ACADEMIC REGULATIONS
PROGRAM STRUCTURE
and
DETAILED SYLLABUS

Bachelor of Technology
(Mechanical Engineering)

(Effective for the students admitted from the Academic Year 2014-15)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

Gokaraju Rangaraju
Institute of Engineering and Technology, Hyderabad
Department of Mechanical Engineering(B.Tech)
GR14 Regulations

Gokaraju Rangaraju Institute of Engineering &Technology 2014 Regulations (GR14 Regulations) are given hereunder. These regulations govern the programmes offered by the Department of Mechanical Engineering with effect from the students admitted to the programmes in 2014-15 academic year.

1. **Programme Offered:** The programme offered by the Department is B.Tech in Mechanical Engineering, a four-year regular programme.

2. **Medium of Instruction:** The medium of instruction (including examinations and reports) is English.

3. **Admissions:** Admission to the B.Tech in Mechanical Engineering Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the State Government/University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in the common entrance examination conducted by the Government/University or on the basis of any other order of merit approved by the Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. **Programme Pattern:**
   a) Each Academic year of study is divided into two semesters.
   b) Minimum number of instruction days in each semester is 90.
   c) The total credits for the Programme is 200.
   d) All the registered credits will be considered for the calculation of the final percentage of marks.

5. **Award of B.Tech Degree:** A student will be declared eligible for the award of B.Tech Degree if he/she fulfills the following academic requirements:
   a) A student shall be declared eligible for the award of B.Tech degree, if he/she pursues the course of study and completes it successfully in not less than four academic years and not more than eight academic years.
   b) A student has to register for all 200 credits and secure all credits.
   C) A student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the date of admission, shall forfeit his/her seat in B.Tech course.

d) The degree of B.Tech in Mechanical Engineering shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, on the students who are admitted to the programme and fulfill all the requirements for the award of the degree.

6. Attendance Requirements:

a) A student shall be eligible to appear for the semester-end examinations if he/she puts in a minimum of 75% of attendance in aggregate in all the courses concerned in the semester.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above but less than 75%) in a semester may be granted. A committee headed by Dean, Academic Affairs shall be the deciding authority for granting the condonation.

c) Students who have been granted condonation shall pay a fee as decided by the Academic Council.

d) Shortage of Attendance more than 10% (attendance less than 65% in aggregate) shall in no case be condoned.

e) Students whose shortage of attendance is not condoned in any semester are detained and are not eligible to take their end examinations of that semester. They may seek re-registration for that semester when offered next with the academic regulations of the batch into which he/she gets re-registered.

7. Paper Setting, Evaluation of Answer Scripts, Marks and Assessment:

a) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the Academic Council from time to time.

b) Distribution and Weightage of Marks

S.No.		End exams (External)	Internal	Total
1	Theory	70	30	100
2	Practical	50	25	75
3	Engineering Graphics	70	30	100
4	Industry Mini Project	50	25	75
5	Comprehensive Viva	100	-	100
6	Seminar	-	50	50
7	Project	150	50	200

c) Continuous Internal Evaluation and Semester End Examinations
The assessment of the student's performance in each course will be based on continuous internal evaluation and semester-end examinations. The marks for each of the component of assessment are fixed as shown in the following Table.

Assessment Procedure

S.No	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Examinations
1	Theory	30	Internal Exams & Continuous Evaluation	1) Two mid semester examinations shall be conducted for 20 marks each for duration of 2 hours. Average of the two mid exams shall be considered i) Subjective - 15 marks ii) Objective - 5 marks 2) Tutorials - 5 marks 3) Attendance - 5 marks
		70	Semester-end examination	The semester-end examination is for a duration of 3 hours
2	Practical	25	Internal Exams & Continuous Evaluation	1) Lab Internal :10 marks 2) Record : 5 marks 3) Continuous Assessment : 5 marks 4) Attendance : 5 marks
		50	Semester-end examination	The semester-end examination is for a duration of 3 hours.

d) Industry Oriented Mini Project: The Mini Project is to be taken up with relevance to Industry and is evaluated for 75 marks. Out of 75, 25 marks are for internal evaluation and 50 marks are for external evaluation. The supervisor continuously assesses the student for 15 marks (Attendance – 5 marks, Continuous Assessment – 5 marks, Report – 5 marks). At the

end of the semester, Mini Projects shall be displayed in the road show at the department level for the benefit of all students and staff and the same is to be evaluated by the Mini Project Review Committee for 10 marks. The Mini Project report shall be presented before Project Review Committee in the presence of External Examiner and the same is evaluated for 50 marks.
Mini Project Review Committee consists of HOD, Mini Project Coordinator and Supervisor.

e) Comprehensive Viva: The Comprehensive Viva shall be conducted by a Committee consisting of HOD and two senior faculty members of the department. The student shall be assessed for his/her understanding of various courses studied during the programme of study. The Viva-Voce shall be evaluated for 100 marks.

f) Seminar: For the seminar, the student shall collect information on a specialized topic and prepare a technical report and present the same to a Committee consisting of HOD, two senior faculty and the seminar coordinator of the department. The student shall be assessed for his/her understanding of the topic, its application and its relation with various courses studied during the programme of study for 50 marks.

g) Major Project: The project work is evaluated for 200 marks. Out of 200, 50 marks shall be for internal evaluation and 150 marks for the external evaluation. The supervisor assesses the student for 25 marks (Attendance – 5 marks, Continuous Assessment – 15 marks, Report – 5 marks). At the end of the semester, Projects shall be displayed in the road show at the department level for the benefit of all the students and staff and the same is to be evaluated by the Project Review Committee for 25marks. The external evaluation for Project Work is a Viva-Voce examination which is conducted by the Project Review Committee in the presence of external examiner and is evaluated for 150 marks.
Project Review Committee consists of HOD, Project Coordinator and Supervisor.

h) Engineering Graphics

- Two internal examinations, each is of 20 marks .The average of the two internal tests shall be considered for the award of marks.
- Submission of day to day work - 5 marks.
- Attendance - 5 marks.

8. Recounting of Marks in the End Examination Answer Books: A student can request for re-counting of his/her answer book on payment of a prescribed fee.

9. **Re-evaluation of the End Examination Answer Books:** A student can request for re-evaluation of his/her answer book on payment of a prescribed fee.

10. **Supplementary Examinations:** A student who has failed in an end semester examination can appear for a supplementary examination, as per the schedule announced by the College/Institute.

11. **Malpractices in Examinations:** Disciplinary action shall be taken in case of malpractices during Mid/ End-examinations as per the rules framed by the Academic Council.

12. **Academic Requirements:**
    a) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or laboratories if he/she securesnot less than 35% of marks in the Semester-end Examination and a minimum of 40% of the sum total of the Internal Evaluation and Semester-end examination taken together.
    b) A student shall be promoted from II year to III year; or from III year to IV year only if he/she fulfills the academic requirements of minimum credits from the following examinations whether the candidate takes the examination or not.

