mechanical Engg. Department)

A series of meetings were held at RTC Institute of Technology Anandi, Ormanjhi, Cambridge Institute of Technology, Tatisilwai, Ranchi and Nilai Educational Trust's Group of Institutions (NETGI), Thakurgaon, Ranchi in April/ May 2012 to decide the course structure of Under Graduate (UG) Course in ~~Electrical &~~ ~~Electronics~~ Engineering.
Mechanical

The following members ~~were~~ participated in finalization of course structure:-

1. Prof.P.K.Pathak
   H.O.D,Department of Mech.Engg.,
   RTC Institute of Technology,Anandi,Ormanjhi,Ranchi

   Pathak
   9.5.12

2. Prof. B.P. Gupta
   Head of Department,
   Department of Mechanical Engineering
   CIT ,Tatisilwai,Ranchi

   9/5/12

3. Prof.P.Kumar
   Department of Mech.Engg.,
   RTC Institute of Technology,Anandi,Ormanjhi,Ranchi

   09/5/12

4. Prof. Arbind Kumar
   HOD, Mechanical Engg. Dept.
   Birla Institute of Technology
   Messa, Ranchi

   09.05.12

5. Dr. Raj Kumar Ohdas.
   HOD., Forge Technology Dept.
   NIFFT, Hatia Ranchi - 3

   Ohdas
   09/05/12

6. Raj kumar
   Department of mech Engg
   NEThi Thakurgaon Ranchi

   Rajkumar

The enclosed Course Structure of B.Tech (Mech.Engg.) was finalised and approved.

REGULATION

FOR

B.TECH. COURSE

RANCHI

UNIVERSITY

REGULATION
FOR
B.TECH. COURSE OF RANCHI UNIVERSITY
Leading to Bachelor of Technology Degree

1. **Introduction :**

    1.1   The Ranchi University, Ranchi, constituted the Board of studies, vides Notification, No. RU/R/8086/12 dated 12.03.2012 , to formulate the Curricula of B. Tech.Courses as well as regulations of the university. Several meetings of the committee were held chairmanship of the Dean, Faculty of Engineering of Ranchi University, Ranchi. The Board of studies considered the guidelines provided by AICTE, while formulating the regulation and syllabus of B.Tech Courses.

    1.2 All B.Tech Courses of 4-year duration shall consist of eight semesters. However, a student may be allowed to complete the course in maximum of six years.

    1.3 The regulation and curriculum of B.Tech Courses will come into force from the Academic Year 2012 for the students admitted in the session 2012-13 and onwards.

    1.4 The provision of this regulation shall also be applicable to any discipline that is introduced from time to time in the Engineering Colleges affiliated to Ranchi University.

    1.5 The University Senate on the recommendation of the Academic Council may change any or all parts of this Regulation at any time considered appropriate.

2.   **Academic Calendar**

    2.1   The Academic Session shall be divided into two semesters each of approximately 17 weeks duration (90 working days including examination period).The odd semesters shall start from July and end in December, whereas even semesters will begin in January and end in May every academic year.

    2.2   A Co-ordination Committee shall be constituted consisting of Dean, Faculty of Engineering (Chairman), Controller of Examination of R.U (Member-Secretary) and Principals of all affiliated engineering colleges under Ranchi University (members).

    The committee shall prepare the Examination Calendar at the beginning of each Academic Year for both odd as well as even semesters.

3.   **Admission**

    3.1   Admission to all B. Tech. Courses will be made in the first semester of each academic year, at the first year level through the JECECE, AIEEE, and others as per the guidelines of AICTE/Government of Jharkhand. Lateral entry in IIIrd Semester will be permitted as per the guidelines of AICTE/ Government of Jharkhand.

    3.2 All students admitted to any of the B.Tech. courses shall deposit the requisite fees as prescribed by the institutes at the time of joining in each academic year.

4. **Residence**

4.1 The Residential requirement shall be as per rules of AICTE. There should be accommodation facility at least 25% for Boys & 50% for Girls Students.

5. **Attendance**

5.1 Minimum 70 % attendance is essential for any student to appear in the end semester examination. The balance 30% shall include absence for all other reasons including medical.

6. **Conduct & Discipline**

Following rules shall be in force to govern the conduct and discipline of students:

6.1 Students shall show due respect to the teachers of the Institute, the wardens of Hostels, the sports officers and the officers of the National Cadet Corps; proper courtesy and consideration should also be extended to the employees of the institute and hostel. They shall also pay due attention and courtesy to visitors.

6.2 Students are required to develop a friendly relationship with fellow students. In particular, they are expected to show kindness and consideration to the new students admitted to the institute every year. Law bans ragging in any form to anybody. Any act of physical or mental pressurization of junior students, individually or in a group, will be considered as an act of ragging. Ragging also includes forcing junior students to meet seniors outside institute premises, or in places where student has no valid reason to be present, asking irrelevant questions or using abusive language. Ragging will be considered as gross indiscipline and will be severely dealt with, which may include expulsion from institute.

If junior student yields to any form of ragging by senior students and does not inform the institute or hostel authorities, or willfully withholds the information in an enquiry of ragging incident, the matter will be treated as indiscipline on part of junior student and will invite punishment comparable to those against whom ragging charge are framed. Willful withholding of complain by a junior student does not automatically exempt a senior from punishment.

6.3 The following acts of omission and /or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures:
- Furnishing a false statement of any kind in the form of application for admission or for award of scholarship or prizes etc.

- Furnishing false statement to the Disciplinary Committee, or willfully withholding information relevant to an enquiry.

- Organising or participating in an activity that has potential for hurting fellow students along lines of religion, caste, home state, and batch of admission, hostel or any other unhealthy criterion.

- Physical or mental harassment of freshers through physical contact or oral abuse.

- Getting involved in a brawl or fight with persons outside the Institute, either alone or in a group, irrespective of who has initiated the conflict.

- Willfully damaging or stealthily removing any property that belonging to the institute, hostel or fellow students.

- Adoption of unfair means in the examinations.

- Possession, consumption or distribution of alcoholic drinks or any kind of hallucinogenic drugs.

- Organising or participating in any group activity except purely academic and scientific programms in the company with others in or outside the campus without prior permission of Dean   of Student's affairs /Principal of Institute.

- Mutilation or unauthorized possession of library books.

- Displaying lack of courtesy and decorum by resorting to indecent behavior anywhere within or outside campus.

- Resorting to noisy and unseemly behavior, disturbing studies of fellow students.

- Not intimating his/her absence to the warden before leaving the campus.

6.4   Commensurate with the gravity of offence, the punishment may be

    i.   Reprimand.

    ii.   Additional work in the institute.

    iii.   Debarment from student activities and elections and captaincy of sport teams.

    iv.   Debarment from medals and prizes.

    v.   Partial (1 month or one semester) or complete debarment from campus placement.

    vi.   Reduction in grade in one or more subjects.

    vii.   Expulsion from hostel.

    viii.   Rustication for a specified period.

    ix.   Outright expulsion from the Institute.

Punishment under items v-ix will constitute major punishment and will debar a student from all academic medals & prizes as well important non academic awards.

6.5 For all such major acts of indiscipline, which may have serious repercussion on students in general and/or which may warrant a uniform and more formalized nature of investigation, the Institute will form Disciplinary Committee to examine available evidences and award punishment through Principal of the college.

6.6 Cases of unfair means in the sessional examination may be dealt with Examination Disciplinary committee of the Institute

6.7 In case any student is found using unfair means in any subject/paper for the End Semester for which the examination are in progress, the concerned student will be expelled from the course for which he was admitted. However, this would not preclude from his being readmitted to the next course in the series and such student may be readmitted to the next course from the beginning of concerned semester during which he was expelled from the course. As an example, if a student was found using unfair means during examination for second semester of the course, he may be readmitted from the beginning of second semester of next course in the series.

7. **Change of Branch**

7.1   Only those Students will be eligible for a change of Branch after the Second Semester, who   has
(a) Completed all the Credits prescribed in the First Two Semesters of their Studies in their
first attempt.
(b)   Obtained a CGPA, at the end of the Second Semester, not lower than 8.25.

7.2   Students may *enlist their choice* of Branch, in order of preference, to which they wish to change over.   It will not be permissible to alter the *choice* after the application has been submitted.

7.3 Change of Branch shall be made strictly on the basis of Merit of the applicants. For this purpose, the CGPA obtained at the end of second semester shall be considered.

7.4   All Change of Branch made in accordance with the above Rules will be effective from the 3rd Semester of the applicants concerned.

7.5   No changes of Branch shall be permitted here after.

7.6   Maximum branch change will be limited to 10% of branch intake, subject to condition that (a) strength of branch will not go below 90 % of sanctioned strength and (b) there is vacancy in the branch.

7.7 The Institute will forward *the* recommendation for branch change to Dean, Faculty of Engineering, followed by approval *of* Vice-Chancellor *and the decision is* to be communicated to Controller of Examination, Ranchi University and the Institute concerned.

8. **Course Structure**

8.1   Total credit point for B.Tech course should be between   200-212.

8.2   The Curricula for the different Degree Programs   as proposed by the respective Departments *and* recommended by the Academic Committee of   the Institute shall be approved by the Academic Council of the University and subsequently ratified by Ranchi   University Senate.

9.   Registration

9.1 Every Student of the B. Tech.   Course is required to register, in person, at the commencement of each semester, on the day fixed for and notified in the Academic Calendar.

9.2   Registration of students for all semesters will be centrally organized by the Academic section of the Institute.

9.3   A student who failed to register on the day announced for the purpose may be permitted for late registration within next   three working days on payment of additional late fee as prescribed by the Institute.   Normally no Late Registration shall be permitted after the Third Working Day from the scheduled date of registration.

9.4   Only those students will be permitted to register who have:

(a)   Cleared all dues of the previous semesters.

(b)   Paid all prescribed fee for the current semester.

(c)   Not been debarred from registering for a specified period on disciplinary or

any

other ground.

10.   Performance Evaluation

10.1   Students' performance will be measured on a 10 point Scale Grading System using Letter Grades.

10.2 Grading System: A grade will be awarded to student in a subject based on his performance in end semester examination, practical examination and internal assessment through class tests, home assignments. Grades will be assigned and associated point values will be as follows:

Range of Marks (percentage)	Grade	Point of Value
90-100	Ex	10
80-89	A	9
70-79	B	8
60-69	C	7
50-59	D	6
35-49	P for theory courses	5
40-49	P for Laboratory Courses(Practical)	5
Less than 35	F for theory courses	0
Less than 40	F for Laboratory Courses(Practical)	0

The student must secure 35% marks in end semester examination (ESE) **and** 35% marks in sessional separately.

The Examination Section of Ranchi University will centrally conduct the End Semester Examinations in respect of the Theory component of the subjects. Each subject/paper will carry 100 marks. The sessional and practical will be assessed on 50 marks each.

The distribution of sessional marks will be as follows:

Attendance: 10

Class Test/Home assignment: 30

Performance/Behavior: 10

The distribution of practical marks will be as follows:

Attendance: 10

Timely submission of lab report: 05

Lab oratory report: 15

Viva-voce: 20

10.3 Students who have failed in maximum of three theory subjects, but pass in all practical and sessional examination, will be promoted to next higher semester & they will be permitted to appear in those subjects, when semester examination of this subject takes place. The marks obtained by the students in practical/sessional examination in the relevant semester will be counted for publication of result.

10.4 For registration in III rd Semester a student must have

(a) Completed at least 35 Credits out of 57 Credits with minimum P grades in each Practical Examination.

(b) Obtain a Cumulative Grade Point Average$_{(35)}$ (CGPA$_{(35)}$) of not lower than 4.5 calculated on the basis of the best Grades obtained by him/her to attain in 35 Credits.

10.5 Students who have failed in more than three subjects in a semester must register for all subjects including sessional /practical courses offered in the corresponding semester of the next year.

10.6 No supplementary examination will be conducted for B. Tech I, II, III, IV and V semesters.

10.7 There will a supplementary examination for promoted candidates only each for VI and VII semesters to enable candidates to clear backlog papers of these semester, if any. However, if the candidate fails to clear any of the subject/paper in supplementary examination, he/she will not be promoted to the next semester. Such candidate will have to repeat that particular semester again.

10.8   However, if the student is successful in obtaining at least pass marks or more in the subjects, he/she has appeared then, only pass grade will be entered for publication of result.

10.9   Only those candidates, who have cleared all the subjects of all previous semesters including those in VIIth semester, will be promoted to VIII semester.

10.10   Only one supplementary examination will be conducted for VIII semester for those candidates only, who could not clear or could not appear (due to compelling reasons like serious illness of himself/herself), subject to following conditions:

   a.   If the candidate appears in all the papers and obtains at least pass marks or more in all the subjects he/ she has appeared, then marks obtained in all the papers along with the sessional and practical marks already secured, will be considered afresh for publication of result.
   b.   If the candidate appears in failed papers & obtains at least pass marks or more, only pass grade will be entered for publication of result.

10.11   Semester Grade Point average (SGPA) will be computed for each semester. The SGP will be calculated as follows:

$$SGPA = \frac{\sum_{i=1}^{n} c_i\ g_i}{\sum_{i=1}^{n} c_i}$$

Where 'n' is the number of subjects registered for the semester, 'c_i' is the number of Credit allotted to particular subject, & 'g_i' is the grade point carried by the Letter Grade corresponding to the subject. SGPA will be rounded off to the second place of decimal and recorded as such. The SGPA would indicate the performance of the student in the semester to which it refers.

10.12   Starting from second Semester at the end of each semester , a cumulative Grade Point Average (CGPA) will be computed for every student as follows:

$$CGPA = \frac{\sum_{i=1}^{m} c_i\ g_i}{\sum_{i=1}^{m} c_i}$$

Where 'm' is the total number of subjects the student has registered from the First Semester onwards up to & including the semester, 'c_i' is the Number of Credits allotted to a particular subject and 'g_i' is the Grade –Point carried by the Letter Grade corresponding to the Grade awarded to the student for the subject . CGPA will be rounded off to the second place of Decimal & recorded as such.
The CGPA would indicate the cumulative Performance of the student from the First semester up to the end of the semester to which it refers.

The CGPA, SGPA & the Grades obtained in all the subjects in a semester will be communicated to every student at the end of every semester.

For determining the Inter se Merit Ranking of a group of students, only the rounded off values of the CGPAs will be used.

10.13   When a student gets the grade 'F' in any subject during a semester, the SGPA and the CGPA from that semester onwards will be tentatively calculated, taking only 'Zero

Point' for each such 'F' Grade. After the 'F' Grade(s) has/have been substituted by Letter Grade during a subsequent/examination, the SGPA and the CGPA of all the semester, starting from the earliest Semester in which 'F' Grade has been updated, will be recomputed and recorded to take this Change of Grade into account.

10.14   The six week Industrial training undergone by the students in summer vacation will be assessed within five weeks after commencement of the seventh semester. The students are required to submit a written report on training received & give a seminar. This will be evaluated along with project work of VII semester.

10.15   Assessment of Project Work: Performance in the various activities involved in the Project would be assessed   individually at the end of each semester in which it is being carried out as per the curriculum.

10.16   The Chairman, Academic Affairs/Head of the Department of Institute will constitute a committee for conducting the comprehensive Vive-Voce Examination, evaluation of project etc. as per the requirement of the Curriculum.

10.17   A Student will be issued an Admit Card for appearing in the End Semester Examination, only if he/she has

(a)   requisite attendance.

(b)   paid all Institute & Hostel dues for the semester.

(c)   no disciplinary action is pending against him.

(d)   paid the requisite examination fee

11.   Graduation Requirement

11.1.   In order to qualify for a B.Tech. Degree of Ranchi University covered under this regulation a student must:

(a)   Complete all the Credit requirements for the degree as laid down in the prescribed

Curriculum of the Course with a minimum of Grade 'P' scored in every subject.

(b)   Obtain a minimum CGPA of 4.50 at the end of the semester in which he/she completes all the requirements for the degree.

(c)   In the final degree certificate CGPA obtained by the candidate will be mentioned.

B. TECH COURSE STRUCTURE

MECHANICAL ENGINEERING

RANCHI UNIVERSITY, RANCHI

COMMON TO ALL B.TECH BRANCHES   **YEAR: I**   **SEMESTER: I**

Sl No.	Course No.	Subject	Periods			
		THEORY	**L**	**T**	**P**	**Credit Point**
1.	HS 1101	ENGLISH FOR PROFESSIONAL COMMUNICATION	2	-	-	2
2.	CH 1101	ENGINEERING CHEMISTRY	2	-	-	2
3.	PH 1101	ENGINEERING PHYSICS I	3	-	-	3
4.	MH 1101	MATHEMATICS I	3	1	-	4
5.	ME 1101	ENGINEERING MECHANICS	3	1	-	4
6.	EE 1101	BASIC ELECTRICAL ENGINEERING	3	1	-	4
		PRACTICAL/DRAWING/DESIGN				
7.	CH1102-P PH1102-P	CHEMISTRY/ PHYSICS LAB (TO BE TAKEN IN ALTERNATE WEEKS)	-	-	3	2
8.	ME1102-P EE 1102-P	ENGINEERING MECHANICS / ELECTRICAL LABORATORY (TO BE TAKEN IN ALTERNATE WEEKS)	-	-	3	2
9.	ED1101-P	ENGINEERING GRAPHICS I	-	-	3	2
10.	WP1101-P	WORKSHOP PRACTICE I	-	-	3	2
11.	HS1102-P	GENERAL PROFICIENCY I	-	-	-	2
		TOTAL	**16**	**3**	**12**	**29**

COMMON TO ALL B. TECH BRANCHES   **YEAR : I**   **SEMESTER : II**

Sl No.	Course No.	Subject	Periods			
		THEORY	**L**	**T**	**P**	**Credit Point**
1.	CS 1201	INTRODUCTION TO COMPUTING	2	-	-	2
2.	CH 1201	ENVIRONMENT & ECOLOGY	2	-	-	2
3.	PH 1201	ENGINEERING PHYSICS II	3	-	-	3
4.	MH 1201	MATHEMATICS II	3	1	-	4
5.	ME 1201	ENGINEERING THERMODYNAMICS	3	1	-	4
6.	EC 1201	BASIC ELECTRONICS	3	-	-	3
		PRACTICAL/DRAWING/DESIGN				
7.	EC1202-P	BASIC ELECTRONICS LAB	-	-	3	2
8.	CS1202-P	COMPUTER PROGRAMMING LAB	-	-	3	2
9.	ED1202-P	ENGINEERING GRAPHICS II (M/C DRAWING)	-	-	3	2
10.	WP1202-P	WORKSHOP PRACTICE II	-	-	3	2
11.	HS1202-P	GENERAL PROFICIENCY II	-	-	-	2
		TOTAL	**16**	**2**	**12**	**28**

MECHANICAL ENGINEERING　　　　　　　**YEAR : II**　　　　　　**SEMESTER : III**

Sl No.	Course No.	Subject	Periods			Credit Point
		THEORY	**L**	**T**	**P**	
1.	CS 1301	NUMERICAL ANALYSIS & COMPUTER PROGRAMMING (C,)	2	-	-	2
2.	ME 1302	MATERIAL SCIENCE	2	-	-	2
3.	ME 1303	STRENGTH OF MATERIALS	3	1	-	4
4.	ME 1304	FLUID MECHANICS	3	-	-	3
5.	ME 1305	APPLIED THERMODYNAMICS	3	-	-	3
6.	MH 1306	MATHEMATICS III	3	1	-	4
		PRACTICAL/DRAWING/DESIGN				
7.	CS1302-P	NUMERICAL ANALYSIS & COMPUTER PROGRAMMING (C,) LAB	-	-	3	2
8.	ME1307-P ME1308-P	MATERIAL SCIENCE/ STRENGTH OF MATERIALS LAB	-	-	3	2
9.	ME1309-P	FLUID MECHANICS LAB	-	-	3	2
10.	ME1310-P	APPLIED THERMODYNAMICS LAB	-	-	3	2
11.	HS 1303-P	GENERAL PROFICIENCY III	-	-	-	2
		Total	**16**	**2**	**12**	**28**

Sl No.	Course No.	Subject	Periods			Credit Point
THEORY			**L**	**T**	**P**	
1.	ME 1401	MECHANICAL MEASUREMENT & METROLOGY	2	-	-	2
2.	ME 1402	INDUSTRIAL ENGINEERING	2	-	-	2
3.	ME 1403	ADVANCE STRENGTH OF MATERIALS	3	1	-	4
4.	ME 1404	KINEMATICS OF MACHINE	3	-	-	3
5.	ME 1405	MANUFACTURING TECHNOLOGY - I	3	-	-	3
6.	EE 1412	ELECTRICAL MACHINES	3	-	-	3
PRACTICAL/DRAWING/DESIGN						
7.	ME1406-P	MECHANICAL MEASUREMENT & METROLOGY LAB	-	-	3	2
8.	ME1407-P	KINEMATICS OF MACHINE LAB	-	-	3	2
9.	ME1408-P	MANUFACTURING TECHNOLOGY - I LAB	-	-	3	2
10.	EE1413-P	ELECTRICAL MACHINES LAB	-	-	3	2
11.	HS 1404-P	GENERAL PROFICIENCY IV	-	-	-	2
TOTAL			**16**	**1**	**12**	**27**

MECANICAL ENGINEERING   **YEAR : III**   **SEMESTER : V**

Sl No.	Course No.	Subject	Periods			Credit Point
		THEORY	**L**	**T**	**P**	
1.	HS 1501	VALUE ENGINEERING	2	-	-	2
2.	ME 1502	TOTAL QUALITY MANAGEMENT	2	-	-	2
3.	ME 1503	MACHINE DESIGN - I	3	-	-	3
4.	ME 1504	DYNAMICS OF MACHINES	3	-	-	3
5.	ME 1505	MANUFACTURING TECHNOLOGY - II	3	-	-	3
6.	ME 1506	HEAT & MASS TRANSFER	3	-	-	3
		PRACTICAL/DRAWING/DESIGN				
7.	ME1507-P	MACHINE DESIGN – I LAB	-	-	3	2
8.	ME1511-P ME1508-P	HEAT & MASS TRANSFER/ DYNAMICS OF MACHINES LAB	-	-	3	2
9.	ME1509-P	MANUFACTURING TECHNOLOGY – II LAB	-	-	3	2
10.	ME 1510-P	COMPUTER AIDED DRAFTING LAB	-	-	3	2
11.	HS 1505-P	GENERAL PROFICIENCY IV	-	-	-	2
		TOTAL	**16**	**-**	**12**	**26**