Phase	Minimum Credits	No. of Examinations				
		I-I	I-II	II-I	II-II	III-I
II to III Year	37	2 Regular 1 Supply	1 Regular 1 Supply	1 Regular —	--- ---	--- —
III to IV Year	62	3 Regular 2 Supply	2 Regular 2 Supply	2 Regular 1 Supply	1 Regular 1 Supply	1 Regular

13. Award of Class: After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B. Tech Degree by Jawaharlal Nehru Technological University Hyderabad, he/she shall be placed in one of the following four classes (the marks awarded are from the aggregate marks secured for the 200 credits):

Class Awarded	% of Marks Secured
First Class with Distinction	Marks ≥ 70%
First Class	60% ≤ Marks < 70%
Second Class	50% ≤ Marks < 60%
Pass Class	40% ≤ Marks < 50%

14. **Withholding of Results:** If the student has not paid dues to the Institute/ University, or if any case of indiscipline is pending against him, the result of the student (for that Semester) may be withheld and he will not be allowed to go into the next Semester. The award or issue of the Degree may also be withheld in such cases.

15. **Transfer of Students from the Constituent Colleges of JNTUH or from other Colleges/ Universities:** Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities shall be considered only on case-to-case basis by the Academic Council of the Institute.

16. **Transitory Regulations:** Students who have discontinued or have been detained for want of attendance, or who have failed after having undergone the Degree Programme, may be considered eligible for re-admission/re-registration to the same or equivalent subjects as and when they are offered.

17. **General Rules**
    a) The academic regulations should be read as a whole for the purpose of any interpretation.
    b) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
    c) In case of any error in the above rules and regulations, the decision of the Academic Council is final.
    d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

Academic Regulations GR14 for B.Tech (Lateral Entry)

(Effective for the students admitted into II year from the Academic Year 2015-16)

1. All regulations as applicable for B.Tech Four year degree programme (Regular) will hold good for B.Tech. (Lateral Entry Scheme) except for the following rules:

a) Pursued a programme of study for not less than three academic years and not more than six academic years(para2(a))

b) Registered for 150 credits and secured 150 credits. The marks obtained in all 150 credits shall be considered for the calculation of the final percentage of marks (para2(b))

c) Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech programme (para2(c))

2. Academic Requirements

A student shall be promoted from III year to IV year only if he/she fulfills the academic requirement of minimum credits from the following examinations whether the candidate takes the examination or not (para 12(b)).

Phase	Minimum Credits	No. of Examinations		
		II-I	II-II	III-I
III to IV Year	37	2 Regular 1 Supply	1 Regular 1 Supply	1 Regular —

3. Award of Degree or Class

After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B. Tech Degree by Jawaharlal Nehru Technological University Hyderabad, he/she shall be placed in one of the following four classes (the marks awarded are from the aggregate marks secured for the 150 credits):

Class Awarded	% of Marks Secured
First class with Distinction	Marks ≥ 70%
First class	60% ≤ Marks < 70%
Second class	50% ≤ Marks < 60%
Pass class	40% ≤ Marks < 50%

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
B.Tech (ME) PROGRAMME STRUCTURE

I B.Tech (ME) **I Semester**

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Marks
BS	GR14A1001	Linear Algebra and Single Variable Calculus	2	1	-	3	4	100
BS	GR14A1002	Advanced Calculus	2	1	-	3	4	100
BS	GR14A1008	Engineering Chemistry	2	1	-	3	4	100
ES	GR14A1023	Engineering Graphics	1	-	2	3	5	100
ES	GR14A1018	Basic Electrical Engineering	3	1	-	4	5	100
ES	GR14A1012	Engineering Mechanics-STATICS	2	1	-	3	4	100
HS	GR14A1024	Business Communication and soft skills	-	-	2	2	4	75
ES	GR14A1026	IT Workshop	-	-	2	2	4	75
BS	GR14A1030	Engineering Chemistry lab	-	-	2	2	4	75
		Total	**12**	**5**	**8**	**25**	**38**	**825**

I B.Tech (ME) **II Semester**

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Marks
BS	GR14A1003	Transform Calculus and Fourier Series	2	1	-	3	4	100
BS	GR14A1004	Numerical Methods	2	1	-	3	4	100
BS	GR14A1006	Physics for Engineers	2	1	-	3	4	100
ES	GR14A1005	English	2	1	-	3	4	100
ES	GR14A1011	Computer Programming and data structures	2	1	-	3	4	100
ES	GR14A1020	Engineering Mechanics -DYNAMICS	3	1	-	4	5	100
HS	GR14A1025	Engineering Workshop	-	-	2	2	4	75
ES	GR14A1029	Engineering Physics Lab	-	-	2	2	4	75
BS	GR14A1028	Computer Programming and data structures Lab			2	2	4	75
		Total	**13**	**6**	**6**	**25**	**37**	**825**

II B.Tech (ME) **I Semester**

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Marks
BS	GR14A2011	Probability and Statistics	2	1	-	3	4	100
PC	GR14A2019	Kinematics of Machinery	3	1	-	4	5	100
PC	GR14A2020	Mechanics of Solids	3	1	-	4	5	100
PC	GR14A2021	Engineering Thermodynamics	3	1	-	4	5	100
PC	GR14A2022	Material Science and Metallurgy	3	1	-	4	5	100
PC	GR14A2023	Machine Drawing Lab	-	-	2	2	4	75
PC	GR14A2024	Material Science and Metallurgy Lab	-	-	2	2	4	75
PC	GR14A2025	Mechanics of Solids Lab	-	-	2	2	4	75
		Total	**-**	**-**	**-**	**25**	**36**	**725**
MC	GR14A2002	Value Education and Ethics	-	-	-	0	4	75
		Total	**14**	**5**	**6**	**25**	**40**	**825**

II B.Tech (ME) **II Semester**

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Marks
HS	GR14A2026	Electrical and Electronics Technology	2	1	-	3	4	100
PC	GR14A2027	Production Technology	3	1	-	4	5	100
PC	GR14A2028	Fluid Mechanics and Hydraulic Machinery	3	1	-	4	5	100
PC	GR14A2029	Internal Combustion Engines	3	1	-	4	5	100
PC	GR14A2030	Advanced Mechanics of Solids	3	1	-	4	5	100
PC	GR14A2031	Production Technology Lab	-	-	2	2	4	75
PC	GR14A2032	Electrical and Electronics Technology Lab	-	-	2	2	4	75
	GR14A2033	Fluid Mechanics and Hydraulic Machinery lab	-	-	2	2	4	75
		Total	**-**	**-**	**-**	**25**	**36**	**725**
MC	GR14A2001	Environmental Science	-	-	-	0	4	75
		Total	**14**	**5**	**6**	**25**	**40**	**825**

III B.Tech (ME) **I Semester**

Group	Sub-Code	Subject	L	T	P	C	H	Marks
HS	GR14A2104	Managerial Economics &Financial Analysis	2	1		3	4	100
ES	GR14A3026	Machine Design	3	1		4	5	100
ES	GR14A3027	Applied Thermodynamics	3	1		4	5	100
ES	GR14A3028	Dynamics of Machinery	3	1		4	5	100
ES	GR14A3029	Machine Tools	3	1		4	5	100
HS	GR14A3100	Advanced English Communication Skills Lab			2	2	4	75
ES	GR14A3030	Thermal Engineering Lab			2	2	4	75
ES	GR14A3031	Machine Tools Lab			2	2	4	75
		TOTAL	**14**	**5**	**6**	**25**	**36**	**725**