MECHANICAL ENGINEERING   **YEAR : III**   **SEMESTER : VI**

Sl No.	Course No.	Subject	Periods			Credit Point
		THEORY	**L**	**T**	**P**	
1.	HS 1601	PROJECT MANAGEMENT & BUSSINESS MANAGEMENT	2	-	-	2
2.	ME 1602	IC ENGINES	2	-	-	2
3.	ME 1603	MACHINE DESIGN II	3	-	-	3
4.	ME 1604	FLUID MACHINERY	3	-	-	3
5.	ME 1605	AUTOMATIC CONTROL	3	-	-	3
6.	ME 1606	REFRIGERATION & AIR CONDITIONING	3	-	-	3
		PRACTICAL/DRAWING/DESIGN				
7.	ME1607-P	IC ENGINES LAB	-	-	3	2
8.	ME1608-P	MACHINE DESIGN II LAB	-	-	3	2
9.	ME1609-P	FLUID MACHINERY LAB	-	-	3	2
10.	ME1610-P	REFRIGERATION & AIR CONDITIONING LAB	-	-	3	2
11.	HS 1606-P	GENERAL PROFICIENCY VI	-	-	-	2
		TOTAL	**16**	**-**	**12**	**26**

Sl No.	Course No.	Subject	Periods			Credit Point
		THEORY	L	T	P	
1.	ME 1701	COMPUTER AIDED DESIGN	3	-	-	3
2.	ME 1702	NUMERIC CONTROL OF MACHINE TOOLS & ROBOTICS	3	-	-	3
3.	ME 1703	AUTOMOBILE ENGINEERING	3	-	-	3
4.	-	OPEN ELECTIVE I	3	-	-	3
5.	-	PROFESSIONAL ELECTIVE I	3	-	-	3
		PRACTICAL/DRAWING/DESIGN				
6.	ME1704-P	COMPUTER AIDED DESIGN	-	-	3	2
7.	ME1705-P	NUMERIC CONTROL OF MACHINE TOOLS & ROBOTICS	-	-	3	2
8.	ME1706-P	AUTOMOBILE ENGINEERING	-	-	3	2
10.	ME 1707-P	PROJECT I	-	-	3	2
11.	HS 1707-P	GENERAL PROFICIENCY VII	-	-	-	2
		TOTAL	**15**	**-**	**12**	**25**

OPEN ELECTIVE - I

Sl. No.	Code	Paper
01	HS 2731	Enterprise Resource Management
02	CS 2731	E-Commerce Strategic IT
03	HS 2732	Technology Management
04	HS 2733	Decision Support and Executive Information System
05	CS 2732	Software Technology
06	HS 2734	Industrial Pollution Control

Professional Elective – I

Sl. No.	Code	Paper
01	MH 2731	Finite Element Analysis
02	ME 2732	Energy Engineering
03	ME 2733	Manufacture and Inspection of Gears
04	ME 2734	Computer Integrated Manufacture
05	ME 2735	Entrepreneurship Development
06	ME 2736	Composite Materials
07	ME 2737	Mechatronics Engineering
08	ME 2738	Welding Technology

Sl No.	Course No.	Subject	Periods			Credit Point
		THEORY	**L**	**T**	**P**	
1.	ME 1801	POWER PLANT ENGINEERING	3	-	-	3
2.	ME 1802	OPERATIONS RESEARCH	3	-	-	3
3.		OPEN ELECTIVE - II	3	-	-	3
4.		PROFESSIONAL ELECTIVE - II	3	-	-	3
5.		PROFESSIONAL ELECTIVE - III	3	-	-	3
		PRACTICAL/DRAWING/DESIGN				
6.	ME 1803-P	PROJECT - II	-	-	12	6
7.	HS 1808-P	GENERAL PROFICIENCY - VIII	-	-	-	2
TOTAL			**15**	**-**	**12**	**23**

OPEN ELECTIVE – II

Sl. No.	Code	Paper
01	HS2831	Knowledge Management
02	CS2831	IT in Marketing Management
03	CS2832	IT in HR Management
04	CS2833	IT in Finance Management
05	HS2832	Human Values
06	HS2833	Science Technology and Society
07	HS2834	Financial Management & Accountancy

Professional Elective – II

Sl. No.	Code	Paper
01	ME2831	Machine tool Design
02	ME2832	Hydraulic Control
03	ME2833	Experimental Mechanics
04	ME2834	Automotive Chassis and Transmission
05	ME2835	Pumps, Fans, Blowers and compressors
06	ME 2836	Cost Estimation and Optimization
07	ME2837	Terotechnology Mechatronics Engineering
08	ME2838	Project Engg.
09	ME 2839	Nuclear power generation and safety
10	ME 28310	Gas Dynamics
11	ME 28311	Nano Structured Materials
12	ME 28312	Material Handling

Professional Elective – III

Sl. No.	Code	Paper
01	ME2841	Cryogenic Engineering
02	ME2842	Special casting Techniques
03	EC2831	Robotics
04	ME2843	Pneumatic Control and Low Cost Automation
05	HS 2835	Industrial Design
06	HS 2836	Personnel Management
07	HS 2837	Enterprise Resource Planning
08	HS 2838	Financial Management and Accounting
09	ME2844	Fuels and Combustion
10	ME2845	Thermal Engineering
11	ME2846	Fundamental of Tribology
12	CS2841	Bio Informatics

B. TECH COURSE STRUCTURE

COMMON TO ENGINEERING BRANCHES

1ST & 2ND SEMESTER

RANCHI UNIVERSITY, RANCHI

HS 1101   ENGLISH FOR PROFESSIONAL COMMUNICATION

UNITS   NO. OF LECTURES

COMMUNICATION   (5 LECTS)

Role & Objectives Of Communication, Process of Communication, Element & Essentials of Communication, Flow of Communication, Barriers /Factors Inhibiting Communication, Verbal/Non-Verbal Communication, Kinesics/Body Languages, Style In Technical Communication, Communication Skills-Reading, Writing, Speaking, Listening& Talking.

PROFESSIONAL WRITING   (3 LECTS)

Business Letters/Official Letters, Letter Writing Skills, Letter Writing Process, Letter Formats, Essentials of Letter Writing, Types Of Professional Letters, D.O Letter, Job Application and resume.

GRAPHICS   (1 LECT)

INTRODUCTION, PLANNING OF GRAPHICS, PLACING OF GRAPHICS, CONSTRUCTION OF GRAPHICS, TYPES OF GRAPHICS.

PHONETICS & PHONOLOGY   (8 LECTS)

ORGANS OF SPEECH/ SPEECH MECHANISM, PHONETIC SYMBOLS, CONSONANT/VOWELS/ DIPHTHONGS-CLASSIFICATION, STRESS PATTERN/INTONATION, PRONUNCIATION GUIDELINES, SYLLABLE/SYLLABLE DIVISION, TONES.

REPORT WRITING   (5 LECTS)

INTRODUCTION & IMPORTANT FEATURES OF REPORT, TYPES OF REPORT, STRUCTURE &LAYOUT FORMAT, LANGUAGE STYLE, PROJECT REPORT, LABORATORY REPORT, INDUSTRY REPORT, SOCIO CULTURE REPORT, TECHNICAL REPORT, PROPOSALS –NATURE, SIGNIFICANCE TYPES, STRUCTURES.

DISCUSSION SKILLS   (3LECTS)

Introduction, importance of group discussion, Process of group discussion Group discussion strategies, Interaction strategies, Individual, Contribution, Leadership skills, Team management, Creating a friendly co operative atmosphere.

PRESENTATION SKILLS

Nature And Importance of Presentation, Introduction And Meaning of Presentation, Planning Presentation, Objective With Central Idea, Main Ideas, Role of Supporting, Material –Steps, Handling Stages Fright

STUDY SKILLS   (2LECTS)

Note making, Mechanics of note making, Note writing techniques, Reduction device, Organizing techniques, Methods of sequencing, Summarizing & paragraph, Mechanics of summarizing, Summarizing techniques, Outlining & paraphrasing

REFERENCING   (2LECTS)

Referencing Skills, Method of Referencing, Using Footnotes, Scanning Skills, Skimming Skills, Locating Books in the Library, Required Information/Meaning/Pronunciation.

SENTENCES (2LECTS)

Requisites of Good Sentence Writing, Effective Sentence Structure, Sentence Building, Sentence Coherence, Use of Connectives, Sentence Emphasis/Sentence Theme, Development of Paragraph

PARAGRAPH WRITING (2LECTS)

Paragraph Structure, Principles of Paragraph Writing, Paragraph length/ Coherence/ Division, Use of Modals/Connectives/Modifies, Punctuations & Spelling, Concord

TELEPHONIC CONVERSATION (2LECTS)

Introduction, Listening/speaking, Telephonic skills required Problems of telephonic conversations, Intensive listening

LISTENING COMPHREHSION (2LECTS)

To comprehend spoken materials in standard Indian, English/British English & American English, Current situation in India regarding English American English/British English

INTERVIEW (2LECTS)

The Interview process, Pre interview preparation techniques, projecting a positive image, Answering strategies.

GENERAL PROFICIENCY

G.P. classes are conducted for personality development of students. It includes Group Discussion, Presentation, Seminar, Quiz, C V Writing, Technical Report Writing and also inculcates Human Values and Professional Ethics. There will be assignments and class tests also.

SYLLABUS OF ENGINEERING CHEMISTRY   CH1101

Adv. Atomic structure / Atoms

1. Basic ideas about de-Broglie's ware equation, Heisenberg uncertainty principle, schrodinger wave equation (Derivation). Particle in a box illustrating energy quantization radial and angular part of H-atom. Wave functions/orbitals, probability and charge distribution.

    (4 period)

2. Chemical bonding/chemical valency/ molecules.

    Ionic bond, covalent bond, co-ordinate bond, vanderwalls forces & hydrogen bonding shape and geometry of species (Helfrich rule, VSEPERT & Hybridisation) and nature of species (VBT & MOT) of diatomic molecular.

    (4 period)

3. Chemical kinetics / Reaction dynamics

    Rate laws, molecularity & order of reaction, kinetic derivation of first and 2nd order of reaction with their half life period. Arrhenius equation for single and double temperature. Collision and transition state theory.

    (3 period)

4. Laser in chemistry

    Explain laser in chemistry with their types   **(2 period)**

5. Electrochemistry:

    Nernst equation for electrode potential (Derivation), Application of electrode potentials to predicet redox reactions in solution with special reference in lattimer and frost diagrams.   **(3 Period)**

6. Transition metal chemistry/Co-ordination chemistry

    Nomenclature and isomerism of complex compounds. Theories of bonding in co-ordination compounds, Viz crystal field theory, Valence bond theory. Chelation. Application in organic synthesis.   **(4 Period)**

7. Organometallic chemistry:

    Introduction, structure and bonding in organometallic complexes. The eighteen and sixteen electron rules.   **(3 period)**

8. Catalysis:

   Introduction, types and characteristics of catalysis (Homogeneous, Heterogeneous, acid-base, auto and enzyme catalysis). The role of metals in catalysis cycles turning some chemical reaction (e. g. Hydrofirngalation, Hydrogenetion) **(3Period)**

9. Role of metals in biology:

   Oxygen carrier, electron transfer biologigical role of iron and copper.

   (2 Period)

10. Structure and reactivity of organic molecules/organic chemistry:

    Electron displacement effects (Inductive effect, Mesomeric effect or resonance hyper conjugation, electromeric effect, inductomeric effect)

    Intermediate organic species based on carbon (free radicals, carbocations, carbanions, carbenes)

    Types of organic reactions addition reaction, elimination reaction (E_1 & E_2) substitution reactions (SN_1 SN_2, SN_i)

    Stereochemistry (introduction, Chirality, isomerism conformational analysis E-Z & R-S nomenclature) **(6 Period)**

11. Polymerisation;

    Basic concepts, classification and industrial application **(2 Period)**

12. Photochemistry:

    Introduction, fluorescence, phosphorescence, norrish type –I and II reaction, application of photosynthesis, photosynthem (Z- diopram) chemistry of vision. Laws of phtochemistry. **(4 Period)**

    Reference Books:-
    1. Advance physical chemistry, Gurdeep Raj, Goel publishing house Meerut
    2. Essentials of Physical Chemistry B. S. Bahal, S. chand and Company
    3. Organic Chemistry Morrison Boyd
    4. Advanced Inorganic Chemistry Gurdeep Raj
    5. Engg. Chemistry Shashi Chawla, Dhanpat Rai and Com.
    6. Engg. Chemistry Jain & Jain, Dhanpat Rai and Com.
    7. Industrial Chemistry, B. K. Sharma, Goel publishing house Meerut

PH 1101 ENGINEERING PHYSICS-I **(3-1-0)**

Module 1. Theory of Relativity

Inertial frame of reference, Noninertial frames and fictitious forces, Outline of relativity, Michelson-Morley experiment, Lorentz transformation of space and time, Length contraction, variation of mass with velocity, Equivalence of mass and energy. **[6]**

Module 2. Cardinal Points of Optical System

Combination of thin lenses, Cardinal points of coaxial system of thin lenses, Thick lenses, Location and properties of cardinal points, Graphical construction of images. **[4]**

Module 3. Interference of Light

Analytical treatment of interference, Intensity distribution of fringes system, Coherent and Non-coherent sources, Fundamental conditions of interference, Fresnel's biprism, Displacement of fringes, Wedge shaped films, Newton's rings. **[5]**

Module 4. Diffraction of Light

Single slit and double slit diffraction, Diffraction grating, Limit of resolution, Resolving power of grating and image forming systems. **[4]**

Module 5. Polarization of Light

Brewster's law, Double refraction, Geometry of calcite crystal, Optic axis, nicol prism, Circularly and elliptically polarized light, Retardation plates, Production and analysis of plane, circularly and elliptically polarized light, Polarimeter. **[5]**

Module 6. Thermal Physics

Kinetic theory of gases, Maxwellian distribution, Mean free path , Transport phenomena in gases, Imperfect gases and Vander waal's equation of state. **[4]**

Module 7. Accoustics

Production and applications of Ultrasonics, Accousitcs of buildings. **[2]**

Module 8. Dynamics of fluids

Continuity equation, Bernoulli's theorem and its applications, Torcelli's theorem, Viscosity-flow of Liquid through a capillary tube , Capillaries in series and parallel, Stoke's formula, Rotation viscometer. **[5]**

Books Recommended:

1. Optics, Ajoy Ghatak, Tata Mc: Graw- HILL Publising Company Co. , New Delhi.
2. Relativistic Mechanics, Satya Prakash , Pragati Prakasan , Meerut.
3. Heat and thermodynamics, P. K. Chakrawarty, Hindustan Publishing Concern.

Mathematics-I

Unit-1

Differentiation of functions of one variable:- Successive differentiation, Leibnitz Theorem(without proof), Rolle's Theorem ,Lagrange's Mean Value Theorem, Taylor's Theorem and Expansions of functions into Taylor's and Maclaurin's Series.   **(05 Classes)**

Unit-2

Calculus of function of several variables:-Partial Derivatives, Chain Rule, Differentiation of implicit function, Total Differentials, Euler's Theorem.   **(05 Classes)**

Unit-3

Maxima and Minima:-Maxima and Minima of function of two Variables, Method of Lagrange's Multiplier's.   **(02 Classes)**

Unit-4

Integral Calculus:-Elementary Reduction formula for Integral, Integration as a Limit of Sum, Problems on Length, Area, Volume and surface area of revolutions.   **(08 Classes)**

Unit-5

Multiple Integral:-Double and Triple Integral, Change of Order of Integration, Jacobian, Applications to Areas and Volume.   **(05 Classes)**

Unit-6

Differentiation of Vector:- Scalar and Vector point Function, Gradient Divergence and Curl.
                    (03 Classes)

Unit-7

Integration of Vectors:-Line Integral and surface Integral, Greens Theorem, Gauss Divergence Theorem and Stoke's Theorem (without proof) and their simple applications.   **(05 Classes)**

Unit-8:

Infinite Series:- Convergence and Divergence of Series, Comparison Test, Ratio Test, Cauchy's root test, Leibnitz Rule, Absolute and Conditionally convergence.   **(06 Classes)**

Reference Books:-

1. Advanced Mathematics for Engineers, by "Erwin Kreyszig"(Wiley Eastern Publication)

2. Higher Engineering Mathematics, by "B.S.Grewal" (Khanna Publication)

3. Engineering Mathematics, by " S.S.Shastri" (PHI Publication)

4.Advance Mathematics for Engineer,by'Gorakh Prasad"(Torrent Publication).

ME 1101   <u>**ENGINEERING MECHANICS**</u>   **(3-1-0)**

Fundamentals of Mechanics – Basic concepts   **(5 Lectures)**

Force Systems and Equilibrium
Force, Moment and couple, Principle of Transmissibility, Varignon's theorem, Resultant of force system- Concurrent and non- concurrent coplanar forces, Free body diagram, Equilibrium equations and their uses in solving elementary engineering problems.
(5 Lectures)

Plane Trusses   **(5 Lectures)**
The structural model, simple trusses, analysis of simple trusses: method of joints, method of sections, graphical method.

Friction   **(5 Lectures)**
Introduction, laws of coulomb friction, simple contact friction problems, belt friction, the square screw thread, rolling resistance.

Properties of Surfaces   **(5 Lectures)**
First moment of an area and centroid, Second moment and product of area of a plane area, transfer theorems, relation between second moment and product of area, polar moment of inertia, principal axes, mass moment of inertia.

Virtual work   **(5 Lectures)**
Work of a force, Principle of Virtual work and its application.

Kinematic of Rigid bodies   **(5 Lectures)**
Plane motion, Absolute motion, Relative motion, Translating axes and rotating axes.

Kinetics of Rigid bodies   **(5 Lectures)**
Plane motion, Work energy, Impulse and momentum.

Suggested Text Books & References:-

- Mechanics for Engineering ,Beer F.P. and Johnson F.R. , Mc Graw Hill

- Engineering Mechanics, Timoshenko ,Young & Rao , TMH

- "Engineering Mechanics,Dr. R.K. Bansal ,Laxmi Publications

- "Engineering mechanics, R.S. Khurmi ,

- "Engineering Mechanics,Dr. V.M. Domkundwar , Dhanpat Rai Publications

- Engineering mechanics", I.H Shames & Rao , Prentice Hall of India

- Engineering mechanics, Dr. D. S. Kumar , Kataria & sons

Semester I

EE 1101 - BASIC ELECTRICAL ENGINEERING (3-1-0)

DC Networks
Kirchoff's laws, node voltage and mesh current methods; Delta-star and star-delta conversion; Classification of Network Elements, Superposition principle, Thevenin's and Norton's theorems. **4Hrs**

Single Phase AC Circuits
Single phase EMF generation, average and effective values of sinusoids; Solution of R,L,C series circuits, the j operator, complex representation of impedances; Phasor diagram, power factor, power in complex notation; Solution of series, parallel and series- parallel circuits. **6Hrs**

Three Phase AC Circuits
Three phase EMF generation, delta and Y- connection, line and phase quantities; Solution of three phase circuits balanced supply voltage and balanced load; Phasor diagram, measurement of power in three phase circuits; three phase four wire circuits.
6Hrs

Magnetic Circuits
Ampere's circuital law, B-H curve, solution of magnetic circuits, Hysteresis and eddy current losses. **4Hrs**

Transformers
Construction, EMF equation, ratings; Phasor diagram on no load and full load; Equivalent circuit, regulation and efficiency calculations; Open and short circuit test, Three phase transformers. **4Hrs**

Induction Motors
The revolving magnetic field, principle of operation, ratings; Equivalent circuit

; Torque-speed characteristics; **4Hrs**

DC Machines
Construction, EMF and Torque equations; Characteristics of DC generators and motors; Speed control of DC motors and DC motor stators; Armature reaction and communication. **4Hrs**

Electrical Measuring Instruments
DC PMMC instruments, shunts and multipliers, multi-meters, Moving iron ammeters and voltmeters, Extension of instrument ranges. **4Hrs**

Power Supply Systems (Introductory)

General structure of electrical power systems; power transmission and distribution via overhead lines and underground cables, steam, hydro, gas and nuclear power generation. **4Hrs**

Suggested text books & references

1 ”Basic Electrical” Mittal & Mittal, Tata McGraw Hill
2 “Theory and Practice of Basic Electrical Engg.” Kothari & Nagraaj ,Prentice Hall of India
3 “Basic Electrical Engg.” G.K. Lal, 3-D Publication
4 ”Fundamental of Electrical Engg.” Ashfaq Hussain, Dhanpat Rai Publication.

SYLLABUS OF ENGINEERING CHEMISTRY OF PRACTICAL PAPERS

CH1102-P

1. Acide – base titration (estimation of commercial caustic soda).

2. Redox titration (estimation of iron using permanganometry)

3. Perparation and analysis of a metal complex (for example thiourea/copper sulfate or nickel chloride/ammonia complexes.

4. Chemical kinetics (determination of relative rates of reaction of iodide with H_2O_2 at room temperature (clock reaction)

5. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water.

6. Photochemical oxidation-reduction(study of Photochemical reduction of ferric salt)

7. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity)

8. Synthesis of aspirin

9. Synthesis of P-nitro aniline from acetanilide.

10. Detection of functional groups in organic compounds.

11. Radical polymerization of vinyl monomers such as styrene, acrylonitrile etc.

12. Conductometric titration (determination of the strength of a given HCL solution by titration against a standard NaOH solution.

Reference Books:-

1. Essentials of experimental Engg. Chemistry by Shashi Chawla & Dhanpat Rai & Company.

PH1102-P <u>**ENGINEERING PHYSICS-1**</u>

<u>**List of Experiment**</u>

- To determine the coefficient of viscosity of water by capillary flow.
- To determine the thermal conductivity of a bad and good conductor by Lee's method and Searl's methods respectively.
- To determine the wave length of light by Newton's ring method.
- To determine the wave length of light by Fresnel's biprism.
- To determine the dispersive power of the given material of the prism.
- To determine the focal length of light combination of two thin lenses by nodal slide assembly and its verification.
- Determination of c/m by J. J. Thomson's method.
- Measurement of thermo emf between different types of thermocouples as a function of temperature difference between the junction, measurement of an unknown temperature.
- Use of Carry Foster Bridge.
- Study of electromagnetic Induction.
- Study of electromagnetic damping and determination of terminal velocity reached by magnet falling in a metallic tube.
- Study of electromagnetic damping and determination of terminal velocity reached by magnet falling in a metallic tube.
- Study of L.C.R circuits with AC circuits.
- Determination of Plancks's constant using photocells.

List of Experiments

To determine the Newton's second law of motion by Fletcher's trolley apparatus.

To determine the moment of inertia of a flywheel about its axis of rotation.

To verify: (a) The condition of equilibrium of forces by parallel force apparatus.

(b) The principal of moments by crank lever.

To determine the dry friction between inclined plane and slide boxes of different materials.

To determine the coefficient of friction between the belt and rope and the fixed pulley.

To determine the velocity ratio of a simple screw jack and to plot graph between

(a) Effort- Load

(b) Friction-Load

(c) Efficiency- Load.

To measure the area of a figure with the help of a Polar Planimeter.

EE 1102-P – Basic Electrical Engineering   **(0-0-3/2)**

List of Experiments

- To measure the armature and field resistance of a DC machine.

- To calibrate a test (moving iron) ammeter and a (dynamometer) wattmeter with respect to standard (DCPMMC) ammeter and voltmeters.

- Verification of circuit theorems, Thevenin's and Superposition theorems (with DC Sources only).

- Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of
  fuse wire.

- Measurement of current, voltages and power in R-L-C series circuit excited by (single phase) AC
  supply.

- Open circuit and short circuit tests on a single – phase transformer.

- Connection and starting of a three – phase induction motor using direct online (DOL) or star – delta starter.

- Connection & measurement of power consumption of a fluorescent lamp.

- Determination of open circuit characteristics (OCC) of a DC machine.

- Starting and speed control of a DC shunt motor.

- Connection and testing of a single - phase energy meter (unity power factor load only).

- Two – wattmeter method of measuring power in three – phase circuit (resistive load only).

ED 1101-P   <u>**ENGINEERING GRAPHICS – I**</u>   **(0-0-3)**

General

Importance, Significance & scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, B.I.S. Specifications.   **(5 Lectures)**

Projections of Points & Lines

Introduction of planes of projection, Reference and auxiliary planes, projections of points and lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on auxiliary planes,
shortest distance, intersecting and non- intersecting lines.   **(5 Lectures)**

Planes Other than the Reference Planes

Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., projections of points and lines lying in the planes, conversion of oblique plane into auxiliary plane and solutions of related problems.   **(5 Lectures)**

Projections of Plane Figures

Different cases of plane figures (of different shapes), making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes, Obtaining true shape of the plane figure by projection.   **(5 Lectures)**

Projection of Solids

Simple cases when solid are placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.   **(5 Lectures)**

Development of Surface   **(5 Lectures)**

Development of simple objects with & without sectioning.

Isometric Projection   **(5 Lectures)**

Nomography

Basic concepts and uses

1st and 2nd semester

WP 1101 – P   **WORKSHOP PRACTICE I & II**   **(0-0-3)**

Carpentry: Definition, engineering applications, seasoning and preservation, plywood and plyboards.

Foundry: Moulding sands, constituents and characteristics, Pattern, definition, materials, types, core prints Role of gate, runner, riser, core and chaplets, Causes and remedies of some common casting defects like blow holes, cavities, inclusions.

Metal Joining: Definition of welding, brazing & soldering processes and their applications, Oxy – acetylene gas welding process, equipment and techniques, types of flames and their applications, Manual metal are welding techniques and equipments, AC & DC welding, electrodes, constituents and functions of electrode coating, Welding positions, Type of weld joint, common welding defects such as cracks, undercutting, slag inclusions, porosity.

Metal Cutting: Introduction to machining and common machining operations. Cutting tool materials, Definition of machine tools, specification and block diagram of lathe, Shaper, drilling machine & grinder, Common
Lathe operations such as turning, chamfering and facing, Quick return mechanism of shaper, Difference between drilling and boring, Files – material and classification.

Forging: Forging principle, materials, operations like drawing, upsetting, bending and forge welding, use of forged parts.

List of Jobs to be made in the workshop

Group A

1. T – Lap joint and Bridle joint   (Carpentry shop)
2. Mould of any pattern   (Foundry shop)
3. Casting of any simple pattern   (Foundry shop)

Group B

1. (a) Gas welding practice by student on mild steel flat
    (b) Lap joint by Gas Welding
2. (a) MMA Welding practice by students
    (b) Square butt joint by MMA Welding
3. (a) Lap joint by MMA Welding
    (b) Demonstration of brazing
4.   Tin smithy for making mechanical joint and soldering of joints.

Group C

1.   Job on lathe with one step turning and chamfering operations
2.   Job on shaper for finishing two sides of a job
3. (a) Drilling two holes of size 5 & 12 mm diameter on job used/to be used for shaping
    (b) Grinding a corner of above job on bench grinder
4.   Finishing of two sides of a square piece by filling

B. TECH COURSE STRUCTURE

COMMON TO ENGINEERING

BRANCHES

2ND SEMESTER

RANCHI UNIVERSITY, RANCHI

(CS 1201) INTRODUCTION TO COMPUTING

Module I   **[5 Hrs]**

Fundamentals of Computer:

History of Computer, Generation of Computer, Classification of Computers

Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices

Module II   **[6 Hrs]**

Number systems representation of signed and unsigned numbers, BCD, ASCII, Binary, Arithmetic & logic gates.

Assembly language, high level language, compiler and assembler (basic concepts)

Module III   **[4 Hrs]**

Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX.

Introduction to typesetting software such as Microsoft office, Introduction to emails, FTP, R-login, Network Services, Internet.

Module IV   **[20 Hrs]**

Concepts of Algorithm & flow chart, notion of programs, programmability and programming languages.

Structure of programs, object codes.

Introduction to Programming Languages - BASIC, FORTRAN and PASCAL.

Text Books:

Kerninghan, B.W.	The Elements of Programming Style
Gottfried	Programming with Pascal, Shaum Series, TMH
Rajaraman V.	Fundamental of Computers

Reference Books:

Kerninghan B.W. & Ritchie D.M.	The C Programming Language
Balaguruswamy	Programming in C
M.M.Oka	Computer Fundamentals, EPH
Leon	Introduction to Computers, Vikas
Leon	Fundamental of Information Technology, Vikas

ENVIRONMENT & ECOLOGY (CH1201)

Unit – I   **4 Lecture**
1) Environment:
   Definition Components of Environment importance of study, Environmental degradation and human activity.

Unit – II
2) Ecology: **5 Lecture**
   Definition elements of Ecology, Scope/object of Ecology, Different kind of Ecosystem (structure & function), Principles of Environmental impacts assessment.

Unit – III   **5 Lecture**
3) Air Pollution:
   Atmospheric composition, energy balance, climate, weather, dispersion, soures and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures.
4) Water pollution:
   Hydrosphere, natural water , pollutants their origin and effects river/lake/ground water pollution standards and control

Unit – IV   **4 Lecture**

5) Land pollution:
   Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid waste) their origin and effects, collection and disposal of solid waste, recovery and conversion methods.
6) Noise Pollution
   Sources, effects standards and control

Unit – V   **5 Lecture**
7) Energy:
   Definition different kind of sources of energy (conventional & nonconventional) and its impact on environment. Solar, Biomass, Bio-gas, hydrogen as an alternative Future source of energy.

Unit – VI   **6 Lecture**
   Current environmental issues of importance population growth, climate change and/or Global warming – definition and its effect, Acid Rain, ozone layer Depletion

Unit – VII   **3 Lecture**
   Environmental protection – Role of Government and Civilians. Environmental education.

Unit – VIII   **3 Lecture**
   Solid Waste Management – Definition and methodology.

Reference:-

1. Environmental Chemistry B. K. Sharma
2. Environmental Studies by Ritu Bir, Vayu education of India.
3. Environmental Studies by S. Deswal, A. Deswal, Dhanpat Rai & company.

PH 1201   **ENGINEERING PHYSICS-II**   **(3-0-0)**

Module 1. Vector analysis

Scalar and vector fields, Gradient of a scalar field, Divergence and curl of vector fields, Line integral of a vector field, Gauss-divergence theorem, Stoke's theorem. **[5]**

Module 2. Electrostatics

Quantization & conservation of charge, Coulomb's law (vectorial form) and superposition principle, Concept of electric field lines, flux of electric field, Gauss's law, Electric Potential and potential energy, Conductors, Capacitors and dielectric materials. **[5]**

Module 3. Electromagnetism

Magnetic field, Force on a moving charge in a magnetic field, Force on a current element, Torque on current loop, Biot-Savart law, Ampere's circuital law, Electromagnetic induction and Faraday's law, Magnetism in materials, Maxwell's equations, Electromagnetic Waves. **[7]**

Module 4. Thermoelectricity

Seebeck effect, Law of successive temperatures, Law of intermediate metals, Peltier effect, Thomson effect, Thermoelectric power, Application of thermodynamics on thermocouple. **[6]**

Module 5. Matter waves

Elements of wave properties of particles, Elements of particle properties of waves, Nuclear Energy.

[3]

Module 6. Laser

Spontaneous and Stimulated emission of radiation, Einstein coefficient, Parts of laser, Types of laser and their application. **[3]**

Module 7. Energy Bands and charge carrier in semiconductors

Energy band diagram, Covalent bonds, Bound and free electrons, Holes, Electron and hole mobilities, Intrinsic and extrinsic semiconductors, Fermi and impurity levels. **[3]**

Module 8. Conductivity in semiconductors

Impurity compensation, Charge neutrality equation and semiconductors conductivity, Einstein relation, Drift and diffusion current, Photo conductivity and Hall effect. **[3]**

Books Recommended:

1. Mathew N.O. Sadiku (SAD), Elements of Electromagnetics, Oxford University Press(2001).
2. Arthur Beiser (AB), Concept of Modern Physics, 6th edition 2009, Tata McGraw- Hill.
3. Halliday, Resnick, Walker , Fundamentals of Physics 6/e, John Wiley & Sons 2004.
4. Streetman and Banerjee, Solid State Electronic Devices, PHI Publication India.

MH 1201   <u>**Mathematics-II**</u>

Unit-1
Matrices and Determinant:-Review and operation on Determinant and Matrices, Rank of a Matrix, Elementary Transformations, Reduction to Normal form, Solution of simultaneous Equations, Gauss Jordan Method. Cayley Hamilton's Theorem, Eigen Values and Eigen Vectors.   **(05 Classes)**

Unit-2
Vector Space:- Definition, Linear dependence and linear independence of vectors.   **(03 Classes)**

Unit-3

First Order Ordinary Linear differential Equation:- Method of solution of first order differential equations (Types: Variable Separable, Homogeneous and non Homogeneous differential equations, linear differential equations, Bernoulli's differential equations and Exact differential equations.
                                                                                            (06Classes)
Unit-4
Higher Order Linear differential equation:- Solution of Higher Order linear differential equations with constant coefficient, Method of Variation of Parameters, Cauchy's Homogeneous and Legendre differential equations.   **(06 Classes)**

Unit-5
Laplace Transformations:-Definition, Existence of Laplace Transform, Laplace Transform of Basic and Periodic function, Shifting Theorems, Properties of Laplace Transformations   **(05 Classes)**

Unit-6
Laplace Inverse Transformation:- Laplace Inverse Transformation of basic functions, Convolution theorem, Laplace Transform of Unit Step function and Unit Impulse function, Application of Laplace Transformation to differential equations.   **(05 Classes)**

Unit-7
Numerical Analysis:-Operators ($\Delta, \nabla, \mu, \delta, E$) and   relation   between   operators,   Factorial Polynomial.   **(03 Classes)**

Unit-8:
Interpolation and Extrapolation:- Newton's Forward and Backward Formula, Lagrange's Interpolation formula and Newton's divided difference formula for unequal intervals, Numerical Differentiation and Numerical Integration   (Newton's cote's Method, Trapezoidal rule, Simpson's $\frac{1}{3}$rule and $\frac{3}{8}$rule).   **(06 Classes)**

<u>**Reference Books**</u>:-

      1. Advanced Mathematics for Engineers, by "Erwin Kreyszig"(Wiley Eastern Publication)

      2. Higher Engineering Mathematics, by "B.S.Grewal"(Khanna Publication)

      3. Introductory Method of Numerical Analysis, by " S.S.Shastri" (PHI Publication)

      4. Advance Mathematics for Engineer,by'Gorakh Prasad"(Torrent Publication).

ME1201   **ENGINEERING THERMODYNAMICS**   **(3-1-0)**

Fundamentals and definition   **(5 Lectures)**
System, properties, state, state change, diagram, Dimension and units

Work mechanism and thermodynamics   **(6 Lectures)**
Definitions, Displacement work at part of a system boundary, Engine indicator, Displacement work in various quasi static processes, Shaft work, electrical work, Heat, temperature, thermal equilibrium, Zeroth law of thermodynamics, sign convention for heat transfer.

First law of thermodynamic   **(5 Lectures)**
Statement, application to non cyclic and cyclic process, Energy, mode of energy, pure substances, specific heats, and first law applied to flow processes.

Second law of thermodynamics   **(5 Lectures)**
Direct and reversed heat engine, Kelvin – Plancks and clausius statement of second law and their equality, reversible and irreversible process, Carnot cycle, carnot Theorem, thermodynamic temperature scale.

Entropy   **(5 Lectures)**
Definition, calculation through T – ds relation, T – S diagrams, entropy as a measure of irreversibility, Clausius inequality

Properties of pure substances including steam tables and Mollier diagram
                                                                                    (5 Lectures)

Psychometrics: **(5 Lectures)**
Properties of ideal gas and ideal gas mixture with a condensable vapour.

Second law analysis of engineering processes, Avaibility and irreversibility and their application in thermal engineering.   **(4 Lectures)**

Suggested Text Books & References:-

- Engineering Thermodynamics - R.K.Rajput ,Laxmi Publications
- Engineering Thermodynamics - P.K.Nag ,TMH
- Thermal Science & Engineering - Dr. D.S. Kumar , Kataria & sons
- Thermal Engineering-D r. P. L. Ballaney , Khanna Publication

EC 1201

Semester - II

<u>Basic Electronics</u>

(3 – 0 – 0)

Module – I [10 Hrs]

Introduction Ideal diode, Introduction to P – N Junction diodes, Characteristics of semiconductor diode, analysis of simple diode circuits, DC and AC load lines, Zener diodes its characteristics and application.

Module – II [6 Hrs]

Application of Rectifier diode, Half wave & Full wave Rectifier, L, C, L – C & π Filter clipper and clamper Circuits, Voltage multiplier Circuit

Module – III [7 Hrs]

Introduction to BJT, Transistor operation Common Base, Common Collector, Common Emitter configuration, Transistor dc load line, JFETs & MOSFETs, Depletion type MOSFET & Enhancement type MOSFET

Module – IV [4 Hrs]

OP – AMP: Introduction, Differential &Common mode operation, virtual ground, inverting & non inverting amplifier, Adder, Subtractor, integrator, differentiator, buffer

Module - V [4 Hrs]

Semiconductor Devices: Introduction to SCR, DIAC, TRIAC, GTO, UJT

Module – VI [2 Hrs]

CRO: Introduction, Cathode Ray tube – theory and construction

Suggested Text Books and References Books:

- Millman and Halkias, " Integrated and Electronics", Tata Mc Graw Hill
- Nashelesky & Boylstead, " Electronic Devices & Circuit Theory", Prentice Hall of India
- D. Chattopadhay & P.C. Rakshit, " Electronics Fundamentals and Applications", New Age International

EC 1202 - P

Basic Electronics Lab

(0-0-3)

List of Experiments:

- Characteristics curve for Common Base, Common   Emitter & Common Collector Transistors.
- Characteristics of Field Effect Transistor.
- Verification of properties of Operational Amplifiers (Inverting, Non Inverting, Differential, Adder, Integrator, Differentiator).
- Study of CRO. (Measurement of Frequency & Amplitude of Sinusoidal, Triangular & Square Wave Signals).

- Study of working of Data Acquisition system**.**

(CS 1202 – P) LAB ASSIGNMENT

1. DOS System commands and Editors
2. UNIX system commands and vi
3. Simple Programs: simple and compound interest. To check whether a given number is a palindrome or not, evaluate summation series, factorial of a number , generate Pascal's triangle, find roots of a quadratic equation
4. Programs to demonstrate control structure: text processing, use of break and continue, etc.
5. Programs involving functions and recursion
6. Programs involving the use of arrays with subscripts and pointers
7. Programs using structures and files

ED1202-P   <u>**ENGINEERING GRAPHICS – II (M/c Drawings)**</u>   **(0-0-3)**

Shape Description (External)

Multiplanar representation in first and third angle systems of projections, glass box concept, sketching of orthographic views from pictorial views, precedence of lines

Sketching of pictorial (isometric and oblique) views from Multiplanar orthographic views, Reading exercise, Missing line and missing view exercises.

Shape Description (Internal)

Importance of sectioning, principles of sectioning, types of sections, cutting plane representation, section lines, conventional practices.

Size Description

Dimensioning, tools of dimensioning, Size and location dimensions, Principles and conventions of dimensioning, dimensioning exercises.

Computer Aided Drafting

Basic concepts and use.

Screw Threads

Different type of threads , Assembly drawing of nut and bolt.

Joints and couplings

Cotter joints and Knuckle joint , Flanged coplings

B. TECH COURSE STRUCTURE

MECHANICAL ENGINEERING

3RD SEMESTER

RANCHI UNIVERSITY, RANCHI

(CS1301)   NUMERICAL ANALYSIS & COMPUTER PROGRAMMING

Numerical Analysis:-

Module 1   **[5 Hrs]**

Approximation and round of error, Truncation errors.
Taylor Series, Bisection Method, Determination of root of polynomials and transcendental equation by Newton-Raphson, Secant and Bairstow method.

Module 2   **[5 Hrs]**

Solutions of linear simultaneous linear Algebraic equations by Gauss Elimination and Gauss Siedel Iteration Methods. Backward, Forward and Central difference relations and their uses in Numerical Differentiation and integration .

Module 3   **[5 Hrs]**

Application of difference Relations in the solution of Partial Differential Equations. Numerical Solutions of Ordinary Differential Equations by Eular, Modified Eular, Runge-Kutta and Predictor-Corrector method. Curve fitting-Linear and Non Linear Regression analysis, Trapezoidal rule, Simpson's rule.

Computer Programming:-

Module 4   **[3 Hrs]**

Introduction to Computer Programming in C Languages. Arithmetic Expressions . Simple Programs. The Emphasis should be more on Programming Techniques rather than the Language itself.

Module 5   **[3 Hrs]**

C Data Types, int , char, float etc. C Expressions, Arithmetic Operations , Relational and Logic Operations. C Assignment Statements, Extension of Assignments to the operations. C Primitive input output using getchar() and putchar(), Exposure of the scanf() and printf() Functions.

Module 6   **[5 Hrs]**

C statements , Conditional Execution using if-else. Optionally Switch and Break statements may be Mentioned. Concepts of Loops, Example of Loops in C using for, while and do-while optionally continue may be mentioned

Module 7   **[4 Hrs]**

One Dimensional Arrays and example of iterative programs using Array. 2-D Arrays. Use on Matrix Computations. Concept of Sub-Programming, Functions, Examples of Functions, Argument passing of simple Variables. Pointers relationship between arrays and Pointers, Argument passing using pointers, Array of Pointers, Passing array as arguments . String and C string library.

Module 8   **[5 Hrs]**

Structure and Union Defining C . Structures passing structures as arguments-program examples
Files I/O Use fopen and fprintf routines.