III B.Tech (ME) **II Semester**

Group	Sub-Code	Subject	L	T	P	C	H	Marks
ES	GR14A3032	Design of Machine Members	3	1		4	5	100
ES	GR14A3033	Heat Transfer	3	1		4	5	100
ES	GR14A3034	Metrology and Surface Engineering	2	1		3	4	100
ES	GR14A3035	Industrial Management	3	1		4	5	100
	Open Elective		**3**	**1**		**4**	**5**	**100**
ES	GR14A3036	Automobile Engineering						
ES	GR14A3037	Mechatronics						
ES	GR14A3038	Power Plant Engineering						
SPW	GR14A3101	Industry Oriented Mini Project			2	2	4	75
ES	GR14A3039	Heat Transfer Lab			2	2	4	75
ES	GR14A3040	Metrology Lab			2	2	4	75
		TOTAL	**14**	**5**	**6**	**25**	**36**	**725**

IV B.Tech (ME) — I Semester

Group	Sub-Code	Subject	L	T	P	C	H	Marks
ES	GR14A4039	Basic Finite Element Methods	3	1		4	5	100
ES	GR14A4040	CAD/CAM	3	1		4	5	100
ES	GR14A4041	Operations Research	2	1		3	4	100
		Elective -I	3	1		4	5	100
ES	GR14A4042	Flexible Manufacturing System						
ES	GR14A4043	Robotics						
ES	GR14A4044	Instrumentation and Control Systems						
		Elective -II	3	1		4	5	100
ES	GR14A4045	Unconventional Machining Processes						
ES	GR14A4046	Renewable Sources of Energy						
ES	GR14A4047	Computational Fluid Dynamics						
ES	GR14A4048	CAD/CAM Lab			2	2	4	75
ES	GR14A4049	Instrumentation and Control Systems Lab			2	2	4	75
ES	GR14A4050	Production Drawing Practice			2	2	4	75
		TOTAL	**14**	**5**	**6**	**25**	**36**	**725**

IV B.Tech (ME) — II Semester

Group	Sub-Code	Subject	L	T	P	C	H	Marks
ES	GR14A4051	Refrigeration and Air Conditioning	2	1		3	4	100
		Elective -III	**2**	**1**		**3**	**4**	**100**
ES	GR14A4052	Production Planning and Control						
ES	GR14A4053	Plant Layout and Material Handling						
ES	GR14A4054	Tribology						
		Elective -IV	**2**	**1**		**3**	**4**	**100**
ES	GR14A4055	Mechanical Vibrations						
ES	GR14A4056	Nuclear Power Plant						
ES	GR14A4057	Optimization Techniques						
ES	GR14A4058	CAM and Simulation Lab			2	2	4	75
SPW	GR14A4142	Comprehensive Viva			2	2	4	100
SPW	GR14A4143	Seminar			2	2	4	50
SPW	GR14A4144	Major Project			10	10	10	200
		TOTAL	**6**	**3**	**16**	**25**	**34**	**725**

I-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

LINEAR ALGEBRA AND SINGLE VARIABLE CALCULUS

Course Code: GR14A1001 L:2 T:1 P:0 C:3
I Year I Semester

Unit-I

Linear Algebra and Matrix eigen value problem: Rank of a matrix,Consistency of a system of linear equations-Pseudo inverse of a matrix-Condition number of a matrix-Approximate solution of an over determined system of linear equations using the pseudo inverse-Solution of a system of homogeneous linear equations.

Vector norms, Linear dependence of vectors, Gram-Schmidt orthogonalization of vectors, Matrix norms.Determination of eigen values and eigen vectors of a square matrix-Properties of eigen values and eigen vectors of real and complex matrices.

Unit-II

Matrix factorizations and Quadratic Forms: Diagonalization of a matrix-Orthogonal diagonalization of symmetric matrices-Computation of matrix powers- Computation of Singular value decomposition - QR factorization.

Quadratic forms-Definiteness of a quadratic form-Rank, index and signature of a quadratic form- Reduction of a quadratic form into a canonical form by Lagrange's method and by an orthogonal transformation.

Unit-III

Differential Calculus of functions of a single variable: Mean value theorems (Rolles', Lagrange's, Cauchy's, Taylor's and Maclaurin's theorems Geometrical Interpretation without proof) - Approximation of functions by Taylor's and Maclaurin's theorems-Series expansion of functions.

Unit-IV

Linear differential equations of the first order and their applications: Formation of ODE-Methods to solve first order LDE (exact, reducible to exact, linear and Bernoulli equations).

Applications - Growth and decay models - Newton's law of cooling - Applications to electrical circuits (LR and RC circuits) - Geometrical applications - Orthogonal trajectories.

Unit-V

Linear differential equations of the higher order and applications: Equations

with constant coefficients-Particular integrals for functions of the type e^{ax}, x^n, sinax, cos ax, e^{ax}.V(x) Exponential shift - Method of variation of parameters.

Applications - Deflection of beams, Simple harmonic motion (simple pendulum, spring-mass systems) and RLC circuits.

Teaching Methodologies

1. Tutorial sheets uploaded in website
2. NPTEL video lectures
3. MATLAB exercises for visualization

Text Books

1. Advanced Engineering Mathematics: R.K.Jain and S.R.K.Iyengar-Narosa Publishing House
2. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.
3. Higher Engineering Mathematics: B.S.Grewal-Khanna Publications.

References

1. Introduction to Linear Algebra-Gilbert Strang
2. Schaum's outline series on Linear Algebra
3. GRIET reference manual

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED CALCULUS

Course Code: GR14A1002 L:2 T:1 P:0 C:3
I Year I Semester

Unit-I

Differential Calculus of functions of several variables and Function Optimization: Partial differentiation - Hessian matrix-Total differentiation-Jacobians. Optimization of functions of several variables without constraints-Constrained optimization of functions of several variables with equality constraints-The Lagrange's multiplier method.

Unit-II

Curve tracing principles and Applications of integration: Basic principles of tracing Cartesian, polar and parametric curves -Applications of the definite integral to evaluate arc lengths, surface areas of revolution and volumes of revolution.

Unit-III

Multiple integrals and applications: Evaluation of Double integrals in Cartesian and polar coordinates-Changing the order of integration- Change of variables - Evaluation of triple integrals in Cartesian, cylindrical and spherical polar coordinates. Application of multiple integrals to evaluate plane areas and volumes of solids.

Unit-IV

Vector Calculus: Vector differentiation in Cartesian coordinates-Gradient, Divergence and Curl and their physical interpretation-Directional derivatives-Angle between surfaces, Vector Identities, Irrotational fields and scalar potentials. Vector integration-Evaluation of line integrals-Work done by conservative fields-Surface integrals.

Unit-V

Vector Field theorems: Green's theorem in the plane-Divergence theorem of Gauss-Stoke's theorem (Without Proofs).

Teaching Methodologies

1. Tutorial sheets uploaded in website
2. NPTEL video lectures
3. MATLAB exercises for visualization

Text Books

1. Advanced Engineering Mathematics: R.K.Jain and S.R.K.Iyengar Narosa Publishing House
2. Schaum's outline series on Vector Analysis
3. Higher Engineering Mathematics: B.S.Grewal-Khanna Publications

Reference Books

1. Advanced Engineering Mathematics: Erwin Kreyszig-Wiley
2. Calculus and Analytical Geometry-Thomas & Finney-Narosa
3. Higher Engineering Mathematics: B.S.Grewal-Khanna Publications

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY

Course Code: GR14A1008 L:2 T:1 P:0 C:3
I Year I Semester

Unit-I

Water Technology: Sources of natural water, impurities, hardness: causes, types, expression, units, estimation of hardness of water using complex metric titration method, problems on hardness, Boiler feed water, boiler troubles(scale, sludge, carry over, Caustic Embrittlement, Boiler Corrosion). Internal reatment methods(carbonate, phosphate, calgon), Softening of water – Lime Soda, Ion-Exchange process. Alkalinity of water and its determination, Potable water- its characteristics and steps involved in Municipal Water Treatment, Chlorination-Break Point Chlorination, sterilization by ozonation. Desalination of Brackish water - Reverse Osmosis. Waste water-types of effluents, domestic and industrial effluents(on over view)

Unit-II

Electrochemistry & Corrosion: Concept of Conductances-specific, equivalent, molar conductances and their inter relation ships applications of conductance-conductometric titrations-(Strong acid Vs Strong Base and Weak Acid Vs Strong Base). EMF of a cell, Electrode- Single Electrode Potential, Standard Electrode potential, Electro chemical series and its applications, Electrochemical Cells-types, Galvanic cell: cell representation, Cell reactions, Cell EMF, Electrolytic cells, Concentration cell. Batteries-types Lithium Cell(Li-thionyl Chloride), Secondary cells: Pb-PbO_2 cell, Fuel cells: H_2-O_2 fuel cells and their applications.

Causes and effects of corrosion-types of corrosion- chemical (Dry) corrosion-types and their mechanism, Electrochemical (Wet) corrosion and its mechanism, factors affecting the rate of corrosion – nature of metal and nature of environment. Corrosion Control Methods-Cathodic Protection: Sacrificial Anodic, Impressed Current Cathodic protection. Metallic Coatings –Anodic and Cathodic coatings, Methods of application of metallic coatings- Hot Dipping method(Galvanisation), Cementation(Sheradising), Electroplating(Cu coating), Organic Coatings: Paints – its constituents and their functions.

Unit-III

Engineering Materials I: Cement-types-portland cement –composition, Setting & Hardening of Portland cement. Ceramics-types-ceramic products - white wares, Stone ware, properties and applications of ceramics. Refractories-classification,properties(refractoriness,RUL,thermal spalling, thermal conductivity) and their application.

Lubricants: Classification with examples, mechanisms of lubrication (thick film, thin film, extreme pressure), properties of lubricants- viscosity, flash point, fire point, cloud point, pour point (Definition and significance).

Unit-IV

Engineering Materials II: Electronic materials : Semi conductors, Preparation of Pure Ge and Si by Zone Refining, Czochralski Crystal Pulling, Doping Techniques-Epitaxy, Diffusion & ion implantation.

Polymer Materials: Monomer, polymer, types of polymerization-addition and condensation, Plastics-Thermoplastic resins, Thermo set resins. Compounding & fabrication of plastics (compression & Injection moulding), Preparation, Properties, Engineering applications of Hi Density Poly Ethylene(HDPE), Poly Vinyl Chloride(PVC), Bakelite & Nylon 6,6. Liquid Crystal Polymers and their applications, Organic Light Emmiting Diodes (an Over View). Biodegradable polymers-their advantages and their applications. Elastomers – preparation, properties and applications of Butyl rubber, Thiokol rubber, Styrene-Butadiene Rubber. Conducting Polymers-classification with examples-mechanism of conduction in trans poly acetylene and their applications.
Rubber. Conducting Polymers-classification with examples-mechanism of conduction in trans poly acetylene and their applications.

Unit-V

Energy sources: Fossil Fuels: Coal –types, analysis of coal- proximate and ultimate analysis and their significance, Calorific value of fuel – HCV, LCV, Determination of Calorific Value using BOMB calorimeter, Theoretical calculation of Calorific Value by Dulong's formula, Numerical Problems. Petroleum-its composition-synthetic petrol – Bergius and Fischer Tropsch's process method , cracking (Definition) and its significance, knocking and its mechanism in Internal Combustion engines, Octane Rating of Gasoline, Composition, and applications of natural gas, LPG, CNG. Bio-fuels: preparation of Bio-diesel by transesterification method, advantages of Bio-fuel.

Teaching Methodologies

1. White Board with marker, OHP & Power Point Presentation
2. Conducting quizzes,
3. Conducting Experiments
4. Assignment uploaded in website.

Text Books

1. A text book of engineering chemistry by PC Jain and Monica Jain, Dhanpat Rai publishing company.

Reference Books

1. A text book of engineering chemistry by SS Dara and SS Umre, S Chand publications.
2. A text book of engineering chemistry by Dr Y Bharathi kumari and Dr Ch Jyothsna, VGS publications.
3. A text book of engineering chemistry by R.P.Mani, K.N.Mishra, B.Rama Devi, V.R.Reddy, cengage learning publications

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING GRAPHICS

Course Code: GR14A1023 L:1 T:0 P:2 C:3
I Year I Semester

Unit -I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions. Curves used in Engineering Practice & their Constructions: a) Conic Sections, b) Cycloid, Epicycloid and Hypocycloid, c) Involutes.

Scales: Different types of scales. Plain Scale, Diagonal Scale &Vernier Scale

Unit-II

Orthographic Projections: Principles of Orthographic Projections – Conventions – First and Third Angle Projections. Projections of Points and Lines inclined to both planes, True lengths, traces.

Unit-III

Projection of Regular Planes: Plane parallel to one reference plane and perpendicular to other; planes inclined to one reference plane and perpendicular to other; Plane inclined to both the reference planes.

Projections of Solids: Projections of Regular Solids inclined to both planes.

Unit-IV

Sections of Solids: Types of section planes, Section by a plane perpendicular to V.P., Section by a plane perpendicular to H.P.

Development of Surfaces: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts.

Unit-V

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

Transformation of Projections: Conversion of Isometric Views to Orthographic Views – Conventions.