Text Books :
❖   Grewal, B.S. "*Numerical Methods*" Khanna Publication
❖   Gottfried, B. S. "*Programming with C*", Tata McGraw Hill Publication
❖   Ritchie & Kernighan "C Programming Language" Prentice Hall

References Books :
❖   Kamthane, A. "Programming in C" Pearson
❖   Theraja, Reema. "Programming in C" Oxford University Press
❖   Balaguruswamy, E. "*Programming in C*" Tata McGraw Hill
❖   Venugopal, K.R "*Programming in C*" Tata McGraw Hill

ME 1312

MATERIAL SCIENCE

(2-0-0)

Module – I   [5 Hrs]

History of materials: Source of engineering materials, categorization of engineering materials [2 or 3 material, their properties and their application just to make an illustrative point] Periodic table approach to engineering materials, Atomic bonding vis-à-vis properties of materials: Crystal structure and no crystalline structure, Miller indices

Module – II   [3 Hrs]

X-ray diffraction,

Defects, their origin, Frenkel Schottky defects, Oder-disorder transformations, association of defects, non-stoichiometric solids, role of defects in defining electronic properties of materials – Si, GaAs, Dislocations 3 hours

Diffusion in solid, atom mobilities, temperature and impurity dependence of diffusion, various diffusion processes

Module - III   [5 Hrs]

Binary phase diagrams (Pb-Sr, AI- Si, Ge-Si & Au-Si etc), microstructure and its effect on properties. 2 hours Materials for use in electronic devices: Polymers, ceramics. Semiconductors and matals – their structure and properties, insulators, superconductors, dielectric, ferroelectric, memory and magnetic materials. Case studies, 7 hours Quantum mechanical approach to structure of materials: Energy band in solid, electrical conductivity Extrinsic and intrinsic semiconductors, carrier concentration, work function

Module – IV   [3 Hrs]

Carrier transport mechanism: Scattering and drift of electrons and holes, diffusion and drift of carriers, Hall effect

Module – V   [5 Hrs]

Technology of fabrication of semiconductor devices, Unit operations: Thin film deposition, oxidation, diffusion, implantation lithography, etching metallization, bonding, encapsulation and packaging, Description of a discrete device fabrication, IC fabrication technology

Module – VI   [4 Hrs]

Sensors and actuators: classification and terminology, acoustic sensor, mechanical sensors, magnetic sensors, radiation sensors, thermal sensors, biosensors, chemical sensors and mechanical sensors Examples of integrated sensors 4 hours

Module – VII   **[4 Hrs]**

Opto-electronic materials and devices: Modulation of light: birefringence, Kerr effect, magneto-optic effects, acousto – optic effects. Display devices' CRTs. LEOs, LCDs, photoconductors, IR detectors, Photon devices, Lasers, Optical switching devices

Module – VIII   **[6 Hrs]**

Structural, chemical characterization of material – introduction to X-ray Analysis, optical microscopy, ESCA

SEM-EDAX, STM, AFM, case studies of Si, GaAs, ferrites, lithium niobate

Environmental assessment of semiconductor device production retrospect and prospect

Suggested text Books and References:

- Ian P. Jones, " Material Science for Electrical and Electronic Engineers"., Oxford Publication, Indian Edition
- Collister, Jr. Willium D, John Willey, " Materials Science and Engineering – An Introduction" Singapore
- Naurula, " Material Science"., Tata McGraw Hill Publication
- O.P. Khanna, "Material Science"., Dhanpat Rai Publication

ME 1303   **STRENGTH OF MATERIALS**   **(3-1-0)**

Stress: Axial load-safety concept, general concepts; stress analysis of axially loaded bars, member strength of design criteria.   (4 Lectures)

Strain: Axial strain and deformation; strains and deformation in axially loaded bars, stress-strain relationship, poison's ratio, thermal strain and deformation, strain concentration.
                                    (4 Lectures)

Generalized Hook's law, Pressure vessels, constitutive relationship-generalized concepts, relationship between elastic constants, thin wall pressure vessel.   (6 Lectures)

Torsion: Torsion stress and deformation in circular members, design of circular members in torsion, closed coil helical spring.   (5 Lectures)

SFD & BMD: Axial force, shear and bending moment diagram, introduction-direct approach for axial force, shear and bending, bending of beams with symmetrical cross-section.   (4 Lectures)

Stresses in Beams: Shear stress in beams; introduction-shear flow-shear stress in beams.
                                    (4 Lectures)

Combined stresses: Transformation of stress and strain; analysis of combined loading, transformation
of stress and strain-Mohr's rule for stress information.   (6 Lectures)

Deflection of beams: Introduction-deflection by integration-deflection by moment-area method.
                                    (6 Lectures)

Stability of column: introduction-Euler's buckling load formula, Rankin's formula-introduction to beam
column.   (2 Lectures)

Suggested Text Books & References:-

- Strength Of Materials , R S Khurmi , S. Chand
- Strength Of Materials, R K Rajput , S. Chand
- Strength Of Materials , Dr Sadhu Singh , Khanna Publications
- Strength Of Materials , Young & Timoshenko

- Strength Of Materials , Singer, Happer & Row Publisher

ME 1304   **<u>FLUID MECHANICS</u>**   **(3-1-0)**

Introduction: Fluid and flow definition and types, properties of ideal and real fluids, continuum concept, Lagrangian & Eulerian approach.   (4 Lectures)

Fluid statics :   General differential equation, Hydrostatics manometry, Force on plane and curved surfaces, stability of floating and submerged bodies; Relative equilibrium.   (4 Lectures)

Kinematics of fluid: Steady flow, uniform flow, stream, streak and path lines, continuity equation, stream function, irrational flow, velocity potential, flow nets, circulation, simple flow, flow around half body circular cylinder with and without rotation, lift and drag. (6 Lectures)

Dynamics of fluids : Concept of system and control volume, Reynolds transportation theorem, Euler's equation, Bernoulli's equation, Navier stock's equation to nozzle, venturimeter orifices and mouth pieces, time taken in emptying a vessel, pitot and prandtl tube.   (6 Lectures)

Flow in pipes: Laminar flow through pipes; total and hydraulic gradient lines; series and parallel connection of pipes transmission of power through pipes.   (4 Lectures)

Laminar flow of viscous fluids: Boundary layer concept, boundary layer thickness; displacement, momentum and energy thickness; integral method; drag on flat plate; flow around of airfoil; boundary layer separation ; flow; plane flow.   (6 Lectures)

Turbulent flow :   Fluid friction and Reynolds's number; Prandtl mixing length hypothesis velocity distribution in pipes; the universal pipe friction flows; Cole Brook White formula.
                                                                                      (5 Lectures)

Dimensional analysis :   Buckingham's P theorem; Non-dimensional numbers and their application;similitude.   (3 Lectures)

Compressible fluid flow : Velocity of sound, Mach number, Steady isentropic flow through ducts, chocked flow , flow through convergent and convergent-divergent nozzle, Adiabatic flow; Fanno lines; diabetic flow ; Rayleigh lines.   (6 Lectures)

Suggested Text Books & References:-

- Fluid Mechanics ,R.K. Bansal , Laxmi Publication
- Fluid Mechanics , A,K. Jain, Khanna Publication
- Fluid Mechanics & Machinary, Ojha ,Berndtsson &Chandramouli ,Oxford Publication
- Fluid Mechanics & Fluid Power Engineering , Dr. D.S. Kumar , Kataria & sons
- Fluid Mechanics , R K Rajput ,
- Fluid Mechanics , R K Khurmi ,
- Fluid Mechanics ,S.K. Som & G. Biswas ,, TMH
- R.J. Garde,New Age Publication

ME 1305   APPLIED   THERMODYNAMICS

(3-1-0)

Introduction to Thermodynamic system: Definition, familiarity eighth common examples   of thermodynamic   system such as steam power plant, Vapour compression refrigeration, Automobile engine, air compressor , a rocket engine.   (6 Lectures)

Review of basic concepts: Working fluid properties (air, steam) for various thermodynamic processes   and cycles , First law and second law energy equations for closed and open system under SSSF and   USUF condition.   (4 Lectures)

Third law of Thermodynamics: Measurement of entropy, zero value of entropy, Absolute zero   temperature.   (3 Lectures)

Thermodynamic (PVT) relations of working fluid :   Equations of state for ideal and real gases , Behavior of real gases and   compressibility factor , Law of corresponding state and use of generalized compressibility chart, Helmoltz and Gibb function.   (6 Lectures)

Gas power cycle : Carnot, Sterling , Ericssion, Otta Diesel, Dual combustion, Brayton and Atkinsion
cycle, Air standard thermal efficiency, Maximum work output and efficiency, Indicated power, Brake power and mean effective pressure for reciprocating engine.   (9 Lectures)

Vapour power cycle :   Carnot and Rankine cycles, reheating and regenerative feed heating Rankine   cycle, Binary vapour cycle, Thermal efficiency and work ratio. Factor affecting efficiency and   work output.   (9 Lectures)

Refrigeration cycle process : Brayton air refrigeration cycle, Vapour compression cycle, Vortex and pulse tube, refrigeration, thermoelectric refrigeration.   (7 Lectures)

Suggested Text Books & References:-

- Engineering Thermodynamics , R.K.Rajput , Laxmi publications
- Thermal Science & Engineering , Dr. D.S. Kumar , Kataria & sons
- Thermodynamics ,P.K.Nag , TMH
- Thermal Engineering-D r. P. L. Ballaney , Khanna Publication

Thermodynamics Engineering , Hawkins G.A.

MH 1306   **Mathematics-III**

Unit-1

Fourier series:- Periodic Funcions, Euler's Formula, Fourier Series of Periodic Function, Fourier Series of discontinuous functions,Change of Intervl, Half range series, Harmonic Analysis.
(05 Classes)

Unit-2

Series solutions:-Series solution of Second order Ordinary differential Equation, Bessel's functions and its solution, Recurrence relations of Bessel's functions , Orthogonality properties of Bessel's functions.

(05 Classes)

Unit-3

Legendre Equations and its solutions, Rodrigue's Formula, Recurrence relations of Legendre equations,   Legendre's Polynomial. Orthogonality properties of Legendre Equations.
(02 Classes)

Unit-4

Complex Variable:- Differentiation, Analytic functions ,Cauchy-Riemann's Equations. **(03 Classes)**

Unit-5

Complex Integration:- Conformal mapping ,Bilinear Transformations, $w=z^n$,$w=\sin z$,$w=e^z$, $w=z+\frac{1}{z}$. Complex Integration, Cauchy's Integral Theorem, Cauchy's Integral Formula, Taylor's and Lorentz's Expansion, Zeros, Poles and Residues, Cauchy's residues Theorem, Contour Integration of trigonometric functions and   algebraic functions without a pole on real axis.   **(08 Classes)**

Unit-6

Partial differential equation:-Linear and non-linear partial differential equations of first order, four tandard forms.   **(04 Classes)**

Unit-7

Boundary Value Problems:- Equations of vibration of string and one dimensional heat flow ,Their solution by separation of variables.   **(06 Classes)**

Unit-8:

Fourier Transform:- Fourier Integral Transform, Fourier Transform, Convolution theorem and Inversion Formula of Fourier transform.   **(06 Classes)**

Reference Books:-

1. Advanced Mathematics for Engineers, by "Erwin Kreyszig"(Wiley Eastern Publication)
2. Higher Engineering Mathematics, by "B.S.Grewal"(Khanna Publication)
3. Engineering Mathematics, by " S.S.Shastri" (PHI Publication)
4. Advance Mathematics for Engineer,by'Gorakh Prasad"(Torrent Publication).

LAB ASSIGNMENT

1. Write a Program to print " HELLO WORLD"
2. Write a Program to add two numbers.
3. Write a program to find the area of a circle.
4. Write a program to check whether the given number is palindrome or not.
5. Write a program to check whather the given number is prime or not.
6. Write a program to find the largest among three numbers using if-else statement.
7. Write a program to swap two numbers using function.
8. Write a program to store 100 elements within array and find largest and smallest element.
9. Write a program to add two matrices and display the resultant matrix.
10. Write a program to multiply two matrices and display the resultant matrix.
11. Write a program to display the output.

```
        *
        * *
        * * *
        * * * *

        . . . . .
        . . . . . .
```

12. Write a program to display the output.

```
         1
        0 1
        1 0 1
        0 1 0 1

        . . . . .
        . . . . . .
```

`13. Write a program to display the output.

```
           1
          1 2 1
         1 2 3 2 1
        1 2 3 4 3 2 1

      . . . . . . . . .
     . . . . . . . . . .
```

14. To find the roots of non-linear equation using Bisection method/Muller's method.
15. To find the roots of non-linear equation using Newton's method/Miller's method.
16. Curve fitting by least-squares approximations.
17. To solve the system of linear equations using Gauss-Elimination method.
18. To solve the system of linear equations using Gauss-Seidal iteration method.
19. To solve integral equation numerically using Trapezoidal rule.
20. To solve integral equation numerically using Simpson's rule.
21. To find numerical solution of ordinary differential equations by Euler's method.
22. To find numerical solution of ordinary differential equations by Runga-Kutta method.
23. To find numerical solution of partial differential equation/laplace equation/wave equation/heat equation.
24. To find numerical solution of ordinary differential equations by Milne's method.
25. To solve a given problem using Newton's forward interpolation formula.
26. To solve a given problem using Lagrange's forward interpolation formula.

ME 1307 – P

MATERIAL SCIENCE LAB

(0-0-2)

LIST OF EXPERIMENTS:

- To study the lattice structure of various type of unit cell. Observe the Miller Indices for various Planes and direction in a unit cell.
- To study the microstructure of cast iron, mild steel, solder under annealed, cold worked, forged / rolled condition.
- To verify the Hall effect
- To determine the fracture characteristics of ductile and materials
- To determine the chemical composition of a few common alloys
- To determine percentage of C and S content in an alloy with Fe as main constituent

ME 1308-P   <u>**STRENGTH OF MATERIALS LAB**</u>   **(0-0-3)**

<u>**List of Experiments**</u>

1.   Tensile Test: -To prepare the tensile test upon the given specimen (Mild Steel).

2.   Compression Test: -To determine the compressive strength of the given specimen.

3.   Torsion Test: - To perform the Torsion test on given specimen.
4.   Impact Test: - To determine the impact toughness of the given material.
5.   Brinell Hardness Test: - To determine the hardness of the given specimen.
6.   Vicker's Hardness Test: - To determine he hardness of the given specimen.
7.   Rockwell Hardness Test: - To determine he hardness of the given specimen.

ME 1309-P   FLUID MECHANICS LAB   (0-0-3)

 List of Experiments
1.   Verification of Bernoulli's theorem.
2.   Determination of co-efficient of discharge for a venturimeter.
3.   Determination of loss of head of water flowing in a pipe; through different climaters.
4.   Determination of loss of head due to friction.
5.   Determination of co-efficient of discharge for Orificemeter.
6.   Determination of met accenteric height of a boat model.
7.   Verification of Reynolds Law.
8.   Viscosity determination of a liquid by Capillary tube method.

ME 1310-P   APPLIED THERMODYNAMICS LAB   (0-0-3)

List of Experiments

1.   To study the construction & operation of a Cochran Boiler.
2.   To study the construction & operation of a Bobcock Boiler.
3.   To study the construction & operation of a Lancashire Boiler.
4.   To study the construction & operation of a Vertical Water Tube Boiler.
5.   To study about 2 Stroke Petrol Engine.
6.   To study about 4 Stroke Petrol Engine.
7.   To study about C.I. Engine (Diesel Engine).
8.   Study of Simple & Compound Stream Engine.

HS 1303 – P

GENERAL PROFICIENCY

G.P. classes are conducted for personality development of students. It includes Group Discussion, Presentation, Seminar, Quiz, C V Writing, Technical Report Writing and also inculcates Human Values and Professional Ethics. There will be assignments and class tests also.

B. TECH COURSE STRUCTURE

MECHANICAL ENGINEERING

4th SEMESTER

RANCHI UNIVERSITY, RANCHI

ME1401   MECHANICAL MEASUREMENTS & METROLOGY   (2-0-0)

1.   Mechanical Measurements

Introduction: Introduction to measurement & measuring instruments, Generalised measuring system & functional elements, accuracy and precision, units of measurement, static & dynamic performance characteristics of measurement devices, calibration, concepts of error, source of error, statistical analysis of errors.   **(5 Lectures)**

Sensors & Transducers: Types of sensors, types of transducer & their characteristics.

(3 Lectures)

Measurement of displacement & angular velocity   **(2 Lectures)**

Measurement of pressure: Gravitational, directing acting, elastic & indirect type pressure transducers, Measurement of very low pressure.   **(3 Lectures)**

Strain Measurement: Types of strain gauges & their working, strain gauge circuits, temperature compensation, Strain rosettes.   **(3 Lectures)**

Measurement of force & torque.

Temperature measurement: By thermometers, bimetallic, thermocouples, thermistors & pytometers   **(2 Lectures)**

Measurement of Flow: Obstruction meters, variable head meter, hot wire & magnetic meters, ultrasonic flow meters etc   **(2 Lectures)**

Vibration & noise measurement: Seismic instruments, vibration pick-ups & decibel meters

(2 Lectures)

Data acquisition system: Introduction to data acquisition systems, single & multi channel systems, Data acquisition systems Input-output devices.   **(4 Lectures)**

2.   Metrology

Standards of linear measurement, line & end standards   **(1 Lectures)**
System of limits & fits   **(1 Lectures)**
Linear & angular measurements devices & systems   **(1 Lectures)**
Limit gauges & their design
Measurement of geometric forms like straight, flatness, roundness & circularity   **(2 Lectures)**

Optical projectors, toolmakers microscope, autocollimators   **(3 Lectures)**
Interferometry: Principle & use of interferometry, optical flat & interferometers, laser interferometers   **(3 Lectures)**
Comparators: Types, working principles & magnification range   **(2 Lectures)**
Measurement of screw threads & gears   **(1 Lectures)**
Surface texture: quantitative evalution of surfaces roughness & its measurement   **(2 Lectures)**
 Introduction to CMM: In-process gauging systems
Inspection in process & final inspection, Sampling & 100% inspection, Sampling plans

(2 Lectures)

Suggested Text Books & References:-

- Mechanical Measurement , Beckwith
- Engineering Metrology , R.K. Jain , Khanna Publication
- R.K.Rajput , Kataria & sons
- A Text Bookof Metrology , M Mahajan , Dhanpat Rai Publications
- Engineering Metrology, I.C.Gupta
- Mechanical Measurement , Instrumentation & Control, Sawhney, Dhanpat Rai

ME1402   INDUSTRIAL ENGINEERING   (2-0-0)

Evaluation of work Study: Work of F. W. Taylor, Frank & Lillen Gilberth & others, Productivity definition, Means of increasing productivity & work study definition, Productivity & work study.
                                                                    (8 Lectures)

Motion study: Definition, aims, procedure for method study, selection of jobs, recording techniques, micro motion study, Therbligs, Cyclograph & Chronocyclo-graph, Principles of motion economy, design of work place layout, Analysis in the form of a chart, operation chart, flow chart, flow diagram, String diagram, Man machine chart, Two hand chart, Simo chart. **(10 Lectures)**

Work Measurement (Time Study): Definition, uses, procedure, time study equipment, Performance rating, allowances, Number of cycles to be studied, Determination of standard time, Predetermined Motion Time Systems.   **(6 Lectures)**

Job Evaluation: Job evaluation**,** objectives of job evaluation**,** Methods of job evaluation, Non-quantitative.   **(5 Lectures)**

Wages & Incentives: Characteristics of a good wage or incentive system, Methods wage payment, Concept of wage incentive schemes, financial & non- financial, Halsely premium plan, Merri's Multiple piece rate system.   **(6 Lectures)**

Concept of New Techniques: Scheduling through Network C.P.M. & PERT, use of linear programming methods to solve product – mix problems.   **(5 Lectures)**

Value Engineering: Concept of value, product life cycle, value engineering approaches, job plan, value tests.   **(3 Lectures)**

Suggested Text Books & References:-

- Industrial Engg. & Management , O.P. Khanna , Dhanpat Rai Publications
- Industrial Engg. & Production Management , Matand Telsang , S Chand Publications
- Industrial Engg. & Production Management, A.P. Verma
- Industrial Engg. & Management , T R Banga & S C Sharma , Khanna Publications
- Industrial Engg. & Production Management , M mahajan , Dhanpat Rai Publications

ME1403   ADVANCED STRENGTH OF MATERIALS   (3-1-0)

1. Stress and strain in three dimension, theories of yielding, different theories of failure, comparison of theories of failure yield loci.   (6 Lectures)

2. Bending of curved beams in the plain of loading crane hooks, rings and chain links.
                                                                        (7 Lectures)

3. Strain energy due to direct bending, Castig Liano's theorem, applicable to deflection of simply supported beams and cantilever beams due to shear.   (5 Lectures)

4. Thick cylinders, radial and hoop stresses, applications of compound stress theories, compound cylinders, thick spherical shell, radial and circumferential stresses.   (8 Lectures)

5. Shear center of thin walled open cross flow section shear flow.   (4 Lectures)

6. Fatigue: fatigue of metal, Bauschinger's Experiment, strain method of obtaining fatigue ranges, formula, connected to stress range, maximum stress and ultimate strength, S - N curve, Gerber's formula, Goodman's law.   (6 Lectures)

7. Creep: creep metals, Mechanism of creep, equilibrium temperature, creep curve, creep rate, prediction of long term properties from short duration list.   (3 Lectures)

Suggested Text Books & References:-

- Strength Of Materials , Dr Sadhu Singh , Khanna Publications
- Strength Of Materials , G.H. Ryder
- Strength Of Materials , Razimi
- Strength Of Materials ,Authur Morlay
- Strength Of Materials ,S. Ramamrutham
- Strength Of Materials ,S. Ramamrutham

ME1404   KINEMATICS OF MACHINE   (3-0-0)

Kinematics: Elements, pairs, mechanism, four bar chain and its inversions, velocity and acceleration in mechanism, velocity and acceleration diagrams Klein's construction component instantaneous, entre method, synthests of mechanism, pantograph, Scott-Russel, indicator mechanisms, Davis and Ackermenn steering mechanism, Hook's joint.

(10 Lectures)

Brakes and Dynamometers: Band & Block brakes, Braking action, absorption and transmission type dynamometers, Prony, rope and Hydraulic dynamometers, Braking systems of automobiles.

(5 Lectures)

Inertia Force Analysis: Velocity and acceleration of slider crank and four bar mechanism, inertia force, piston thrust and forces in connecting rod, turning moment diagram, flywheel.

(6 Lectures)

Governors: Simple, Porter, Proell, Hartnell and spring controlled governors, governor effort, power stability, inertia effects.   (5 Lectures)

Cams: Types of cams, displacement, velocity and accelerations curves for different cam followers, consideration of pressure angle and wear, analysis of follower for cams with specified contours.

(6 Lectures)

Gyroscope: Principles of gyroscopic couple, effect of gyroscopic couple and centrifugal force on vehicle taking a turn, stabilization of sea vessels.   (5 Lectures)

Balancing: Balancing of rotating masses in the same and different planes, balancing of reciprocating masses, swaying couple, hammer blow and tractive effort, primary and secondary balancing of a locomotive and internal combustion engines, balancing machines.

(7 Lectures)

   Suggested Text Books & References:-

- Theory of Machine , R.S. Khurmi , S. Chand Publisher
- Theory of Machine , S.S. Ratan , Tata McGraw Hill.

ME1405   MANUFACTURING TECHNOLOGY – I   (3-0-0)

Importance of manufacturing, economic & technological definition of manufacturing, Survey of manufacturing processes.   (2 Lectures)

Casting: Basis principal & survey of casting processes, sand casting patterns, pattern material, allowance, Green and dry sand moulding methods, moulding sand properties and testing, elements of mould and design considerations, Coresuse, materials and making practice, Die, investment and centrifugal casting processes, Melting practice and concepts in solidification, Inspection and defects analysis.   (8 Lectures)

Forming: Elastic & plastic deformation, concept of strain – hardening rolling, forging, extrusion, wire & tube drawing processes, machine and equipments, parameters and force calculations.
                                              (8 Lectures)

Sheet-metal working: Role of sheet metal components, Cutting mechanism, Description of cutting processes like blanking, piercing, lancing etc; basic elements of processes for sheet metal working, Part feeding system, Punch and die clearance and die elements.   (10 Lectures)

Welding: Principle of welding, soldering, brazing and adhesive bonding, Survey of welding and allied processes, Arc welding power sources and consumables MMAW, TIG & MIG processes and their parameter selection, Resistance Welding principle and equipments Spot, projection and seam welding processes, Gas welding and cutting processes and equipments.   (8 Lectures)

Powder Metallurgy: Powder manufacturing, compaction and sintering processes, Advantages and application of P/M   (4 Lectures)
Manufacturing of plastic components

Suggested Text Books & References:-

- Manufacturing Technology , R K Rajput ,Laxmi Publications
- Manufacturing Science , Amitabh Ghosh & A K Mallik , Affiliated East West Pub
- Foundry Technology , K.P. Singh
- Workshop Technology - I , B.S. Raghuwanshi , Dhanpat Rai

EE 1412   ELECRICAL MACHINE   (3-0-0)

Electromagnetics and Transformers:
Review of laws of Electromagnetics and Electro-mechanics.
Autotransformer: Equivalent circuits and equations for step-up and step-down operations, Comparison with two winding transformer on the basis of copper losses and volume of copper.
[6 Lectures]
Three-phase transformer, special constructional features – cruciform mitering, alternative winding arrangements, cooling methodology, conservators, breathers, Buchholz relay, Transformer connection, vector phase groups, Phase conversions – 3 to 1, 3 to 2, 3 to 6 and 3 to 12.
[6 Lectures]
Parallel operation of single and three- phase transformers and load sharing, testing of 3-phase transformers, Special Purpose Transformers: Pulse, Isolation, Welding, Rectifier, High frequency.
[6 Lectures]
DC Machines:
Review of constructional features. Methods of excitation, Armature windings, Power balance, Voltage and torque equations. Operation as generator – Self excitation principle, Armature reaction, Characteristics of generators and motors, Commutation, Starting and speed control including solid state controllers, Breaking, Losses, Efficiency, Testing, efficiency and application of DC motors, Parallel operation of generators.
[7 Lectures]
Poly-Phase Synchronous Machine:
Constructional features, Poly- phase Distributed AC Windings: Types, Coil span and winding factors; Excitation systems, e.m.f. equation and harmonic elimination; Interaction between excitation flux and armature m.m.f., equivalent circuit model and phasor diagram and circle diagram; Power angle equations and characteristics. Voltage regulation and effect of AVR; Synchronizing methods, Parallel operation and load sharing, active and reactive power control, operation on infinite bus-bar.
[7 Lectures]
Analysis under sudden short circuit; Transient parameters; Motoring mode, Transition from motoring to generating mode, Phasor diagram, steady state operating characteristics, V-curves, starting, synchronous condenser, hunting- damper winding effects, speed control including solid state control. Testing of Synchronous Machines- Stability considerations; Brushless generators, Single- phase generators.
[6 Lectures]
Suggested Books References:
- Mcpherson, George, "Induction to Electric Machines and Transformers", John Wiley and Sons, 1980
- Naser Syed, A., " Electric Machine and Transformer", New York, MACMILLAN, 1984.
- Sen, P. C.,"Thyrister DC Drives", New York, Wiley, 1991.
- Sen, P. C., "Principles of Elecric Machines and Power Electronics", (Second Edition), John Wiley & Sons 1997.
- Say, M. G., "Alternating Current Machine", (5th Edition), ELBS, 1986.
  Fitzgeral, Kingsley C. and Umans, S. D., "Electric Machinery", (5th Edition) McGraw-Hill Book Co., 1992.