Teaching Methodology
Power point Presentations, Working models, white board & marker

Text Books

1. Engineering Drawing, N.D. Bhat / Charotar
2. Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishers

References Books

1. Engineering Drawing and Graphics, Venugopal / New age.
2. Engineering Drawing- Johle/Tata Macgraw Hill.
3. Engineering Drawing, Narayana and Kannaiah / Scietech publishers. Engineering Drawing, Narayana and Kannaiah / Scietech publishers.
4. Engineering Drawing – BasanthAgrawal/ C M Agrawal; 2e McGraw Hill Education

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

BASIC ELECTRICAL ENGINEERING

Course Code: GR14A1018 L:3 T:1 P:0 C:4
I Year I Semester

Unit-I

Basic Laws: Ohm's law , Kirchhoff's voltage and current laws , Nodes-Branches and Loops , Series elements and Voltage Division , Parallel elements and Current Division , Star-Delta transformation, Independent sources and Dependent sources , Source transformation.

Unit-II

AC Fundamentals-I: Review of Complex Algebra , Sinusoids , Phasors , Phasor Relations of Circuit elements , Impedance and Admittance , Impedance Combinations , Series and Parallel combination of Inductors and Capacitors, Mesh analysis and Nodal Analysis.

Unit-III

AC Fundamentals-II: RMS and Average values, Form factor, Steady State Analysis of Series, Parallel and Series Parallel combinations of R, L,C with Sinusoidal excitation, Instantaneous power, Average power, Real power, Reactive power and Apparent power, concept of Power factor, Frequency.

Unit-IV

Resonance and Network Theorems: Resonance in Electric circuits: Analysis of Series and Parallel Resonance, Theorems: Superposition theorem, Thevinin's theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity theorem.

Unit-V

Fundamentals Of Electrical Machines: Construction, Principle, Operation and Applications of –

(I) DC Motor,
(ii) Single phase Transformer
(iii) Single phase Induction motor

Text Books

1. Fundamentals of Electric Circuits by Charles K.Alexander, Matthew N.O.Sadiku, Tata McGraw Hill Company.

Reference Books

1. Circuit Theory (Analysis and Synthesis) by A. Chakrabarti – Dhanpat Rai & Co
2. Network Theory by Prof. B. N. Yoganarasimham.
3. Engineering Circuit Analysis by William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin by Tata McGraw Hill Company.
4. Electrical Engineering Fundamentals by Vincent Deltoro 5. Circuit Theory by Sudhakar and Shyam Mohan

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING MECHANICS-STATICS

Course Code: GR14A1012 L:2 T:1 P:0 C:3
I Year I Semester

Unit-I

Forces, Moments, Equilibrium: Introduction to Engineering Mechanics, Basic Concepts.

System of forces: Coplanar forces, concurrent forces, Resultant, Moment of forces and its application, Varignon's principle, Couples and resultant of force system.

Equilibrium of systems of forces: Free body diagrams, equations of equilibrium of coplanar systems, Lami's theorem, Graphical method for the equilibrium of coplanar forces, Converse of the law of triangle of forces, converse of the law of polygon of forces, conditions of equilibrium.

Unit-II

Friction: Introduction, Types of friction, Laws of Solid friction, definitions-coefficient of friction, Angle of friction, Angle of repose. Equilibrium of a body on horizontal rough plane-under horizontal & inclined force. Equilibrium of a body on a rough inclined plane- with force acting parallel to the plane and inclined to the plane.

Unit-III

Properties of surfaces and Solids: Determination of Areas and volumes, First moment of area and the centroid of sections- Rectangle, circle & triangle from method of integration, Composite sections: T-section, I-section, Angle Sections, Hollow Section by using standard formula.

Unit-IV

Moment of inertia: Second and product moments of plane area. Parallel Axis theorem, Perpendicular axis theorem, Moment of inertia of sections- rectangle, triangle, circle from method of integration, Composite Sections: T-Section, I section, Angle section, Hollow Section by using standard formula. Polar moment of inertia, moment of inertia about inclined axis, principal moments of inertia of plane areas, Principal axes of inertia.

Mass Moment of Inertia: Derivation of mass moment of inertia for rectangular section, circular section, prism, cylinder and sphere from first principles. Relation to area moments of inertia.

Unit-V

Analysis of Trusses: Introduction, Classification of trusses, Assumptions made in the analysis of perfect truss, Methods of analysis of Trusses- Method of Joints and Method of Sections.

Principle of Virtual Work: Equilibrium of ideal systems, efficiency of simple machines, stable and unstable equilibriums.

Teaching Methodology

Power point Presentations, Working models, white board & marker.

Text Books

1. Engineering Mechanics by A. Nelson, Tata-McGrawhill
2. Engineering Mechanics-Timoshenko & Young, Tata-McGrawhill
3. Engineering Mechanics- A.K Tayal, Uma Publications.

Reference Books

1. Engineering Mechanics by Shames L.H, prentice Hall.
2. Engineering Mechanics by Pakirappa, Durga publications.
3. Engineering Mechanics- R.S Khurmi, S Chand Publications
4. Engineering Mechanics- R.C. Hibbler, twelfth edition, Prentice hall.
5. Engineering Mechanics- Basudeb Bhattacharyya, Oxford University press

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

BUSINESS COMMUNICATION AND SOFT SKILLS

Course Code: GR14A1024 L:0 T:0 P:2 C:2
I Year I Semester

Unit-I
Just A Minute (JAM): Introduction to public speaking, analyzing and assimilating ideas, audience, voice modulation, Pronunciation and enunciation.

Unit-II
Phonetics: Introduction to speech sounds; identification of sound symbols; vowel and consonants

Unit-III
Roleplay: Introduction to role play; situation handling; non-verbal communication

Unit-IV
Debate: Introduction and features of Debate; Types of Debate; Understanding critical thinking; building sustainable arguments; assessing credibility of the argument; overcoming obstacles

Unit-V
Describing a Person, Situation, Process and Object: Introduction to techniques of clear, brief and impersonal description to a listener or reader.
Unit-VI
Letter Writing: Manual and Emailing, types and formats, content and body of the letter. Email etiquette.

Unit-VII
Report Writing: Formats and types of reports

Unit-VIII
Mind Mapping: Assimilation of thoughts, expansion of ideas on central idea, suggesting parameters to carry forward the thinking process without deviation.

Reference Books

1. Business Communication; Hory Sankar Mukerjee; Oxford University Press
2. Business Communication; Meenakshi Raman, Prakash Singh; Oxford University Press

3. English and Soft skills; SP DHanavel; Orient Blackswan
4. Soft Skills for Everyone; Jeff Butterfield; Cengage Learning
5. Communication Skills; Viva Career Skills Library
6. Personality Development and Soft Skills; Barun K Mitra; Oxford University Press
7. Six Thinking Hats, Penguin Books, Edward De Bono
8. English for Engineer's; Aeda Abidi, Ritu Chaudhry; Cengage Learning
9. Communication Skills ; Sanjay Kumar , Pushpalatha; Oxford University Press
10. Business English : The Writing Skills you need for today's work place: Geffner, Andrea: Fifth edition, Barron's Educational Series, Newyork

Software Used

1. Sky Pronunciation Suite
2. Clarity
3. Mastering English

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

IT WORKSHOP

Course Code: GR14A1026 L:0 T:0 P:2 C:2
I Year I Semester

PC Hardware
Introduces the students to a personal computer and its basic peripherals, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced. Productivity tools module would enable the students in crafting professional word documents, spread sheets and slide presentations.