SEMESTER IV

ME 1406-P   MECHANICAL MEASUREMENT & METROLOGY LAB   (0-0-3)

List of Experiments:
1.   Study of various types of measuring instruments gauges.
2.   To measure strain.
3.   To measure the " Surface Roughness " of a work piece with the help of Profilometer .
4.   Study of various types of Dynamometers & to measure force, torque & power.
5.   To study the Pressure measuring devices.
6.   Study of various types of temperature measuring devices.
7.   Calibration of Thermocouples.
8.   Study of various types of flow meters.
9.   To measure the vibration noise of equipments.
10.   To study the application of Sensors & Transducers.
11.   To measure the Screw Threads & to determine the flatness of the surface.

ME1407-P   KINEMATICS OF MACHINE LAB   (0-0-3)

List of Experiments:
1.   To draw velocity diagram of four bar mechanism.
2.   To draw velocity diagram of slider crank mechanics.
3.   To draw acceleration diagram of four bar mechanics.
4.   To draw displacement diagram, velocity diagram, acceleration diagram of cam follower.
5.   To draw a cam profile.
6.   Determination of Balancing of masses by graphical method for several unbalanced mass in a same place.

ME 1408-P   MANUFACTURING TECHNOLOGY - I LAB   (0-0-3)

List of Experiments:
1.   To make a solid pattern casting of Aluminum.
2.   To make a hollow pattern casting of alloy.
3.   Fan Box with hook.
4.   Hexagonal nut with threading.
5.   Tungsten Inert gas Welding (TIG).
6.   Metal Inert Gas Welding (MIG).
7.   Powder Metallurgy – Comaction of metal powder sintering & testing.

EE 1413-P   ELECTRICAL MACHINES LAB   **(0-0-3)**

List of Experiments: (Min six experiments to be conducted)
- Characteristics of DC Machines- motors and generators with different excitation.
- Hopkinsin's test and Field test – loss calculation and prediction of performance characteristics.
- Speed control of DC motors – conventional and electronics.
- Determination efficiency of single- phase transformer by using back-to-back test.
- Determination efficiency of single -phase transformer by R-L & R-C loads.
- Determination of equivalent circuit parameters of a three- phase slip-ring induction motor.
- Determination of equivalent circuit parameters of a three- phase squirrel cage induction motor by blocked rotor test and to draw circle diagram.
- Phase conversion using Scott connection and perform load test.
- No-load short-circuit and Zero Power Factor (ZPF) test on a synchronous machine.
- Determination of voltage regulation at specified load by (i) EMF, (ii) MMF, (iii) Pottier method, (iv) ASA methods and comparison of results, Load angle characteristic and comparison with theoretically predicted results.
- V- Curves and inverted V- curves of synchronous machines, Comparison with predicted characteristics.
- Slip-test, short circuit and lagging current tests on a salient pole machine and determination of armature parameters, Estimation of voltage regulation at specific loads using Blondel's method, Comparison with results from load test.
- Sudden short circuit test and determination of X_c, X_d', X_d'' and machine time constants. Determination of X_1, X_2, X_0 by fault simulation methods.
- Study of Automatic Voltage Regulators (AVR) and from grid to stand alone mode.

HS1404–P   **GENERAL PROFICIENCY IV**   **(0-0-0)**

Debate Elocution, Extempore, Group Discussion, Panel Discussion, Presentation – Paper & oral, Allegation & clarification, Quiz / Brain Teaser, Survey Report / Project Report / Case Study, Dissertation, Mock Interview, Expository / Argumentative Report & National Service Scheme (NSS).

B. TECH COURSE STRUCTURE

ELCETRONICS & COMMUNICATION ENGINEERING

5th SEMESTER

RANCHI UNIVERSITY, RANCHI

HS1501   VALUE ENGINEERING   (2-0-0)

An overview

Definition , value engineering Recommendation ,programmes , advantages.

Approach of Function

Evaluation of function, determining function, classifying function,evaluationof costs,evaluation of worth,determining worth,evaluationof valus

VE Job plan

Introduction, orientation, information phase,speculation phase,analysis phase,development phase-implementation phase, follow up phase.

Selection of evaluation of VE Projects

Project selection, methods selection , value standards, application of VE methodology

Versatility of VE

VE operation in maintenance and repair activities ,value engineering in non hardware projects

Initiating A VE programme

Introduction ,training plan,career development for VE specialities

Fast Diagramming

Cost models,life cycle costs

VE Level of effect

VE team,co-ordinator, designer,different services,definitions, construction management contracts, Value engineering case studies.

Suggested text books & references

- Tufty Heralds, G,"Compendium on value engineerin".Indo American Society
- Miles, L.D."techniques of Value Engineering and Analysis".Mcgraw Hill
- Khanna , O.P. ,"Industrial Engineering& Management", Dhanpat Rai and sons

SEMESTER V

ME1502   TOTAL QUALITY MANAGEMENT   (2-0-0)

Quality Concepts

Evolution of quality control , concept change, TQM Modern concept, Quality concept in design, Review of design, Evolution of proto type.   (4 Lectures)

Control on Purchased Product

Procurement of various products, evolution of supplies, capacity verification, Development of sources, procurement procedure.   (4 Lectures)

Manufacturing Quality

Methods and techniques for manufacture, Inspection and control of product, Quality in sales and services, Guarantee, analysis of claims.   (4 Lectures)

Quality Management

Organization structure and design, Quality Function, Decentralization, Designing and fitting organization for different types of products and company, Economics of quality value and contribution, Quality cost, Optimizing quality cost, seduction programme.
        (5 Lectures)

Human Factor in Quality

Attitude of top management, co-operation of groups, operators attitude, responsibility, causes of operators error and corrective methods.   (5 Lectures)

Control Charts

Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts.   (4 Lectures)

Attributes of Control Charts

Defects, construction and analysis of P-chart, improvement by control chart, variable sample size, construction and analysis of C-chart.   (4 Lectures)

Defects Diagnosis and Prevention

Defect study, Identification and analysis of defects, corrective measure, factors affecting reliability, MTTF, calculation of reliability, Building reliability in the product, evaluation of reliability, interpretation of test results , reliability control, maintainability, zero defects, quality circle.
                 (6 Lectures)

Suggested Text Books and References:

- **"Total Quality Management", Lt. gen. H. Loi ,Wiley Eastern Limited.**
- **"Total Quality Management , Dr.K. C. Rao ,Kataria & sons**
- **Greg Bounds," Beyond Total Quality Management", McGraw Hill.**
- **Menon, H.G.,"TQM in New Product Manufacturing",McGraw Hill.**

ME 1503   MACHINE DESIGN I   (3-0-0)

Materials   (8 Lectures)
Properties and IS coding of various material from properties and economic aspects

Design for Strength   (12 Lectures)
Allowable stress, detailed discussion on factor of safety (factor of ignorance), Stress concentration-causes, Introduction of various design consideration like Strength stiffness, weight, cost, space etc., Concept of fatigue failures.

Design of pin, cotter and keyed joints, screw fastenings, subjected to direct stress levers, laminated springs under bending, Shafts and shaft couplings in torsion. Design of shafts and brackets subjected to combined stresses, Design of thin and thick cylinders, power screws, lead screws.
(12 Lectures)

Design of weldments subjects to eccentric loading and combined stresses.   **(8 Lectures)**

Suggested Text Books & References:-

- Mechanical Engg. Dsign, Joseph E. Shigley Charles R. Mischke ,TMH
- Machine Design, P.C.Sharma & Aggarwal , Kataria & sons
- Machine Design, R.S. Khurmi & J.K.Gupta , S. Chand Publications
- Machine Design, Dr Sadhu Singh , Khanna Publications
- Data books of Engineers ,P.S.G Publications

ME1504   DYNAMICS OF MACHINES   (3-0-0)

Gears

Laws of gearing, gears terminology, tooth form, standard interchangeable tooth profile, minimum number of teeth on pinion in contact with a gear, interference and under cutting, level, helical and spiral gears.   **(7 Lectures)**

Gear Trains

Simple, compound, reverted and epicyclic gear trains, analytical, tabular, graphical and vector methods for velocity ratio, gear boxes-sliding and constant mesh gear box for automobiles.
                                                                                (7 Lectures)

Vibrations
One dimensional longitudinal, transverse and torsional vibration, frequency, effect of damping on vibration, different types of damping, Forced vibrations, force and displacement transmissibility, vibration Isolation, vibration measuring instruments.   **(8 Lectures)**

Many Degree of Freedom System
Exact analysis of undamped and damped continuous systems subjected to periodic force, influence numbers, analysis of two and three degree of freedom lumped mass system. Principle of tuned absorbers   **(7 Lectures)**

Numerical Methods
Raleigh, Dunkerley Stodola, Rayleigh-Ritz and Holtzer method for finding natural frequency of continuous / lumped mass systems for different types of end conditions.
                                                                                (6 Lectures)

Critical Speeds of Shafts
Critical speeds of shaft having multiple discs with and without jumping, secondary critical speed.
                                                                                (5 Lectures)

Suggested Text Books & References:-

- "Theory of Machines", R.S.Khurmi. S. Chand Publishers
- Theory of machine,   Ratan, Tata McGraw Hill
- Theory of Vibration with Applications , Thomson, W.T., CBS pub. And Distribution
- Tse, Morse and Hinkle, Mechanical vibration , Prentice Hall of India Ltd
- Mechanical vibration , R. K. Singal , Kataria & sons

ME1505   MANUFACTURING TECHNOLOGY – II   (3-0-0)

Mechanics of metal cutting

Classification of metal removal processes and machines   **(2 Lectures)**

Geometry of single point cutting tool angles, Tool nomenclature in ASA, ORS & NRS and interrelationship. Mechanism of chip formation and types of chips, chips breakers, Orthogonal and oblique cutting, cutting forces and power required theories of metal cutting. Thermal aspects of machining and measurement of chip tool interface temperature. Friction in metal cutting.

(8 Lectures)

Machinability   (6 Lectures)

Concept and evaluation of machinability, tool life, mechanism of tool failure, tool life and cutting parameters, machinability index, factors affecting machinability.

Cutting fluids   **(1 Lecture)**

Types, selection and application methods.

General purpose machine tools   (8 Lectures)

Constructional details of lathe, milling, shaping and planning machines, Tooling, attachments and operations performed, selection of cutting parameters, calculation of forces and time for machining Broaching operation.

Capston and turret lathes, single and multiple spindle automates, operations planning and tool layout

Abrasive processes   (6 Lectures)

Abrasive: natural and synthetic, manufacturing, nomenclature, selection of grinding wheels, wheel mounting and dressing. Machines for surface and cylindrical grinding, their constructional details and processes

Surface finishing Honing, lapping, super finishing, polishing and buffing processes

(2 Lectures)

Screw threads and gear manufacturing methods.   **(2 Lectures)**

Introduction to Jigs and fixture and their use for productivity improvement **(3 Lectures)**

Non- conventional machining   (6 Lectures)

Benefits, general application and survey of Non- conventional machining processes, Mechanism of metal removal, tooling and equipments process parameters, surface finishing obtained, and specific applications of EDM, LBM, EBM, ECM, USM, AJM processes.

Suggested Text Books & References:-

- Workshop Technology II , B.S.Raghuwansi , Dhanpat Rai Publications
- Manufacturing Technology , R. K. Rajput , Laxmi Publications
- Non-Conventional Machining , P.K. Mishra
- Manufacturing Science , Ghosh & Malik , E W Publications

ME1506   HEAT AND MASS TRANSFER   (3-0-0)

Introduction
Various modes of heat transfer, Fourier's, Newton's and Stefan Boltzmann's Law. Combined modes of heat transfer, thermal diffusivity, overall heat transfer coefficient.   **(3 Lectures)**

Conduction
The thermal conductivity of solids, liquids and gases, factors influencing conductivity, measurement. The general differential equation of conduction. One dimensional steady state conduction, linear heat flow through a plane and composite wall, tube and sphere, critical thickness of insulation, Effect of variable thermal conductivity, Conduction with heat source, heat transfer from rods heated at one both ends. Heat transfer from fins of uniform cross-section. Errors of measurement of temperature in thermometer wells.
(12 Lectures)

Convection (Forced)
Introduction, laminar boundary layer equations on a flat plate and in a tube, laminar forced convection on a flat plate and in a tube, simple Reynolds's analogy, Dimensional analysis of forced convection, empirical relationship for forced convection.   **(6 Lectures)**

Convection (Natural)
Dimensional analysis of natural convection, empirical relationship for natural convection. Convection with phase change, Description of condensing flow. A theoretical model of condensing flow, Boiling heat transfer, Empirical relationships for convection with phase change. **(6 Lectures)**

Heat Exchangers
Different types of heat exchangers; determination of heat exchanger performance. Heat exchanger transfer units, Analysis restricted to parallel and counter flow heat exchanger.   **(4 Lectures)**

Thermal Radiation
Introduction, absorption and reflection of radiant energy, Emission, Radiosity and irradiation, Black & non black bodies, Kirchoff's law intensity of radiation, radiation exchange between black surface, geometric configuration factor, grey body relation exchange between surface of unit configuration factor. Electrical analogy to simple problems. Non- luminous gas radiation, Errors in temperature measurement due to radiation.   **(7 Lectures)**

Introduction to Mass Transfer
Mass and mole concentrations, molecular diffusion , eddy, diffusion, Molecular diffusion from an evaporating fluid surface, Introduction to mass transfer in a laminar and turbulem convection, Combined heat and mass transfer, the wet and dry bulb thermometer.   **(6 Lectures)**

   Suggested Text Books & References:-

- Heat & Mass Transfer , R. K. Rajput , S Chand
- Heat & Mass Transfer , S. C. Domkundwar , Dhanpat Rai Publications
- Heat & Mass Transfer , D.S.Kumar , Kataria & sons
- Heat Transfer , R C Sachdeva, New Age International Publications
- Heat Transfer , D.S. Pavarkar, Nishant Publications

ME1507-P   MACHINE DESIGN I LAB   (0-0-3)

List of Experiments:
1.   Design of cotter & Pin Joint.
2.   Design of a Knuckle Joint.
3.   Design of a Shaft.
4.   Design of Spring.
5.   Design of Coupling.
6.   Design of Screw Jack.
7.   Design of Weld Joints.

ME 1508-P   DYNAMICS OF MACHINES LAB   (0-0-3)

List of Experiments:
1. To draw the involute profile of a gear.
2. To determine gear ration of epicyclic gear train by graphical method.
3. Study & use of vibration measuring instruments.
4. To determine natural frequency of longitudinal vibration.
5. To determine critical speed of shaft.
6. To study the Fatigue Testing Machine & to find the no. of cycles at which a material fails.

ME 1511-P   **HEAT & MASS TRANSFER LAB**   **(0-0-3)**

List of Experiments:
1.   Determination of Thermal conductivity of Metal Bar.
2.   Determination of Stefan Boltzman Constant.
3.   Determination of Heat Transfer co-efficient in natural convection.
4.   To determine effectiveness of Tubular Heat Exchanger (Parallel flow & counter flow).
5.   To determine the emissivity of a plate at various temperature.
6.   To determine the Steady State Heat flow through composite bar.

ME 1509-P   **MANUFACTURING TECHNOLOGY - II LAB**   **(0-0-3)**

List of Experiments:
1.   Boring & threading.
2.   Making T – slot by milling.
3.   Shaping V groove.
4.   Polishing of Mild Steel & Aluminum workpiece.
5.   Tool grinding.
6.   Threading cutting.

ME 1510-P   **COMPUTER AIDED DRAFTING**   **(0-0-3)**

List of Experiments:
1.   To learn various commands used in AUTOCAD.
2.   To practice for dimensioning.
3.   To draw machining & welding symbols in drawing.
4.   To draw component of Machine part.
5.   To draw assembly drawing.
6.   Autolist program for Tetrahedron/rectangular box.
7.   Autolist program of a single slider crank mechanism.
8.   Autolist program for drawing "Mohr's circle".
9.   Autolist program to calculate VEL, ACC & DISPL.

HS1505–P   GENERAL PROFICIENCY V   (0-0-0)

Debate, Elocution, Extempore, Group Discussion, Panel Discussion, Presentation – Paper & oral, Allegation & clarification, Quiz / Brain Teaser, Survey Report / Project Report / Case Study, Dissertation, Mock Interview, Expository / Argumentative Report & National Service Scheme (NSS)

B. TECH COURSE STRUCTURE

ELCETRONICS & COMMUNICATION ENGINEERING

6th SEMESTER

RANCHI UNIVERSITY, RANCHI

HS 1601   PROJECT MANAGEMENT & BUSINESS MANAGEMENT   (2-0-0)

I.   PROJECT MANAGEMENT

Concept of Project, Type of project, Project life cycle   **(2 Lectures)**

Project feasibility analysis, Technical feasibility, Choice of technology, financial feasibility, Project budgeting, Geographic feasibility, Location and site selection.   **(4 Lectures)**

Investment analysis, Project appraisal, NPV, IRR, ROI, Payback period, Consideration of risk and uncertainty in the project.   **(4 Lectures)**

Project organization: Role and importance of project manager, Project team structure Task force, selection & training of project manager , Project management information system (PMIS)
          (4 Lectures)

Project planning, Implementation and control, Routing and Scheduling of project, CPM, PERT and GERT, Project Programming Budgeting System (PPBS).   **(4 Lectures)**

II.   BUSINESS MANAGEMENT

Concept, System approach for business management, Social and political aspects on business, Forms of business single proprietorship, Partnership, Joint ventures, Components of business management, Business organization: Kinds of organization, Organization structure, Line, Functional, Staff, Line and staff etc.   **(4 Lectures)**

Financial management

Need of finance, Kinds and source of capital, Shares & debentures, Fixed and working capital, Assets, Financial statements and their importance in business. Financial ratio current ratio, liquidity ratio, equity ratio, inventory ratio, etc. Relation with other departments
(5 Lectures)

Interest and depreciation

Meaning, Compound interest, Annuity – types – capital recovery annuity, present worth annuity, etc., Nominal and effective rate of interest, Depreciation – meaning , kinds and causes, methods of calculating depreciation – straight line, sinking funds method, declining balance method, etc.
          (5 Lectures)

Sales & Marketing

Importance for growth for business, idea or overview of sales & marketing, effect of consumer behavior on business; relationship of marketing with other departments.   **(4 Lectures)**

Purchase Management

Importance and objectives, Functions and duties, purchasing procedure, kinds of purchasing, Relationship with other departments.   **(4 Lectures)**

Suggested Text Books & References:-

- Production Management ,Dr. Prasanna Chandra , TMH Publications

- Production Management, K. Nagarajan , New Age publications

- Production Management, S. Chaudhury , TMH Publications

- Business Management , M. C. SHukla , S. Chand publications

- Industrial & Business Management, Martand, T.Telsang
- Industrial Production management, M.Mahajan

ME 1602   IC ENGINE   (2-0-0)

Fuel cycles real cycles, volumetric efficiency and thermal efficiency, effect of variable specific heats and dissociation on indicator diagram.   **(3 Lectures)**

S.I. Engines

Principles of carburetion, effect of nozzle tip and compressibility, jet size and depression at ventuni – choke and compensation.   **(4 Lectures)**

Combustion in S.I. Engines

Flame development and its propagation, ignition lag, effects of engine parameters, Preignition, combustion chambers.   **(3 Lectures)**

Ignition system

Battery and coil ignition system, Magneto system, spark advancing.   **(3 Lectures)**

Combustion in I.C. Engines

P.O. indicator diagram and their study for various stages of combustion, delay period, combustion chambers.   **(4 Lectures)**

Detonation in I.C. Engines

Various parameters effecting detonation, knock rating of fuel, Octane and centane numbers, H.U.C.R. action of dopes; Valve timing and firing order.   **(3 Lectures)**

Fuel injection system

Air and solid injection, fuel pump and injectors; petrol injection.   **(3 Lectures)**

Supercharging in I.C. Engines

Effect of altitude on power output; types of supercharger.   **(3 Lectures)**

Two Stroke Engines

Constructional detail, scavenging system, valve diagrams, Supercharging.   **(3 Lectures)**

Cooling system

Piston and cylinder temperature distribution; air and water cooling
Lubrication system: Principles, various methods.   **(3 Lectures)**

Testing of Engines

Engine indicator, measure of air and fuel supply, Friction losses, Mechanical and thermal efficiencies, engines losses and heat balance.   **(4 Lectures)**

Compressors

Centrifugal and axial type, Performance.   **(3 Lectures)**

Gas Turbine

Introduction, ideal cycles, regeneration, reheating and intercooling, closed and open even operating variables
Jet propulsion, Principles, turbojet and turboprop Engines.   **(5 Lectures)**

Suggested Text Books & References:-
- I.C. Engines ,R K Rajput, Laxmis Publication
- I.C. Engines ,M. L. Mathur & R.P. Sharma , Dhanpat Rai Publications
- Internal Combustion Engines Colin R. Fergusan „ John Wiley & sens.
- "Internal Combustion Engines , Edward, F. Robert ,Interscience Publishers.
- "I.C. Engines" Agarwal, Khanna Publications
- "Internal Combustion Engine, V Ganesan , TMH.
- I.C. Engines ,R K Singal, Kataria & sons Publications

ME 1603   **MACHINE DESIGN - II**   **(3-0-0)**

Fatigue consideration in design

Variable load, loading pattern, Endurance stresses; influence of size, surface finish notch sensitivity & stress concentration. Goodmann line, Soderberg line, design of machine members, subjected to combined steady & alternating stresses, Design of finite life.   **(10 Lectures)**

Design of gear tooth

Lewis and Buckingham equations, wear and dynamic load consideration, Design & force analysis of spur, helical, bevel & worm gears, Bearing reactions due to gear tooth forces, Detailed design of the fixed ratio gear boxes.   **(10 Lectures)**

Design of sliding & journal bearing, method of lubrication, hydrodynamic, hydrostatic, boundary etc, Minimum films thickness & thermal equilibrium.   **(10 Lectures)**

Design of fly wheels, plate clutches brakes, crank shaft & connecting rod, Design of helical springs, Design of crane hook, C- clamp, machine frame etc.   **(10 Lectures)**

ME 1604   **FLUID MACHINERY**   **(3-0-0)**

Introduction

Classification- energy transfer between fluid and rotor through machines ideal and actual slip.