Task 1
Installation of OS Every student should install Ubuntu and RedHat Linux on the computer. Lab instructors should verify the installation and follow it up with viva

Task 2
Hands on experience on Open Office: Every student should install open office on the computer. Students would be exposed to create word documents with images, tables, formula and with additional word processing features, Power point presentation, Excel and access. Lab instructors should verify the installation and follow it up with viva.

Task 3
Internet Based Applications: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google.

Task 4
Networking-Network Infrastructure: Understand the concepts of Internet, intranet, and extranet, local area networks (LANs), wide area networks (WANs), wireless networking, network topologies and access methods.

Task 5
Network Hardware: Understand switches, routers, media types, static routing, dynamic routing (routing protocols), default routes; routing table and how it selects best route(s); routing table memory, network address translation (NAT).
Task 6: Network Protocols: Understand the Open Systems Interconnection (OSI) model, IPv4, IPv6-ipv4toipv6 tunneling protocols to ensure backward compatibility, dual IP stack, subnetmask, gateway, ports, packets, reserved address ranges for local use (including local loopback IP).

Task 7
Network Services: Understand names resolution, networking services, TCP/IP-Tools (such as ping), tracert, pathping, Telnet, IPconfig, netstat, reserved address ranges for local use (including local loopback IP), protocols.

Task 8
Database -Core Database Concepts: Understand how data is stored in tables, Understanding DML and DDL statements

Task 9
Creating and Insertion of Data: Understanding Data types, tables and how to insert data in to the tables.

Task 10
HTML Basic HTML Tags: Understand what are the tags used for creation of website

Task 11
Designing a Static web page: Understand how to create static web page.

Teaching Methodologies

1. Power Point presentations.
2. Assignments.
3. Hands on experiment.

Reference Books

1. Introduction to Information Technology, ITL Education Solutions Limited, Pearson Education.

2. Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
3. Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
4. Comdex Information Technology Course tool kit Vikas Gupta, WILEY Dreamtech
5. IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinson and Ken Quamme- CISCO Press, Pearson Education
6. PC Hardware and A+Handbook Kate J. Chase PHI(Microsoft)
7. ORACLE DATA BASE LOG PL/SQL Programming SCOTT URMAN, Tata Mc- Graw Hill
8. Introduction to Database Systems, C.J.Date Pearson Education.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY LAB

Course Code: GR14A1030 L:0 T:0 P:2 C:2
I Year I Semester

List Of Experiments

1. Estimation of Total Hardness in sample water by complexometry
2. Estimation of percentage available chlorine in Bleaching Powder.
3. Estimation of Fe2+ by permanganometry.
4. Determination of strength of an acid by potentiometric titration method
5. Determination of strength of an acid using conductometry.
6. Determination of Strength of an acid in Pb-Acid battery titrimetric method
7. Determination of percentage of Iron in Cement sample by colorimetry..
8. Estimation of Calcium in port land cement.
9. Determination of Viscosity of the given unknown liquid by Oswald's viscometer.
10. Determination of surface tention of the given unknown liquid by stalagnometer.
11. Preparation of Thiokol rubber.
12. Determination of percentage Moisture content in a coal sample.

Reference Books

1. Laboratory Manual on Engineering Chemistry, by Dr Sudha Rani, Dhanpat Rai Publishing house.
2. A Text book on Experiments and calculations in Engineering Chemistry, by SS Dara, S Chand publications.
3. Laboratory Manual of Organic Chemistry, by Raj K Bansal, Wiley Eastern Limited, New age international limited.
4. Engineering Chemistry practical manual prepared by faculty of engineering chemistry, GRIET(A) - (for college circulation only)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

TRANSFORM CALCULUS AND FOURIER SERIES

Course Code: GR14A1003 L:2 T:1 P:0 C:3
I Year II Semester

Unit-I

Improper Integrals and Beta, Gamma Functions: Beta and Gamma functions – Their properties – Evaluation of improper integrals in terms of Beta and Gamma functions.

Unit-II

Laplace Transform: Definition and existence of the Laplace Transform-Elementary functions-Properties of the Laplace transform-Convolution integral - Convolution theorem-Heaviside's unit step-function-Dirac delta function.

The inverse Laplace transform-Properties-Method of partial fractions-Heaviside's inversion formula-Inversion by convolution theorem.
Application of the Laplace transform to solve initial value problems and boundary value problems in ODE. Solution of a system of linear differential equations-Solution of problems in electrical circuits by Laplace transforms method.

Unit-III

Z-Transform and Fourier series: Definition-Z transform of elementary sequences-Properties- The inverse Z Transform, Application of Z transform to solve difference equations Definition of orthogonal functions-The concept of Weight function-Fourier series of periodic functions- Fourier expansion of periodic functions-Half range Fourier series expansions.

Unit-IV

Fourier Transform: Exponential Fourier series-The continuous one dimensional Fourier transform-Properties-Convolution-Parseval's identity- Fourier Sine and Cosine transforms.

Unit-V

Partial differential equations: Formation of PDE-Solution of Lagrange's linear equations-Method of separation of variables to solve IBVP like 1-D heat, 1-D wave and BVP like 2-D Laplace's equations. Application of Fourier transform to the solution of partial differential equations.

Teaching Methodologies

1. Tutorial sheets uploaded in website
2. NPTEL video lectures
3. MATLAB exercises for visualization

Text Books

1. Advanced Engineering Mathematics: R. K. Jain and S. R. K. Iyengar Narosa Publishing House.
2. Advanced Engineering Mathematics: Erwin Kreyszig-Wiley
3. Schaum's outline series on Laplace transforms

Reference Books

1. Higher Engineering Mathematics: B. S. Grewal-Khanna Publications
2. Higher Engineering Mathematics: C. Das Chawla-Asian Publishers
3. GRIET reference manual

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

NUMERICAL METHODS

Course Code: GR14A1004 L:2 T:1 P:0 C:3
I Year II Semester

Unit-I

Root finding techniques and Numerical solution of linear algebraic systems: Bisection method-Regula Falsi- Fixed point iteration method-Newton Raphson method - Rate of convergence of the above methods (without proof). LU decomposition method-Cholesky's method-Jacobi and Gauss Seidel iteration methods- Convergence of iterative methods (without proof).

Unit-II

Interpolation and Cubic Splines: Finite differences - Forward, backward and central differences, Relationship between operators- Interpolation with uniform data**-**Newton's forward and backward difference interpolation formulas- Gauss forward, Gauss backward and Stirling's central interpolation formulas- Lagrange and Newton's divided difference interpolation formulas for non-uniform data-Cubic spline interpolation.

Unit-III

Curve fitting and B-spline approximation: Method of least squares- Fitting a straight line, and second degree parabola, exponential and power curves to data-Approximation of functions by B-Splines (Linear and Quadratic cases only).