(6 Lectures)

Hydraulic Turbines

Impulse type – Pelton wheel – Reaction type – Francis, Kalpan and Propeller Principle of operation – regulation and performance – Draft tube   **(12 Lectures)**

Hydraulic Pumps

Radial flow, axial flow and mixed flow type – reciprocating and centrifugal pumps – performance studies – fluid coupling and torque converter   **(12 Lectures)**

Compressors and Blowers

Radial flow an axial flow type – reciprocating and centrifugal compressors applications characteristics

(10 Lectures)

Suggested Text Books & References:-

- Fluid Mechanics , R. K. Bansal, Laxmi Publications
- Fluid Mechanics , R K Rajput , S Chand Publications
- Fluid Mechanics & Machinary, Ojha ,Berndtsson &Chandramouli ,Oxford Publication
- Fluid Mechanics , A.K. Jain, Khanna Publications
- Jagdish Lal, Metropolitan Book Co. Private Ltd
- Fluid Mechanics& Fluid Power Engg , D .S. Kumar , Kataria & sons
- Fluid Mechanics , Vijay Gupta & S.K. Gupta, New Age International Publishers

ME 1605   AUTOMATIC CONTROL   (3-0-0)

Introduction

Meaning and need of automation, Types of automation, Fixed, programmable, flexible, and integrated automation.   **(2 Lectures)**

Components of automation

Actuators, controllers, sensors, Actuators, Solenoids and torque motors, Hydraulic and pneumatic actuators, valves and circuits, Sensors, characteristics, contact and non- contact type, Pressure switches, proximity and position sensors, Encoders.   **(6 Lectures)**
resolvers, synchros, Vision systems, Components of vision systems, image, camera, image capturing systems, processing system, Bar coding and other identification systems, Controllers, Digital and analog control, open and closed loop control, servo systems, servo system analysis and response, control configuration.   **(10 Lectures)**

Logic control and PLCs

Logic control, logic control elements, Programmable logic controllers, Applications, architecture, operation, and programming of PLCs, Typical applications.   **(5 Lectures)**

Automated material handling systems

Automated flow lines, transfer mechanisms, conveyors, robots, Automated guided vehicles, categories, guidance technologies and control, Automated Storage and Retrieval Systems, categories and components.   **(8 Lectures)**

Automated inspection systems

In process gauging systems, Co- ordinate measuring machines, Construction, operational modes and different probes.
Automated assembly systems   **(4 Lectures)**

Factory communication

Interface standards, communication networks, LAN, WAN, Protocols, OSI and MAP

Flexible Manufacturing systems   **(6 Lectures)**

Types, components, architecture and control
Computer integrated manufacturing

Suggested Text Books & References:-

- Automated Production System & computer integrated manufacturing, M. P. Groover,
- Automated manufacturing system , Morriss S. Brian
- Automated Assembly , Boothroyd G. & Poli C
- Computer Integrated Design & manufacturing , David Bed worth etol ,Mc Graw Hill

ME 1606   REFRIGERATION AND AIR – CONITIONING   (3-0-0)

Refrigeration and heating systems
Air refrigeration systems, Bell Coleman air refrigeration cycle, Aircraft air conditioning systems and its performance, steam and air heating systems, piping and accessories.   **(4 Lectures)**

Vapor compression refrigeration
Simple cycle, T-S and p-h charts, analysis of vapor compression cycle, factors effecting performance of vapor compression cycle, actual vapor compression cycle, use of multistage compression, heat exchangers, flash chambers, properties of refrigeration and their suitability. **(8 Lectures)**

Vapor absorption and other refrigeration systems
Description of system components, generator, rectifier, condenser, absorber, heat exchanger and water pump, Aqua ammonia and water Lithium bromide systems.   **(5 Lectures)**

Refrigeration equipment
Constructional details, capacity control and performance of compressors, condensers, evaporators, Expansion device, Purpose.   **(6 Lectures)**

Psychometrics
Psychometric and Psychrometric properties, Psychrometric relations, Psychrometric chart and its use, Psychrometric processes. Humidification and dehumidification, evaporative cooling, Jet water-cooling, air washers and air cleaners, Human comfort, Factor affecting comfort, comfort charts.
          (8 Lectures)

Estimating Requirements
Heating, cooling, humidifying and dehumidifying requirements, loads, Building transmission, infiltration and air charges, Heat gain from people, light, power and duct Winter and summer design conditions, air quantity and temperature requirements.
(5 Lectures)

Automotive Air Conditioning
System location and layout, components, Automotive heaters, air routing and temperature control-objectives, evaporator care air blow through the dash circulating unit duct system, system maintenance.   **(4 Lectures)**

Suggested Text Books & References:-

- Refrigeration and Air conditioning ,S.C. Arora and S.Domkundwar, Dhanpat Rai & Sons
- "Refrigeration and Air conditioning" by R. S. Khurmi , S Chand
- "Refrigeration and Air-conditioning , R. K . Rajput , Kataria & sons
- "Refrigeration and Air-conditioning" C. P. Arora, TMH Publishers.
- "Refrigeration and Air-conditioning" Dr. P L Ballaney , Khanna Publications

ME 1607-P   IC ENGINE LAB   (0-0-3)

List of Experiments:
1.   Determine BHP, Fuel consumption, Nth, air consumption for 2 stroke petrol engine.
2.   Determine Fuel consumption, BHP, Nth, air consumption for 4 stroke petrol engine.
3.   Determine Fuel consumption, BHP, Nth, air consumption for 4 stroke diesel engine.
4.   To determine the various types of efficiencies of a reciprocating air compressor.
5.   To determine the thermal efficiency & heat balance of 2 stroke S.I. Engine.
6.   To determine the thermal efficiency & heat balance of 4 stroke S.I. Engine.

ME 1608-P   MACHINE DESIGN LAB   (0-0-3)

List of Experiments:
1.   Design & draw an open type spurgearing.
2.   Design & draw fixed ratio, helical gear box.
3.   Design & draw worm & worm wheel gear box.
4.   Design & draw journal bearing.
5.   Design & draw plate clutch.
6.   Design & draw machine frame.
7.   Drank shaft design.

ME 1609-P   FLUID MACHINERY LAB   (0-0-3)

List of Experiments:
1. Verification of momentum theory by impact of jet.
2. Determine operating characteristics of an impulse turbine.
3. Determine the operating characteristics of a reaction turbine.
4. Determine the operating characteristics of a reciprocating pump.
5. Determine the operating characteristics of an blower.
6. Determine various types of efficiencies of air compressor.

ME 1610-P   REFRIGERATION & AIR CONDITIONING LAB   (0-0-3)

List of Experiments:

1.   Refrigeration testing, Determination of COP & cooling capacity of refrigeration testing machine.
2.   Preparation of vapor compression – cycles of refrigeration testing machine.
3.   Determination of efficiencies of refrigeration testing machine.
4.   Preparation of
       #   Vapor compressor cycle &
       #   Heal factor of air conditioner
5.   Determination of
       #   H.P
       #   COP &
       #   refrigeration capacity of the air conditioner

HS1606–P   **GENERAL PROFICIENCY VI**   **(0-0-0)**

Debate, Elocution, Extempore, Group Discussion, panel Discussion, Presentation Paper & Oral,
Allegation & clarification, Quiz / Brain Teaser, Survey, Report / Project Report / Case Study,
Dissertation, Mock Interview, Expository / Argumentative Report & National Service Scheme (NSS)

B. TECH COURSE STRUCTURE

ELCETRONICS & COMMUNICATION ENGINEERING

7th SEMESTER

RANCHI UNIVERSITY, RANCHI

ME 1701   **COMPUTER AIDED DESIGN**   **(3-0-0)**

Computer graphics hardware – interactive input and output devices, graphics software, output primitives and their attributes, line drawing and ellipse generating algorithms, interactive picture construction techniques.   **(5 Lectures)**

2D geometric transformations, window, view port and clipping, 3D display methods, 3D object representation   **(5 Lectures)**

Bezier curves and splines, 3D geometric and modeling transformations, 3D viewing, wire frame, surface and solid modeling, Kinematic analysis of open and closed loop mechanisms.
          (10 Lectures)

Purpose and applications of optimum design, formulation and classification of optimization problems, linear programming – simplex method, one dimensional minimization based on elimination and interpolation, unconstrained optimization direct search and descent methods, constrained optimization – penalty function method.   **(10 Lectures)**

Introduction to geometric, dynamic, integer and quadratic programming, computer aided optimum design of machine elements like gears, bearings, shafts and springs. **(10 Lectures)**

Suggested Text Books & References:-

- CAD/CAM- Theory and Practice , Ibrahim Zeid",Tata McGraw Hill
- Geometric Modeling , Michael, E. Mortenson John Wiley and Sons
- Numerical Control and Computer Aided Design ,Kundra, T. K Rao and Tiwari, N.K
- CAD , S.C.Arora

ME 1702 NUMERIC CONTROL OF MACHINE TOOLS AND ROBOTICS (3-0-0)

I. NUMERIC CONTROL:

Introduction to numerical control, components, axes of NC machine tools, open and close loop control, actuation and feedback systems, Point to point, linear and contouring systems, Tooling for NC systems, Steps in NC manufacturing, Machining and turning centers and their features ATC and APC. **(10 Lectures)**

NC programming Input media and coding formats, Manual part programming for lathe, drilling and milling machines, cutter diameter and length compensation, Computer assisted part programming languages APT, EXPAT, ADAPT, COMPACT, CAD/CAM approach of programming.

(10 Lectures)

Computer numerical control, direct and distributed numerical control, adaptive control

(5 Lectures)

II. ROBOTICS:

Industrial robots and their applications for transformational and handling activities Configuration and motions, Actuators, sensors and end effectors, Features like work envelop, precision of movements, weight carrying capacity Robot programming languages. **(10 Lectures)**

Vision systems, Introduction to intelligent robots. **(5 Lectures)**

NUMERICAL CONTROLS

Suggested Text Books & References:-

- Introduction to NC / CNC Machines , S Vishal
- Computer Aided Manufacturing , S Vishal

ROBOTICS

Suggested Text Books & References:-

- Robotics Technology & Flexible Automation , Deb & Deb, TMH publications
- Robotics – Principles & Practice –Dr K C Jain & Dr L N Agrawal , Khanna Publications
- Computer control of Machine tools ,Koren Yorem"
- CAD/CAM , Grover, MP and Zimmer, J.R., Prentice Hall of India.
- " Numerical control and Computer Aided Design ,Kundra, T.K Rao and Tiwari, N.K

ME 1703   AUTOMOBILE ENGINEERING   (3-0-0)

The Automobile
History of development, Automobiles industry in India and abroad, testing of Automobiles, Resistances to motion and power requirement for propulsion.
Automobile Engines
Requirements and classification, materials, constructional details and manufacturing process of engine components, Exhaust manifolds-types-necessity, maintenance problems, materials used.
(4 Lectures)

Frame
layout of chassis, types of chassis frames and bodies, their constructional features, loading points, testing of frames and materials.   **(3 Lectures)**
Transmission system
Necessity of Clutch in automobile, Types of clutches, clutch material, clutch lining Fluid coupling, over running clutch, necessity and field of application, Gear boxes, Necessity of gear box, Construction details of sliding mesh, constant mesh, synchromesh and epicyclic gear boxes, Automatic transmission system, Hydraulic torque converter.   **(7 Lectures)**
Drive Line and Rear Axle
Propeller shaft, universal joints, rear axle drives, Torque reaction, driving thrust, overdrive, Hotchkiss and torque tube drives, rear axle types and construction Principle of differential, types of differential.   **(5 Lectures)**
Wheels and Tires
Types of wheels and tires, Tire construction, functions of tires, solid and pneumatic tires, tire inflation pressure, tire wear and their causes, repair of the tire and tube.   **(4 Lectures)**
Steering System
Steering wheel and steering column, Steering boxes, steering linkages, steering mechanism, under and over steering, Front axle, Steering Geometry wheel alignment, wheel balancing, centre point steering, power steering.   **(6 Lectures)**
Suspension system
Objects and requirement, Types of suspension systems, suspension spring, front and rear suspension systems, Independent suspension system, shock absorber.   **(3 Lectures)**
Brakes
Necessity of brake, theory of brake shoe, Classification and function, self energizing brakes, lining materials, factors influencing operation of brakes such as operating Temperature, using area etc.
(6 Lectures)

Storage Battery
Charging, discharging and testing of battery capacity and efficiency, method of charging from D.C & A.C mains, defects and remedies of battery of idle and new batteries maintenance and storage of batteries.
(2 Lectures)

Starter Motor
Battery motor starting system, series motor and its characteristics, consideration in selecting size of motor , types of drives, starting and generating circuit, solenoid switches.   **(3 Lectures)**

Wiring for Auto Electrical Systems

Wiring Diagrams of typical wiring systems and wire loops   **(2 Lectures)**.

Suggested Text Books & References:-

- Automobile Engineering - K. N. MOEED – Kataria & Sons
- Automobile Engineering - R. K. Rajput- Lakshmi Publication N Delhi
- Automobile Engineering - Dr. Kirpal Singh-Standard Publication
- Automobile Engineering - K.K. Ranalingarm, Distribution SciTech Publication
- Automobile Engineering - R K Singal – Kataria & Sons
- Automobile Engineering - G B S Narang – Khanna Publications

ME1704-P   COMPUTER AIDED DESIGN   **(0-0-3)**

<u>**List of Experiments**</u>**:**
1.   Power transmission by interference feet.
2.   Design of gears by 'C Program'.
3.   Selection of bearing.
4.   Design of shaft.
5.   Design of thick cylinder.
6.   Design of spring.
7.   '3 D modeling & analysis of stresses'.
8.   'C' Program for design of Flange coupling.

ME1705-P   NUMERIC CONTROL OF MACHINE TOOLS & ROBOTICS   (0-0-3)

List of Experiments:
1.   Development of camp profile.
2.   Development of drilling jig.
3.   Development & machining of irregular shapes machine parts.
4.   Determination of joint velocities of a robot.

ME1706-P   AUTOMOBILE ENGINEERING LAB   (0-0-3)

List of Experiments:
1.   To study & practice of " Stearing system".
2.   To study & practice of "Ignition system".
3.   To study & practice of "Transmission system".
4.   To study & practice of "Suspension system".
5.   To study & practice of "Braking system".
6.   To study & practice of "Chassis" (frame).
7.   To study & analysis of lubrication & cooling system.

HS1707–P   **GENERAL PROFICIENCY VII**   **(0-0-0)**

Debate, Elocution, Extempore, Group Discussion, panel Discussion, Presentation Paper & Oral, Allegation & clarification, Quiz / Brain Teaser, Survey, Report / Project Report / Case Study, Dissertation, Mock Interview, Expository / Argumentative Report & National Service Scheme (NSS)

OPEN ELECTIVE - I

Sl. No.	Code	Paper
01	HS2731	Enterprise Resource Management
02	CS2731	E-Commerce Strategic IT
03	HS2732	Technology Management
04	HS2733	Decision Support and Executive Information System
05	CS2732	Software Technology
06	HS2734	Industrial Pollution Control

Professional Elective – I

Sl. No.	Code	Paper
01	MH2731	Finite Element Analysis
02	ME2732	Energy Engineering
03	ME2733	Manufacture and a Inspection of Gears
04	ME2734	Computer Integrated Manufacture
05	ME2735	Entrepreneurship Development
06	ME2736	Composite Materials
07	ME2737	Mechatronics Engineering
08	ME2738	Welding Technology

HS2731   ENTERPRISE RESOURCE MANAGEMENT

Manufacturing Industry- Management Characteristics and Information Requirements

Industry Classification, product/market/process characteristics, manufacturing planning and control techniques, ERP concept and Evaluation History: MRP-I,MRP-II ERP. Information Technology Advancement: Client Server Technology, RDBMS.

Sales, Purchase and Inventory Control, Concepts

Classification/coding of material and finished goods, sales enquiry, quotation, order, invoicing, delivery , finished good valuation, purchase requisition, enquiry, supplier quotation , purchase order, material receipts, material issues, method of issue valuation (FIFO/LIFO/weighted Average cost/ std. cost), Returns from operations, return to supplier, stock adjustments, physical stock verification, ABC analysis. Lot and Location control, Replenishment order control (Safety stocks, report point, economic order quantity).

Manufacturing

Product configuration, Bill of material, Master production scheduling, Material requirement planning, capacity requirement planning, loading and scheduling. An overview of man power planning and customer manufacturing planning.

Financial and Cost Accounting

Basic account principles, Day book –cash, Bank, Journal, Purchase and Sales. Ledger- general, supplier, customer, advances etc. Bank reconciliation, Trial balance, profit and loss/income and expenditure account and balance sheet. Fixed asset and depreciation. Budget- Revenue, capital cash, cost element- direct material, direct labour, direct expenses and overheads. Margin at costing and break even analysis, standard costing, activity based costing.

Introduction to A Typical ERP software

Overview of ERP modules and tools of a software like BAAN.

Distribution Module

Module architecture- an overview, Item data, Purchase ordering/ control, sales ordering/ control, Replenishment order control, Electronic data interchange.

Manufacturing Module

Module architecture- an overview, Capacity requirement, planning, engineering change control, engineering data management, master production scheduling, material requirement planning, production classification/ configuration, production planning/control, repetitive manufacturing.

Finance Module

Module architecture- an overview, accounts payable, account receivable, general ledger, cost allocation, cash management, activity based costing, fixed assets, financial budgeting system.

Suggested Text Book and References:

- Joseph Orlicky, "Materials Requirement Planning, the New Way in Production and Inventory Management". McGraw Hill Book Company, New Delhi, 1975.
- BaaN Student Manual, BaaN Education center, Hyderabad.1996.

CS 2721 E-COMMERCE, STRATEGIC IT

Module I

Element of E-commerce: Doing business on the internet. The scope of internet and the web, to reach customers. Benefits of E-commerce market.

Module II

E-business Models and Markets: E-business Models, E-business markets. Traditional build approach and vendors, online sales channels, Advantages of outsourcing an infrastructure to an ECIP.

Module III

E-commerce website development: Web site server, Developing a commerce site, Building the site, implementation.

Module IV

Building Shopping Cart Application: A shopping cart scenario, A customer Servlet, A Real World Application Model, Loose component coupling.

Module V

Mobile E-commerce: Wireless industry standards, wireless communication platforms for LANs, wireless WANs, Faculties for wireless Environment, Concerns for Mobile Enterprise.

Module VI

Security Issue: Security Solution: Symmetric and Asymmetric Cryptosystems, RSA, DES and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronics cash over internet, Internet Security.

Module VII

Electronics Payments Technology: Issue, Smart Cards, Digital Currencies.

Text Books/Reference Books

1. Electronics Commerce – Pete Loshin & John, Vacca – Publication
2. Electronics Commerce from vision to fulfillment - AWAD, PHI Publication
3. Electronics Commerce By – R. Geol – New Age International Publication
4. E-Commerce – T.N. Chhalra & R.K. Suri - Dhenpatrai

HS 2722 TECHNOLOGY MANAGEMENT

Module I
Definition-scope-components, History of technology developments-Issues in managing new technology, Life cycle approach to technology management.

Module II
Approaches to forecasting, Technology performance parameters. Use of Experts in technology forecasting, planning technological process, Morphological analysis of a Technology system.

Module III
Techno-Economic feasibility study, Application of multi-criteria decision making techniques in technologies evaluation and selection-AHP, fuzzy AHP.

Module IV
Modes of global technology transfer-Technology–Human Interface-Organization structures and Technology Implementation issues in new technology.

Module V
Introduction to IPR Act, effectiveness and management of patents, Trademarks and copy rights.

Text Books/Reference Books:

1. Handbook of Technology Management ,Gerard H.Gaynor , McGraw-Hill.
2. "Forecasting and Management of Technology",Alan L. Porter, A. Thomas Roper, Thomas Wimason , Jery Banks,Fredrick A. Rossini.

CS 2722 SOFTWARE TECHNOLOGY

Module I

White-box and black box testing, Test Case Generation, Integration Testing Bottom-up & Top-down Testing, System Testing, Foundation Testing, Performance Testing, Acceptance Testing, Installation Testing, Theoretical Foundation of Testing, Formal Verification, Test Tools.

Module II

Module Introduction, objectives of Usability, How to approach usability, designing with usability in mind, Measuring usability, Guidelines for user interface design.

Module III

Software Reliability: Reliability, Hazard, Repair and Availability, Steady-state Availability, Estimation of residual errors, Reliability Models, Software Complexity.

Module IV

Issues in Project Management – Management Functions, Software Project Management Plan, Software Management Structures, Personal Productivity, Software Project Complexity.

Module V

Software Matrix – Basic Considerations Size Oriented, Function Point Oriented, Software cost estimation techniques. Algorithmic cost modeling. The COCOMO Model.

Module VI

Software project scheduling and the establishment of relationship among the different tasks. Tasks, dependencies and conflict resolution. Resources management and allocation.

Text Books/Reference Books

1. Software Quality Management, John D. Cooper, Matthew J. Fisher
2. Software Quality Management, M. Ross
3. Software Engineering Management, John C. Munson
4. Software Engineering Project Management, R.Chopra, S.K. Kataria & Son
5. Software Engineering: - Sajan Mathew, S. Chand

HS 2724 KNOWLEDGE MANAGEMENT

Module I
Knowledge society-from data to information to knowledge- Drivers of knowledge management-Intellectual capital- KM and learning organizations- case studies.

Module II
Strategic alignment- creating awareness- articulation- Evaluation and strategic alignment - Infrastructural development and deployment- Leadership, measurement and refinement- Role
of CKO.

Module III
Analyzing business environment-knowledge audit and analysis – designing KM team – creating KM system blue print- implementation- capture –store and sharing.

Module IV
Technology components- Intranet and Groupware solutions- tools for collaborative intelligence, Social networking-package choices- knowledge security.

Module V
Integrating with web -based and internal operational & support systems- change management- reward systems- continuous improvement- case studies.

Text Books/ Reference Books:
1. "HBR on Knowledge Management", Peter Drucker, Harvard University Press.
2. "Knowledge Management", Fernandez, Gonzalez & Sabherwal, Pearson.

FINITE ELEMENT ANALYSIS

MODULE I

Introduction : Structural analysis, static, objection dynamic and kinematic analyses, skeletal and continuum structures, modeling of infinite d.o.f. system into finite d.o.f. system, basic steps in finite element problem formulation, general applicability of the method. (5 Lectures)

MODULE II

Element Types and Characteristics: Discretization of the domain, basic element shapes, aspect ratio, shape functions, generalized co- ordinates and nodal shape functions. ID spar and beam elements, 2D rectangular and triangular elements, axisymmetric elements. (5 Lectures)

MODULE III

Assemble of Elements and Matrices : Concept of element assembly, global and local co-ordinate systems, band width and is effects, banded and skyline assembly, boundary conditions, solution of simultaneous equations, Gaussian elimination and Choleksy decomposition methods, numerical integration, one and 2D applications. (5 Lectures)

MODULE IV

 Higher Order and Isoparametric Elements: One dimensional quadratic and cubic element, use of natural co-ordinate system, area co-ordinate system continuity and convergence requirements,2D rectangular and triangular requirements. (5 Lectures)

 MODULE V

Static Analysis: Analysis of trusses and frames, analysis of machine subassemblies, use commercial software packages, advantages and limitations.   (5 Lectures)

MODULE VI

Dynamic Analysis: Hamilton's Principle, derivation of equilibrium, consistent and lumped mass matrices, derivation of mass matrices for ID elements, determination of natural frequencies and mode shapes, of commercial software packages.   (5 Lectures)

Suggested Text Books & References

- Rao, S.S., " the Finite Element Method in Engineering", 2nd ed…, Peragamon Press, Oxford, 1989
- Robert, D. Cook., David, S. Malkins, and Michael E. Plesha, "Concepts and Application of finite Element", 3rd ed., john Wiley
- Chandrupatla, T.R. an Belegundu, A.D., "Introduction to Finite Elements in engineering ", Prentice Hall of India Pvt. Ltd., 1991

ME2733　　　Manufacture and a Inspection of Gears

Introduction to Gears

Types of gears, classification, gear drawing, gear boxes, application of gears, gear production methods, an overview.

Gear Materials

Non metallic, ferrous and non ferrous gears, properties of gear materials, selection of material for typical gears and applications-blank preparation methods for different gears, size, type and materials.

Production of Cylindrical Gears

Gear milling, different gears, cut quality obtainable, Gear hobbing, description and operation of machine, types of gears cut, hobbing cutters, work holding methods-gear shaping, disc type and rack type gear shapers, description of machine, types of green cut, gear shapper cutter.

Production of Conical Gears

Production of straight bevel gears and spiral gears, milling, generation by straight bevel gear generator, duplex cutter, straight bevel generator, Gleason Reva cycle method, spiral bevel gear generator, description of machine, cutter, cutter setting and cutting of gears.

Heat Treatment of Gears

Through hardening, case hardening, flame hardening, induction hardening of gears-nitriding of gears, tuft riding of gears, inspection of gears for hardening defects.

Gear Finishing

Gear finishing advantages, finishing of gears by grinding, shaving, lapping, honing, methods and cold rolling of gears, Description of machines, process and process parameters.

Gear Inspection

Types of gear errors, gear quality standards, tooth thickness and base tangent length measurement, pitch errors, radial runout errors, profile errors, pitch error measurement, composite error measurement, computerized gear inspection centers, reason and remedial of gear errors.

Modern Gear Production Methods

Gear production by stamping, die casting, powder metal process, injection and compression moulding in plastics, cold and hot rolling, mass production methods, shear speed shaping, gear broaching-Gleason G-trac gear generation method.

Suggested Text Books and References:

- HMT, "production Technology", TMH India, 1992.

- Watson, "Modern Gear pergaman Press", Oxford, 1984.

- Wech, M., "Handbooks Tools", Vol. I, John Wiley and Sons, 1984.

- Society of Manufacturing Engineers, "Gear Processing and Manufacturing", 2nd Edition, 1984.

ME 2734   COMPUTER INTEGRATED MANUFACTURE

Introduction

Evolution of CAD/CAM and CIM, scope of CIM, segments of generic CIM, computers and workstations, an overview of CIM software's. (4)

Product Development through CAD and CAE

Geometric modeling techniques, automated drafting, graphic standards. Engineering analysis, optimization, principles of concurrent engineering. (4)

Automated Process Planning

Process planning, general methodology of group technology, code structures variant and generative process planning methods, AI in process planning, process software. (4)

CNC Technology

Principles of numerical control, types of CNC machines, features of CNC systems, programming techniques, capabilities of a typical NC CAM software, integration of CNC machines in CIM environment, DNC-Flexible manufacturing systems. (5)

Manufacturing System Software

MRP II software production control software, forecasting, master production schedule, materials requirements planning, capacity requirements planning, capacity requirement planning, stop floor control, shop floor data collection technique, inventory management, purchase order and receiving, financial control, bill of materials, standard product routing, job costing, marketing application. (5)

Robotics and Automated Quality Control

Types of robotics and their performance capabilities, programming of robots, hardware of robots, kinematics of robots, product design for robotized manufacturing, selecting assembly machines, feeding and transfer of arts, applications of robots in manufacture and assembly, sensors. (5)

Simulation and Automated Quality Control

Types of simulation, simulation methodology, simulation languages and packages, application, statistical process control, objectives pf CAQC types of CMM, non contact inspection methods, in process and post process metrology, flexible inspection systems.

(4)

Data Communication and Technology Management

Technology issues, configurations management, database systems, management of technology, networking concepts, LAN, MAN and WAN, SQL fundamentals, MAP/TQP fundamentals, CIM models, IBM Siemens, DEC,ESPRIT-CIM OSA model, economics of CIM, implementation of CIM.   (5)

Suggested Text Books and References:

- Radhakrishnan, P.,"Computer Integrated Manufacturing", Deptt. Of Mechanical & Production Engineering, PSG College of technology .1992
- Eric Teichols and Joel Orr, "Computer Integrated Manufacturing Hand Book", McGraw Hill Book Co.1989.
- Paul, G.Ranky, "Computer Integrated Manufacturing", 1985.

ME2735   ENTERPRENEURSHIP DEVELOPMENT

Need, Scope and Characteristics of Entrepreneurship

Special schemes for entrepreneurs, exposure to demand based, resource based, service based, import substitute and export promotion industries, identification of opportunities.

Market Survey Techniques

Need, scope and approaches for project formulation, criteria for principles of product selection and development, structure of project report, choice of technology, plant and equipment.

Institutions, Financing Procedure and Financial Incentives

Financial ratios and their signicance, books of accounts, financial statement and funds flow analysis.

Energy Requirement &Utilization

Resource management, men, machine and materials, critical path method (CPM)-project evaluation review technique (PERT) as planning tools for establishing SSI.

Techno-Economic, Fesability of the project

Plant layout and process planning for the product, quality control/quality assurance and testing of product, costing and pricing.

Elements of Marketing & Sales Management

Nature of product and Market strategy, packing and advertising, after sales service, social responsibility and business ethics.

Important Provisions of Factory Act

Sales of good act, partnership act, income tax, sales tax and excise rules, licensing, registration, municipal bye laws and insurance coverage.

Dilute Control, Creativity and Innovation

Problem solving approach, strength weakness opportunity the threat (SWOT) techniques, management of self and understanding human behavior, coping with uncertainties, stress management and positive reinforcement.

Suggested Text Books and References:

- Chandra, Prasana"Project-Preparation, AAPRAISAL and Implementation", Tata McGraw Hill, New Delhi, 1990.
- Kotler, Philip" Marketing Management", Prentice Hall, 1990.
- Chandra, Prasana"Fundamentals of Financing Management", Tata McGraw Hill Publication, 1995

ME2736   **COMPOSITE MATERIAL**

MODULE I

Definition and classification of composites, MMC, PMC, CMC.   (3 Lectures)

MODULE II

Reinforcing fibers- Natural fibers (cellulose, jute, coir etc), boron, ceramic, glass, aramids, polyethylene (UHMWPE), polybenz-thiazoles etc.   (6 Lectures)

MODULE III

Particulate fillers-importance of particle shape an size.   (3 Lectures)

MODULE IV

Matrix resins-thermoplastics and thermosetting matrix resin.   (4 Lectures)

MODULE V

Coupling agents-surface treatment of fillers and fibers, significance of interface in composites.

(5 Lectures)

MODULE VI

Nanocomposites, short and continuous fiber reinforced composites, critical fibers length, anisotropic behavior, SMC, BMC, and DMC etc.   (5Lectures)

MODULE VII

Fabrication techniques pultrusion, filament winding, prepreg technology, injection and compression moulding, bag moulding, resin transfer moulding, reaction injection moulding.

(6 Lectures)

MODULE VIII

Properties and performance of composites. Applications.   (3 Lectures)

Suggested Text Books and References:

1. K.K.Chawla, Composite Materials- Science & Engineering, Springer-Verlag, New York, 1987.
2. F.L.Mattews and R.D. Rawlings, Composite Materials: Engineering and Science, Chapman & Hall, London, 1994.
3. Dr. N.Chand, Tribology of Natural fiber Composites, Wood Head publishing Limited, England.

ME   **MECHATRONICS   ENGINEERING**

MODULE – I

Fundamental Of Mechatronics Definition and Concepts of Mechatronics, Conventional system Vs. Mechatronics System, Need and Role of Mechatronics in Design, Manufacturing and Factory Automation.   (6 Lectures)

MODULE – II

Hardware components for Mechatronics, Binary logic, K-MapMinimization, Transducer signal

Conditioning and devices for data conversion   (5 Lectures)

MODULE – III

PLC Lader programming, counting Jumps timers.   (4 Lectures)

MODULE – IV

Signals, systems and control Introduction to signals, system and control system, system Representation, Linearization of Non-linear systems, Time Delays, Measures of system Performance.   (6 Lectures)

MODULE – V

Sensors and Transducers   Different parameters of sensor performance, types of sensors used in Mechatronic systems.   (6 Lectures)

MODULE – VI

Structure and Properties of Materials: Macroscopic physical properties, Microscopic properties.

                                                              (6 Lectures)

MODULE - VII

Real time Interfacing and Mechatronic application: Data Acquisition systems, Advance Application in Mechatronics, Condition monitoring, Micro-sensors artificial intelligence fuzzy logic.

                                                              (12 Lectures)

 Suggested Text Books and References:

1. Mechatronics System Design by Devdas Shetty, Richard A. Kolk, PWS Publishing

   Company (1997).

2. Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering 2nd

   Edition by W. Bolton (2002).

B. TECH COURSE STRUCTURE

ELCETRONICS & COMMUNICATION ENGINEERING

8th SEMESTER

RANCHI UNIVERSITY, RANCHI

ME 1801   POWER PLANT ENGINEERING   (3-0-0)

Introduction: Power and energy, sources of energy, review of thermodynamic cycles related to power plants, fuels and combustion, steam generators and steam prime movers, steam condensers, water turbines.   **(6 Lectures)**

Variables Load Problem: Industrial production and power generation compared, ideal and realized load curves, terms and factors, Effect of variable load on power plant operation, methods of meeting the variable load, Power plant economics and other considerations in plant selection.
(6 Lectures)

Steam power plant: Power plant boiler including critical and super critical boilers fluidized bed boilers, boilers mounting and accessories, general layout of a steam power plant different systems such as fluid handling system, combustion system, draft, ash handling system, feed water treatment, regenerative systems, condenser and cooling system, turbine auxiliary systems such as governing, feed heating, turbine mountings, lubrication, flange heating and gland leakage. Operation and maintenance of steam power plant, heat balance and efficiency trouble shooting and remedies.
(10 Lectures)

Diesel power plant: General layout, performance of diesel engine, fuel system, lubrication system, air intake and admission system, supercharging system, exhaust system, cooling system, diesel plant operation and efficiency, heat balance, trouble shooting and remedies.
                                                                                    (6 Lectures)

Gas turbine power plant: Elements of gas turbine power plants, regeneration and reheating, cogeneration, Auxiliary systems such as fuel, controls and lubrication, operation and maintenance performance and trouble shooting and remedies.   **(5 Lectures)**

Nuclear power plant: Principles of nuclear energy, basic components of nuclear reactions nuclear power station, troubleshooting and remedies.   **(2 Lectures)**

Hydro electric station: Principles of working, applications, site selection classification and arrangement of hydro-electric plants, runoff size of plant and choice of units, operation and maintenance, hydro systems, interconnected systems, trouble shooting and remedies.

                                                                                    (5 Lectures)

Suggested Text Books & References:

- Power Plant Engg , R.K.Rajput , S Chand
- Power Plant Engg , Arora & Domkundwar , Dhanpat Rai Publications
- Power Plant Engg , Tech max publication
- Power Plant Engg , P C Sharma , Kataria & sons
- Power Plant Engg , - P.T. Morse

SEMESTER VIII

ME1802　　　　　　OPERATIONS RESEARCH　　　　　(3-0-0)

Introduction to Operations Research

Formulation of problems, simplex method of degenerals, dual simplex method, revised simplex method, bounded variable problems.　　　　　　　　(4 Lectures)

Integer Programming

Graphical method, the branch and bound technique, Gomary's ALL-IPP method, transportation model, unbalance in transportation, transshipment problem, sensitivity analysis in transportation problems.　　　　　　　　(5 Lectures)

Dynamic Programming

Bellman's principle of optimality, examples of the application of routing problem, inventory problem, simplex problem, marketing problem.　　　　　　　　(5Lectures)

Network Analysis

PERT and CPM, probability of achieving completion data, cost analysis, graph reduction Theory, updating, resource allocation, resource smoothing.　　　　　　　　(4 Lectures)

Inventory Method

Variables in an inventory problem, inventory problem, inventory models with penalty, storage and quantity discount, safety stock, inventory models with probability, demand, multi item deterministic model.　　　　　　　　(4 Lectures)

Queuing Theory

Poison arrivals and exponential service times, waiting time and idle time cost, single channel, multichannel problem. Monte Carlo technique applied to queuing problems, Poisson arrivals and service time**.**　　　　　　　　(4 Lectures)

Decision Theory Game

Examples on the application of theory of games, 2XM and MX2 problems, graphic dominance and linear programming method for different problems, decision trees.　　　(5 Lectures)

Replacement Models

Replacement of items that deteriorate gradually, fail suddenly, group replacement policy, concept of system reliability.　　　　　　　　(4 Lectures)

Suggested Text Books and References:-

- **Kumar Gupta, Prem and Hira,D.S.,"Operations Research", S Chand & Company Limited**
- **Swarup, Kanti, Gupta, P.K., and Manmohan," Operations Research", Sultan Chand & Sons,**
- **Srinath L.S., "PERT & CPM Principles and Applications", Affiliate East West Press (P) Limited,**

Semester VIII

HS1803–P   GENERAL PROFICIENCY VIII   (0-0-0)

Debate, Elocution, Extempore, Group Discussion, panel Discussion, Presentation Paper & Oral, Allegation & clarification, Quiz / Brain Teaser, Survey, Report / Project Report / Case Study, Dissertation, Mock Interview, Expository / Argumentative Report & National Service Scheme (NSS)

HS 2724 KNOWLEDGE MANAGEMENT

Module I
Knowledge society-from data to information to knowledge- Drivers of knowledge management-Intellectual capital- KM and learning organizations- case studies.

Module II
Strategic alignment- creating awareness- articulation- Evaluation and strategic alignment - Infrastructural development and deployment- Leadership, measurement and refinement- Role
of CKO.

Module III
Analyzing business environment-knowledge audit and analysis – designing KM team – creating KM system blue print- implementation- capture –store and sharing.

Module IV
Technology components- Intranet and Groupware solutions- tools for collaborative intelligence, Social networking-package choices- knowledge security.

Module V
Integrating with web -based and internal operational & support systems- change management- reward systems- continuous improvement- case studies.

Text Books/ Reference Books:
3. "HBR on Knowledge Management", Peter Drucker, Harvard University Press.
4. "Knowledge Management", Fernandez, Gonzalez & Sabherwal, Pearson.

CS – 2831 IT IN MARKETING MANAGEMENT

Module I
Core concepts of marketing -Need, Want & Demand, Product, value and satisfaction, Marketing & Markets. Production concept, Product concept, Selling concept, Marketing concept etc.

Module II
Macro and Micro factors in the marketing environment, Macro features like demography, economic features, socio technological environments etc. Micro features like supplier's competitors etc.

Module III
A model for consumer buying Behaviour, factors influencing consumer behavior, buying decision process- Buying roles & stages in buying.

Demand Estimation: flow to measure market demand - Estimating market size, share, potential, Estimating current and future demands.

Module IV
Segmentation: Approach. Patterns and Segmentation procedures, basis for segmenting consumer market - Targeting - positioning.

Module V
New product Development - Idea generation, Idea screening concept development and using, Product development. market testing etc.

Module VI
Marketing strategies in the various stages of the PLC (Product Life Cycle) Strategies to be followed in the introduction, growth, maturity and decline stages.
Market Planning Process - stages. - The nature and contents of marketing plan (introductory aspects).

Text Books/Reference Books:

1. Marketing management,Grover & T.N Chhalsa,Dhanpatrai.
2. Marketing management,K. Philip & Kellv,PHI.
3. Marketing management,Kelvin,Hartley,Berkowatz,Rudelius,Tata McGraw Hill(New Delhi)

CS – 2832 IT IN HUMAN RESOURCE MANAGEMENT

Module I
Introduction, meaning, significance of HRM. Environmental influence, HRM-mission, objective, strategy and tactics, evolution and development.

Module II
HR Planning: integrated strategic planning, process of HR and control review mechanism, Recruitment: Objective, strategies sources, techniques, process and assessment. Selection, placement and Induction: Procedures.

Module III
Development: Concept, significance, framework, functions. Performance Appraisal: Concept, objectives, system, and methods feed back and counseling. Employee and Executive Training and Development: Essential ingredients of T &D, Training procedures.

Module IV
Techniques evaluation and feedback. Career Planning & Development-Planning and development counseling.

Module V
Job Evaluation: Concept, methods, advantages & disadvantages. Reward systems : Terminologies, role of wage differentiation, mechanism of wage and salary Administration; Executive compensation issues, fringe benefits.

Module VI
Introduction, objective, conditions for Healthy Industrial Relations; Trade unions: functions, role, future. Grievance procedure and Disciplinary procedures. Collective Bargaining. Industrial conflicts: definition, reasons, resolution machinery. Workers participation in Management.

Text Books/ Reference Books

1. "Human resources Management", Cary dessler, Prentice Hall of India.
2. "Human resoursces & personal Management", K. Ashwathappa,Tata McGraw Hill.
3. "Human resource Management",T.N. Chhalos,Dhanpatrai.

CS – 2833 IT IN FINANCIAL MANAGEMENT

Module I
Financial management-Concepts- scope- Need- Time value of money- Valuation concepts—Recent development in the domain of financial management.

Module II
Financial statement analysis- Break even analysis –Employment of these concepts for managerial decisions.

Module III
Capital Budgeting — cost of capital concepts capital structure- designing capital structure- Capital structure theories. NI, NOI, MM approach -New Financial Instruments .

Module IV
Financing decisions – operating, financial combined leverages- capital markets, - term loan financing-other types like leasing, hire purchase. - Dividend Theories & Policies.

Module V
Working capital management-planning-financing- inventory, cash, receivables management.

Text Books/ Reference Books:
1. " Financial Management", Khan. M.Y, Jain.P.K, Tata Mc Graw Hill.
2. " Financial Management Principles and applications", ArthurJ.Keown, Pearson.
3. " Fundamentals of Financial Management", James C.Vanhorne ,JohnM,Wachowicz, Pearson Education.

HS 2832 HUMAN VALUES

The objectives of the course is an exploration of human values which go into making a 'good' human being, a 'good' human society and a 'good' life. The context is the work life and the personal life of modern Indian professionals.

Course Structure

1. The value-crisis in the contemporary Indian Society.

2. The nature of values: The value spectrum for a 'good' life.

3. The Indian system of values.

4. Material development and its values: the challenge of science and technology.

5. Psychological values: integrated personality; mental health.

6. Societal values: the modern search for a 'good' society; justice, democracy, rule of law; values in the Indian constitution.

7. Aesthetic values: perception and enjoyment of beauty.

8. Moral and ethical values; nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

9. Work ethics; professional ethics, commitment =, valuing time.

10. Spiritual values; different concepts; secular spirituality.

11. Relative and absolute values.

12. Human values; humanism, human rights; freedom creatively, love and wisdom, courage, integrity, honesty, living peacefully, respect for others.

13. Management by values: professional excellence; inter-personal relationship at work place; leadership and term building; caring sharing; conflict resolution and stress management; management power.

Text Books/Reference Books

- ➢ Code of practice for corporate member; Institute of Engineers 1994
- ➢ Human values – professional Ethics, Ritu Soryan- Dhanpat Rai & Co.

HS 2833 SCIENCE TECHNOLOGY AND SOCIETY

The course deals with social, human and ethical implications of engineering and technology, with special reference to the Indian situation. Its three main components are:

- Social and Cultural history of technology,
- Social and Human critiques of technology,
- Engineering Ethics and Professional Ethics,

Course Structure:

Module I

i)   Science, Technology and Engineering, a tool for social and professional activities.
ii)   Technology growth vs social, economic and cultural growth.
iii) Ancient, medieval and modern technology/Industrial revolution and its impact.