Unit-IV

Numerical differentiation and numerical integration: Numerical differentiation using the Newton's forward, backward and central difference formulas-Numerical integration by Trapezoidal rule, Simpson's 1/3rd and 3/8th rules-Gauss-Legendre one point, two point and three point rules.

Unit-V

Numerical solution of initial and boundary value problems in ODE: Initial Value Problems: Picard's method of successive approximation, Solution by Taylor series method, Euler method, Runge-Kutta methods of second and fourth orders. Predictor-corrector methods, Combinations of first and second order P-C methods. Boundary Value Problems in ODE: Finite difference methods for solving second order linear ODE.

Teaching Methodologies

1. Tutorial sheets uploaded in website
2. NPTEL video lectures
3. MATLAB exercises for visualization

Text Books

1. Advanced Engineering Mathematics: R.K.Jain and S.R.K.Iyengar-Narosa Publishing House.
2. Advanced Engineering Mathematics: Erwin Kreyszig- Wiley.
3. Introductory methods of Numerical Analysis (5th edition)-S.S.Sastry-PHI.

Reference Books

1. Applied Numerical Methods using MATLAB- Yang, Cao, Chung & Morris – Wiley Interscience
2. Numerical methods in Engineering with MATLAB-Jaan Kiusalaas -- Cambridge University Press.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

PHYSICS FOR ENGINEERS

Course Code: GR14A1006 L:2 T:1 P:0 C:3
I Year II Semester

Unit-I

Crystal Structures: Lattice points, Space lattice, Basis, Bravias lattice, unit cell and lattice parameters, Seven Crystal Systems with 14 Bravias lattices , Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, Miller Indices, Inter planer spacing of Cubic crystal system.

Defects in Crystals: Classification of defects, Point Defects: Vacancies, Substitution, Interstitial, Concentration of Vacancies, Frenkel and Schottky Defects, Edge and Screw Dislocations (Qualitative treatment), Burger's Vector.

Unit-II

Acoustics & Acoustic Quieting: Basic Requirement of Acoustically Good Hall, Reverberation and Time of Reverberation, Sabine's Formula for Reverberation Time(Qualitative Treatment), Measurement of Absorption Coefficient of a Material, Factors Affecting the Architectural Acoustics and their Remedies. Acoustic Quieting: Aspects of Acoustic Quieting, Methods of Quieting, Mufflers, Sound-proofing.

Ultrasonics: Introduction, Production of ultrasonic waves: Piezo electric & Magnetostriction methods, Properties of ultrasonic waves, Applications of ultrasonics: Introduction to NDT, Ultrasonic testing systems: pulse echo, trough transmission, Resonance systems and Ultrasonic testing methods: Contact and Immersion methods.

Unit-III

Dielectric Properties: Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Types of polarization: Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities (Electronic & Ionic) -Internal Fields in Solids, Clausius -Mossotti Equation, Piezo-electricity and Ferro- electricity. Magnetic Properties: Magnetic Permeability, Magnetic Field Intensity, Magnetic Field Induction, Intensity of Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magnetron, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Hysteresis Curve on the basis of Domain Theory of Ferro Magnetism, Soft and Hard Magnetic Materials, Ferrites and their Applications.

Unit-IV

Lasers: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Einstein's Coefficients and

Relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers. Fiber Optics: Structure and Principle of Optical Fiber, Acceptance Angle , Numerical Aperture, Types of Optical Fibers (SMSI,MMSI,MMGI), Attenuation in Optical Fibers, Application of Optical Fibers, Optical fiber Communication Link with block diagram.

Unit-V

Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Bottom-up Fabrication: Sol-gel Process; Top-down Fabrication: Chemical Vapor Deposition, Physical, Chemical and Optical properties of Nano materials, Characterization (SEM, EDAX), Applications.

Teaching Methodologies

1. Power Point Presentations
2. Assignments uploaded in website.

Text Books

1. Engineering Physics: P.K.Palanisamy, Scitech Publishers.
2. Engineering Physics: S.O.Pillai, New age International.
3. Applied Physics: T.Bhima Sankaram,G Prasad,BS Publications.

Reference Books

1. Solid State Physics, Charles Kittel, Wiley & Sons (Asia) Pte Ltd.
2. Fundamentals of physics, Halliday,Resnick,Walker.
3. Optical Electronics, A.J Ghatak and K.Thyagarajan, Cambridge University Press.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH

Course Code: GR14A1005 L:2 T:1 P:0 C:3
I Year II Semester

Unit-I

1. Chapter entitled Sir C.V. Raman: A Path breaker in the saga of Indian Science from "Enjoying Every day English", Published by Sangam Books, Hyderabad.
2. Chapter Entitled Mother Teresa from "Inspiring Speeches and Lives", Published by Maruthi Publications, Guntur

Tutorial-1: Present a small biographical sketch of an inspiring personality
Tutorial-2: Prepare an essay on "Charity begins at home."

Unit-II

Grammar & Vocabulary Development: Articles: Types of Articles and their usages; Tense and Aspect; Subject and Verb Agreement; Prepositions

Vocabulary Development: Synonyms and Antonyms; One-word substitutes; prefixes and suffixes; words often confused; idioms and phrases.

Speaking & Writing skills: Information transfer: verbal to graphical presentation and from graphical presentation to verbal. Public Speaking: Body Language, Presentation Skills and its Features.

Tutorial-3: Worksheet on the usage of Tenses, Articles and Prepositions
Tutorial-4: Exercises on vocabulary
Tutorial-5: Interpretation of data from different formats

Unit-III

1. Chapter Entitled The Connoisseur from "Enjoying Every day English", Published by Sangam Books, Hyderabad
2. Chapter Entitled Sam Pitroda from "Inspiring Speeches and Lives", Published by Maruthi Publications, Guntur.

Tutorial-5: Story Analysis
Tutorial-6: Present a person who bears risk taking ability to solve the problems of people/society
Tutorial-7: Describe a strange event that occurred in your life

Unit-IV

1. Chapter Entitled Bubbling Well Road from "Enjoying Every day English", Published by Sangam Books, Hyderabad
2. Chapter Entitled Amartya Kumar Sen from "Inspiring Speeches and Lives", Published by Maruthi Publications, Guntur

Tutorial-9: Oral Presentation on "Does the quality of Unity in Diversity helped us to acquaint easily with the trends of globalization?"

Tutorial-10: Develop an essay "The ways to impart moral and ethical values amongst the students."

Unit-V

1. Chapter entitled The Cuddalore Experience from "Enjoying Every day English", Published by Sangam Books, Hyderabad
2. Chapter Entitled Martin Luther King Jr. (I have a dream) from "Inspiring Speeches and Lives", Published by Maruthi Publications, Guntur

Tutorial-11: Presentation on "The possible ways to educate students about Disaster Management."

Tutorial-12: Write or present "Is every present leader was a follower?"

Text Books

1. Enjoying Every day English by A. Rama Krishna Rao- Sangam Books
2. Inspiring Speeches and Lives by Dr.B. Yadava Raju, Dr.C. Muralikrishna, Maruthi Publications.