Module II

i)   Social and Human critiques of technology.
ii)   Rapid technological growth and depletion of resources, sustainable development.

Module III

i)   Energy crisis; renewable energy recourses.
ii)   Environmental degradation and pollution. Eco-friendly technologies. Environmental regulation.

Module IV

i)   Technology and the arms race. The nuclear threat.
ii)   Appropriate technology movement.
iii) Technology and the developing nations. Problems of technology transfer.

Module V

i)   Human operator in engineering projects and industries. Problems of man machine interaction.
ii)   Industrial hazards and safety. Safety regulations.

Module VI

i)   Politics & technology: Authoritarian vs democratic central of technology, social and ethical audit of industrial organizations.
ii)   Engineering profession – Ethical issues in engineering practice, business demands and professional ideals, code of professional ethics.

MACHINE TOOL DESIGN

Introduction: Kinematics of different types of machine tools, selection of cutting conditions and tools, calculations of cutting force on single point and multipoint tools, hole machining, calculation of power, accuracy requirements and standards   (4 Lectures)

MODULE II

Design of rotary drives: Design of spindle drives, AC motors with stepped drive, DC and AC variable speed drive motors characteristics and selection, principle of speed controllers, timing belts and other types of transmission belting, pulleys, closed loop operation of main drives, rotary indexing drives.   (4 Lectures)

MODULE III

Design of feed drives: Feed drive using feed boxes, axes feed drive of CNC drives, DC and AC servomotors. Types characteristics controllers and their selection, ball screws and friction screws-guide ways, linear motion systems, design calculations of drives, closed loop operations of feed drives, linear indexing drives.   (4 Lectures)

MODULE IV

Control elements: Single and multi axis CNC controllers, hydraulic control, pneumatic control limit switches, proximity switches, sequencing control using hard wired and PLC systems.   (4 Lectures)

MODULE V

Design of machines tool structures: Static and dynamic stiffness, dynamic analysis of cutting process, stability, forced vibration, ergonomics and aesthetics in machine tool design.   (4 Lectures)

MODULE VI

Design of spindle and spindle supports: Function of spindles, design requirements, standard spindle noses, design calculations of spindles, bearing selection and mounting. (4 Lectures)

MODULE VII

Finite elements analysis of M/C tool structures: Examples of static, dynamic and thermal analysis and optimization of typical machine tool structures like column and using a finite element analysis package. (4 Lectures)

MODULE VIII

Design of special purpose machines : Modular design concepts, standard modules, example of design of a typical SPM with CNC, transfer machines. (4 Lectures)

Suggested text Books and references:

- Mehta, N.K., "Machine Tool Design "Tata McGraw hill Book Co. 1991.
- ANSYS 5.0 Manual" Swanson Associates, USA,1993.
- Macherkan, "Machine Tool Design", Vol I and Vol III Mir Publishers, Moscow, 1973

HYDRAULIC CONTROL

MODULE I

Introduction to fluid power Advantages of fluid power systems. Properties of hydraulic fluids, selection of hydraulic fluids, hydraulic symbols. (4 Lectures)

MODULE II

Pumps and motors: Characteristics and selection of hydraulic pumps and motors, fixed and variable displacement operation, calculation of flow, torque and power, hydrostatic transmission systems. (4 Lectures)

MODULE III

Elements of hydraulic systems : Types, construction and mounting methods of hydraulic cylinders, calculation of area and flow are based on system force and velocity requirements, construction, selection and application of values for control of direction, flow and pressure.

(6Lectures)

MODULE III

Accessories of hydraulic systems: Design of hydraulic power packs, pipes of main and return lines, pipe fittings, calculations involving the use of accumulators, intensifiers, selection and application of seals and pickings. Hydro mechanical servo systems, electro hydraulic servo systems, proportional valves, application for hydraulic servo systems, maintenance of hydraulic systems. (6 Lectures)

MODULE IV

Sequential circuit design Sequencing module, fringe condition modules, cascade method, step counter method. Typical industrial applications of oil hydraulics. Hydraulic circuits for declaration, regenerative circuits, differential circuits, feed circuits design, selection of elements, sizing of pipes, design of power packs. (7 Lectures)

MODULE V

Design of hydraulic circuits: Total design of a hydraulic circuit for linear drive applications In a SPM- specification of the circuit, design, selections of elements, sizing of pipes, design of power packs. (4 Lectures)

MODULE VI

Design of electrical sequencing circuits: Ladder diagrams, introduction to the use of PLCs for sequence control in hydraulic circuits. (4 Lectures)

Suggested test books and references:

- Esposito," Fluid Power with Application", Prentice Hall Inc., 1988.
- Lal Anthony," Oil Hydraulics in the service of Industry", Allied Publishers, 1982

ME 2833 EXPERIMENTAL MECHANICS

Elementary elasticity

Stress, Stress equations of equilibrium, principle stresses, stress strain relations, principle strains.

Brittle coating methods

Coating stress, brittle coating crack patterns, crack detection, test procedures, calibration, and analysis.

Stain gauges

Electrical resistance strain gauges, semi conductor strain gauges, strain gauge circuits, recording instruments, analysis of strain gauge data.

Moire methods

Mechanism of formation of Moiré fringe, geometrical approach to moire fringe analysis, displacement field approach to moiré fringe analysis, out of plane measurements experimental procedure.

Photo elasticity methods

Temporary double refraction, stress optic law, effects of stressed model in plane polariscope, fringe multiplication.

Two dimensional photo elasticity

Isochromatic fringe patterns, isoclinic fringe pattern, compensation techniques, calibration methods, separation methods, scaling model to prototype stresses, materials.

Three dimensional photo elasticity

Locking in model deformations, materials, shear difference method, scattered light method.

Birefringent coatings

Coating stresses and strains, sensitivity, materials and applications, effects of thickness, stress separation.

ME2834   AUTOMATIVE CHASSIS AND TRANSMISSION

Types of automobiles

The scope for automobile industries in india, general classification of vehicles, types of automobiles, layout of automobile, subsystems of automobile,front, rear and four wheel drives, general frame construction, Integral chassis

Suspension system

Objectives and characteristics, quarter, semi and three quarter elliptic leaf springs, helper springs, torsion bar, coil springs, linked suspension system, air springs, rubber springs, hydro elastic springs, rigid axle suspension system, independent suspension, need for shock absorbers, principle of construction and working of shock absobers.

Front Axle and Steering System

Front axle, types of sub axle, principles of steering, Ackerman steering, centre point steering, steering geometry and wheel alignment, caster, camber and kingpin inclination, toe-in and toe-out, steering system layout, types of steering gear boxes, power steering.

Wheels and Tyres

Types of wheels and brake drums, cross play and radial ply tyres-tyres specification tyre wear and maintenance.

Transmission Line

Cardan shaft, universal joints, constant velocity joints, rear axle, types of live rear axle, quarter, semi and three quarter floating axles, two speed axles, hub reduction axles, tandem axles, differential and differential lock.

Braking System

Principle of braking, types of brakes, mechanical breaking system, hydraulic brake system, vacuum suspended type, hydraulic servo system, compressed air brake system, drum and disc brakes.

The Clutch

Need for a clutch, cone clutch-diaphragm clutch, single plate and multiplate clutches, centrifugal clutches, fluid coupling, factors affecting the power transmitted by a clutch, clutch plate, clutch Linkage, clutch pedal adjustment.

The Gear Box

The need for a gear box, rolling, air and gradient resistances, sliding, constant and synchromesh gear boxes,3,4 and 5 speed gear boxes, hydrodynamic torque converter, free wheel drive and over drive. Automatic gear boxes, variator drives.

Recent advances

Activate and passive suspension, rear independent suspension-McPherson strut with coil spring, Tiltable and collapsible steering, four wheel steering, Air bags, Bumpers and crumbles, Power windows and central locking systems, adjustable seats, Door release mechanism, Multi valve engines, Sensors and computer controls, petrol injection, Catalytic converters, crash studies and safety analysis.

Newer Materials and Surface Treatments

Materials, Composite materials, magnesium, lithium alloy, aluminium alloy, recyclable materials and their extent of usage. Surface coatings, corrosive, wear and temperature resistant coatings, decorative coatings, metallic and reflective painthings, interior insulations.

ME2835   PUMPS, FANS BLOWERS AND COMPRESSORS

PUMPS

Theory of centrifugal pump impeller, votex theory, design of impeller, volute and diffusers, specific speed and design constants.   (4)

Design of mixed flow impellers

Geometric relationship, axial flow pumps, design, use of aerofoil data for impeller design, guided vane, pump casting.   (4)

Fans

Fan laws, performance coefficients, effect of change in fan speed, density. Series and parallel operation, fan design losses, blade shape, castings.   (4)

Propeller Fans

Cross flow fans, principle of operation, applications, regulation of volume flow. Source of vibration in fans, noise, attentution testing.   (4)

Blowers

Types, centrifugal and axial, design procedure, selection, performance, special application, control of volume flow.   (4)

Performance Estimation

Instrumentation test rig layout, measurement of pressure, temperature, use of hot wire anemometer, boundary layer probes, measurement of sound.   (4)

Compressors

Centrifugal compressor, multistage arrangement, blade design, types diffusers, performance, series and parallel operation.   (4)

Axial Flow Compressors

Cascade theory, efficiency, two dimensional cascade, velocity triangles and stage loading, stage reactions, losses compressor testing procedure.   (5)

Suggested Test Books and References:

- Val, S.Lobanoff, and Robert, R.Ross,"Centrifugal Pumps Design and Application", Jaico Publishing House, Madras, 1996.
- Allam Wallis, R.,"Axial Flow and Ducts", John Wiley &Sons, 1983.
- Ronald, P.Lapina,"Estimating Centrifugal Compressor Performance", Gulf Publishing Company, 1982.

ME2836   COST ESTIMATION AND OPTIMISATION

Cost Accounting-Cost Estimation

Concepts, differences, steps involved, Different types, cost grid uses.

Labour and Materials Costs

Labour cost direct indirect, Estimation Labour cost variance Material cost direct indirect **Estimation** Material cost variance

Overhead cost

Element in Overhead cost, various method of absorbing Overhead cost, MHR calculation Overhead variance problem, introduction to activity based costing method

Cost calculations

Machined components, welded components, and cast components forged components, calculations of sales cost, case studies, and use of computers in cost Estimation.

Cost optimization

Cost optimization techniques Analytical, graphical, incremental methods for single and multi variable situations, learning curve.

Optimum machining conditions

Taylor's equation deriving the equation for optimum economic cutting velocity, selection of cutting speed for optimum cost, process capability analysis.

Break even analysis

Concepts, applications and area of use, value analysis steps in selection, analysis and implementation.

Group technology and productivity

Group technology, objectives, steps, methods of condification, productivity concepts labour, machine, and material based productivity

Suggested text books and references

- Frederic, C.Jelen, Cand James, H.Black. "Cost optimization engineering"

   McGraw Hill International Book Company, New Delhi, 1983.

- Narang, C.B.S. and Kumar, "Production and casting" Khanna Publishers New Delhi, 1985.
- Samuel Elion, Elements of Prediction and Control", MacMillan, 1985
- ASME," Manufacturing Planning and Estimation- Hand Book "McGraw Hill Book Company Inc. 1963.
- Hazlehurst, M.," Manufacturing Technology ", ELBS, 1985

ME2837   TEROTECHNOLOGY/MECHATRONICS ENGINEERING

Maintenance Organization

Types of maintenance-planned and preventive maintenance, break down and predictive maintenance, history card. Selection of maintenance types for various industries like power plant, steel plant, chemical plant. Maintenance and repair schedules, uptime, down time, maintenance of spare parts and control. (6)

Introduction to Reliability/Failure Concepts

An introduction to reliability, definition of reliability and failure, bath-tub curve, early failure period, life cycle, wear out failure period. (4)

Reliability

A took for Preventive Maintenance programme, maintainability, availability, MTBF and MTTR, Weibull distribution to describe the bath-tub curve, redundancy and standby redundancy. (4)

Methods of Lubrication

Need for lubricant change, change periods, visual examination of used lubricant oils, and laboratory tests for used mineral oils. (4)

Introduction to Vibration Analysis

Vibration parameters, vibration analysers/instruments, data presentation, survey chart, data interpretation. (4)

Contaminant Analysis

Spectrometric oil analysis procedure, ferrography, performance monitoring techniques, magnetic chip detectors. (4)

Failure Analysis

Plain bearing failures, rolling element bearing failure, gear failures and seal failures. (3)

Maintenance Management

Computerized maintenance management system, case studies, single unit like diesel generator and industry like steel plant. Housekeeping, safety aspects, updating of spares and training of maintenance personnel. (5)

Suggested Text Books and References
- Gandhi, O.P., and Chawla, O.P.,"Reliability, Availability and Maintability", IIT Delhi, 1997.
- Collact, R.A.,"Mechanical Fault Diagnosis and Condition monitoring", Chapman and Hall, London, 1977.

ME2838   PROJECT ENGINEERING

Project feasibility Analysis

Marketing, Technical, and Financial Feasibility Report preparation

Project Management

Nature, Scope, PERT, CPM Techniques, Principles, Applications.

Internal Time Value of Money

Simple interest, compound interest, present worth uniform series payments, Use of interest tables, nominal and effective interest rates, continuous compounding payment, uniform gradient.

Depreciation

Reasons for depreciation, causes of reclaiming values, depreciation methods, comparisons with accounting of time value of money and without it.

Methods of Tangible Evaluation of Alternatives

Equivalent annual worth comparisons, present worth comparisons, return comparisons.

Method of forecasting

Need for forecast –statistical method, time series analysis, method of least squares, moving average method, curvilinear trend, and correlation analysis

Replacement policy

Item deteriorating with time and items that fail completely (replacement police for new and old machine with infinite horizon.

Risk Analysis

Risk in economic analysis , measuring risk investment, risk profiles , decision trees, formulation of discounted decision tree, simulation.

Suggested Text Book and references

- James, Roggs," Engineering Economics", McGraw Hill Book Co., 1982
- James, L.Pappas, and Eugene, F. Brigham," Managerial Economics." Holt Rinehaut and Winston Ltd.,1983.
- Norman, N. Barish., Economic Analysis for Engineering", McGraw Hill Book Company, 1978.
- Chandra, Prasanna" Projects" Tata McGraw Hill 1996.

ME2839   NUCLEAR POWER GENERATION AND SAFETY

MODULE I

Description of nuclear power plants and operation   (3 Lectures)

 MODULE II

Thermodynamics of nuclear power, Nuclear power cycles.   (3 Lectures)

MODULE III

Fluid system analysis and introduction to two-phase flow.   (3 Lectures)

MODULE IV

Heat transfer and fluid flow phenomena in rod bundles, Heat transfer with phase change.

(5 Lectures)

MODULE V

Quenching and rewetting phenomena in rod bundles, Hydrodynamics of countercurrent two-phase flow.   (5 Lectures)

MODULE VI

Nuclear reactor accidents, Loss of coolant accident and emergency core cooling system.

(5 Lectures)

MODULE VII

Principles and methods used in safety evaluation of complex engineered systems, Safety characteristics of LWR and BWR, Safety culture.   (6 Lectures)

MODULE VIII

Safety improvements in nuclear reactors, Waste management, Indian nuclear power programme.   (5 Lectures)

Essential Reading:

1. M.M.El. Wakil, Nuclear Power Engineering, McGraw Hill Book Company, New York, 1987.
2. S. Glasstone and A. Setonske, Nuclear Reactors Engineering- CBS Publishers and Distributors, 1992.
3. T.J. Connoly, Fundamentals of Nuclear Energy- John Wiley, 1978.
4. J.H. Rust, Nuclear Power Plant Engineering, Haralson Publication Company.

ME2841   **CRYOGENIC ENGINEERING**

MODULE I

Definition of cryogenics, applications- industrial gases, LNG.   (3 Lectures)

MODULE II

Space propulsions, superconducting devices.   (3 Lectures)

MODULE III

Properties of Fluids and Materials at low temperature.   (3 Lectures)

MODULE IV

Refrigeration and Liquefaction cycles- Linde, Claude, Stirling, GM, and their derivatives.

(8 Lectures)

MODULE V

Storage of cryogenic liquids, design of storage vessels.   (3 Lectures)

MODULE VI

Vacuum Technology- definition, production and measurement of vacuum. (5 Lectures)

MODULE VII

Multilayer insulation and application   (5 Lectures)

MODULE VIII

Superconductivity and superconducting devices.   (5 Lectures)

Essential Reading:

1. K.D. Timmerhaus and T.M. Flynn, Cryogenic Process Engineering, Plenum Press, 1989.
2. A.R. Jha, Cryogenic Technology and Application, Butterworth-Heinemann, 2006.

ME 2842   SPECIAL CASTING TECHNIQUES

Introduction to special Casting Techniques

Shell Moulding

Shell moulding, Process, shell moulding machines, pattern equipment, sands, resins and other materials used in shell moulding, application of shell moulding, advantages of shell moulding over other method.

(8)

Centrifugal Casting

Principle of centrifugal casting, types of centrifugal casting processes, calculation of mould rotary speed, techniques, equipment used and production processes, advantages and limitations of centrifugal casting methods.
(8)

Investment Casting

Introduction, pattern and mould materials used, techniques and production of investment moulds and castings, application of investment casting process, advantages and limitations of investment casting.

(5)

Die Casting

Die Casting processes, Die Casting machines, operations and details, die materials, metal cast by die casting method, advantages and limitations of die casting.   (8)

Recent Development

Low pressure die casting, squeeze casting, Rheocasting, V process, high pressure moulding etc.   (8)

EC 2831   ROBOTICS ENGINEERING

MODULE -I
Introduction to Robotics, Classification of Robotics, Robot components, Robot degree of freedom, Robot Reference frames and coordinate system, Robot languages, Robot application.   (5 Lectures)

MODULE -II
Robotic Kinematics: Robot as Mechanisms Representation of Transformation and Inverse of Transformation Matrices, Forward and Inverse kinematics of Robot.   (5 Lectures)

MODULE -III

Denavit – Hartenberg Representation of Formal kinematic equation of Robots, Inverse kinematic solution & programming of Robots, Degeneracy and Dexterity.   (5 Lectures)

MODULE -IV

Differential Motions and velocities: Differential Relationships, Jacobian, Differential changes between frames. Differential Motions of Robot and its Hand frame.   (5 Lectures)

MODULE -V

Dynamic Analysis and Forces, Dynamic equations for Multi-degree of freedom Robots, Static Force Analysis of Robots. Transformation of forces and Moments between Design Project.   (5 Lectures)

MODULE -VI

Trajectory Planning: Path Vs Trajectory, Joint space Vs Cartesian space Descriptions, Basics of Trajectory planning, Joint-space Trajectory planning, Cartesian space trajectory.
                                                      (5 Lectures)

MODULE -VII

Actuators & Sensors: Characteristics of Actuating system, Comparison of Actuating systems, Hydraulic Devices, Pneumatic Devices, Electrical motor Microprocessor control of Electric Motors, Sensor Characteristics, position velocity, acceleration, Force & pressures,Torque, Micro switches, Touch and Tectile, light and infra red, proximity sensors.   (7 Lectures)

Text Books:
1. Introduction to Robotics Analysis System Application by S.Niku, Pearson Education Publication.

Reference Book:
1. Introduction to Robotics by John J. Craig, Pearson Education Publication.
2. Robotic Engineering by Richard D. Klafler, Thomas S.A. Chmielewski & Michael Negin, Prentice Hall India Ltd. Publication.

Introduction

Approach of industrial design, element of design, structure of industrial design in engineering application in modern manufacturing system.

Ergonomics and Industrial Design

Introduction, general approach to the man- machine relationship, workstation design, working position.

Control and Displays

Shapes and sizes pf various controls and displays, multiple display and control situation, design pf major controls in applications in ergonomics design of office furniture, redesign of instruments.

Ergonomics and Product Design

Ergonomics and automated system, expert system for Ergonomics Design, anthropomorphic data and its application in Ergonomics design, limitations of anthropomorphic data, used of computerized database.

Visual Effects of Line and Form

The machine of vision, psychology of vision, general influences of line and form.

Colour

Colour and light, colour and objects, colour and the eye, colour consistency, colour term, reactions to colour and colour continuation, colour on engineering equipments.

Aesthetic Concepts

Concepts of unity, concept of order with variety , concept of purpose, style and environment, aesthetic expressions, style-components of style, house style, observing style in capital goods.

Industrial Design in Practice

General design situation, specifying design requirements, rating the importance of industrial design, typical industrial design projects.

Suggested Text Books and References:

- Mccormick, K.J., (Ed.) "Human Factors Engineering"-4th ed., McGraw Hill Book Company Ltd., USA, 1992.
- Brian Shackel (Ed.), "Applied Ergonomics Handbook", Butterworth Scientific, London1982.
- Mayall, W.H,"Industrial Design for Engineers", London Iiifee Book Ltd.1967.
- Dale Huchingson, R., "New Horizons for Human Factor in Design", McGraw Hill company 1981.
- Robert, W. Bailey,"Human performance Engineering ", Prentice Hall Inc. New Jersey. 1982.

ME 2845   **THERMAL ENGINEERING**

 MODULE - I

Definitions and Elementary concepts of Thermodynamics, Zeroth law of Thermodynamics

and its significance. Concept of heat and worr and Properties of Ideal gas.   (8 Lectures)

MODULE- II

First law of Thermodynamics and its applications to non-flow and steady flow systems.

(6 Lectures)

MODULE- III

Second law of Thermodynamics, Concepts of heat engines, refrigerator and heat pump.

Concept of Entropy, Entropy changes for various reversible processes.   (6 Lectures)

MODULE - IV

Cycles – Carnot cycle, Otto cycle, Diesel cycle, Joule/Brayton cycle, Rankine cycle. Vapour

compression refrigeration cycle and its C.O.P.   (4 Lectures)

MODULE - V

Principle of I.C. engines, Two-stroke and four stroke cycle engines, indicated and brake

power.   (4 Lectures)

MODULE - VI

Principles of steam Turbine, Impulse and Reaction turbines, Velocity diagrams.   (5 Lectures)

MODULE - VII

Heat transfer, one dimensional steady state conduction. Application to composite walls and

cylinders, Critical thickness of insulation, Forced and free convection. Radiation heat transfer.

(8 Lectures)

 Suggested Text Books and References:

1. An Introduction to Thermodynamics – P.K. Nag

2. Engineering Thermodynamics – R.K.Rajput

3. Thermal Engineering – P.L. Ballaney

4. Thermal Engineering – R.K. Rajput

5. Thermal Engineering – A.S. Sarao