Reference Books

1. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
2. Effective Technical Communication, M. Ashraf Rizvi, Tata McGraw Hill.
3. Technical Communication, Meenakshi Raman, Sangeeta Sharma, Oxford higher Education.
4. English for Engineers Made Easy, Aeda Abidi, Ritu Chaudhry, Cengage Learning.
5. Communicate or Collapse, Pushp Latha, Sanjay Kumar, PHI Learning Pvt.Ltd.
6. Communication Skills, Sanjay Kumar, Pushp Latha, Oxford Higher Education.
7. A Hand Book for Engineers, Dr. P. Eliah, BS Publications

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER PROGRAMMING AND DATA STRUCTURES

Course Code: GR14A1011 L:2 T:1 P:0 C:3
I Year II Semester

Unit-I
Introduction to Computers: Computer Hardware and Software, System Software, Program Development Steps, Algorithms, Flowcharts.
Introduction to C: Structure of C-Program, Keywords, Identifiers, Data Types, Constants, Variables, Operators, Expressions, Precedence and Order of Evaluation, Type Conversions and Type Casting .
Managing I/O: Input-Output Statements,Formatted I/O.

Unit-II
Decision Making Statements: if, if-else, if-else-if, nested if, switch
Iterative Statements: while, do- while, for
Unconditional Statements: break, continue, go to.
Arrays: Introduction, One-dimensional Arrays, Declaring and Initializing Arrays, Multidimensional Arrays.
Strings: Introduction to Strings, String Handling Functions, Array of Strings.

Unit-III
Functions: Introduction, Function Definition, Function Declaration, Function Calls, Return Values and Their Types, Categories of Functions, Nested Functions, Recursion, Storage Classes, Passing Arrays to Functions.
Pointers: Pointers and Addresses, Pointer Expressions and Pointer Arithmetic, Pointers and Functions, Pointers and Arrays, Pointers and Strings, Array of Pointers, Pointer to Pointers.

Unit-IV
Structures: Basics of Structures, Nested Structures, Arrays of Structures, Arrays within Structures, Structures and Functions, Self Referential Structures, Unions.
Files: Introduction, Types of Files, File Access Functions, I/O on Files, Random Access to Files, Error Handling, Command Line Arguments.

Unit-V
Sorting: Bubble sort, Merge sort, Insertion sort, Selection Sort, Quick Sort.
Searching: Linear Search, Binary Search.

Introduction to Data Structures: Stack Operations using Arrays: Push and Pop, **Queue Operations using Arrays:** Insert, Delete

Teaching Methodologies: White board and marker, power point presentation

Text Books

1. The C Programming Language, BRIANW. KERNIGHAN Dennis M.Ritchie, Second Edition, PHI.
2. Programming in C, Pradip Dey, Manas Ghosh, Second Edition, Oxford University Press.
3. Computer Programming and Data structures by EBalaguruswamy, published by Mc Graw Hill.

Reference Books

1. Data structures using C, A.K. Sharma,Pearson publication
2. Let Us C, Yashwanth Kanetkar, 10th Edition, BPB Publications.
3. C& Data structures, P.Padmanabham, B.S. Publications.
4. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
5. Programming with problem solving, J.A.Jones & K.Harrow, Dreamtech Press.
6. Programming in C, Stephen G.Kochan, III Edition, Pearson Education.
7. Data Structures and Program Designing, C,R.Kruse, C.L.Tondo, B P Leung, Shashi M, Second Edition, Pearson Education.
8. Programming in C, Ashok N Kamthane, 2nd edition, Pearson Publication.
9. Introduction to Data Structures in C, Ashok N Kamthane , Pearson Publication.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING MECHANICS-DYNAMICS

Course Code: GR14A1020 L:3 T:1 P:0 C:4
I Year II Semester

Unit-I

Kinematics of Particles- Rectilinear Motion: Introduction- Rectilinear motion of a particle, displacement, velocity and acceleration. Rectilinear motion along X-axis, Determination of motion of particle using methods of differentiation and integration. D'Alembert's Principle.

Uniformly accelerated motion: velocity-time, displacement-time & velocity-displacement relationship. Motion curves- graphical representation of motion of particles. Motion along vertical Y-axis. Motion of the particle projected horizontally in air.

Kinematics of Particles-curvilinear Motion: Introduction, curvilinear motion of a particle, rectangular components of velocity, acceleration components of particle-tangential & normal acceleration components, radial & transverse components of acceleration. Projectile motion, Projectile on Inclined Plane.

Unit-II

Kinetics of Particle: Introduction-Definitions of Matter, body, particle, mass, weight, inertia, momentum. Newton's law of motion. Relation Between force & mass. Motion of a particle in rectangular coordinates. Motion of Lift. Motion of body on an inclined plane. Motion of connected Bodies.

Work Energy method: law of conservation of Energy, Application of Work Energy Method to particle motion and connected system.

Unit-III

Impulse and Momentum: Introduction- Impact, Momentum, Impulse & Impulsive forces, Units. Law of conservation of Momentum, Newton's law of collision of elastic bodies- coefficient of Restitution. Recoil of Gun. Impulse Momentum Equation, Non-Impulsive Forces, Impact of jet on a stationary perpendicular flat plate, Impact of jet on a Moving Perpendicular Flat plate.

Unit-IV

Kinematics & Kinetics of Rigid Body: Kinematics of Rigid Bodies: Types of Rigid body motions- Motion of translation, Motion of Rotation, & General Plane Motion. Rotational motion about a fixed axis- Angular displacement, Angular Velocity, Angular acceleration. Equations of circular motion-Rotational motion

with constant Angular Acceleration & angular Velocity. Relation between linear & angular acceleration.

Kinetics of Rigid Bodies: Defintions- Force & Translation, Moment of couple & rotation, Torque & rotation. Newton's Law of Rotation. Relation between torque & Moment of inertia. Motion of bodies tied to a string and passing over a pulley.

Unit-V

Mechanical Vibrations: Introduction-simple harmonic motion, Definitions. Equations of Simple Harmonic Motion, Motion of a body attached to a spring, springs in series & in parallel, Horizontal Motion of a block attached to a spring. Simple pendulum, seconds pendulum, gain & loss of oscillations due to change in gravity (g) & length (l) of a simple pendulum, compound pendulum, torsional pendulum.

Teaching Methodology

Power point Presentations, Working models, white board & marker.

Text Books

1. Engineering Mechanics by A. Nelson, Tata-McGrawhill
2. Engineering Mechanics-Timoshenko & Young, Tata-McGrawhill

Reference Books

1. Engineering Mechanics by Pakirappa, Durga publications.
2. Engineering Mechanics- R.S Khurmi, S Chand Publications
3. Engineering Mechanics- R.C. Hibbler, twelfth edition, Prentice hall.
4. Engineering Mechanics- A.K Tayal, Uma Publications.
5. Engineering Mechanics- Basudeb Bhattacharya, Oxford University Press

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING WORKSHOP

Course Code: GR14A1025 L:0 T:0 P:2 C:2
I Year II Semester

Unit-I
Carpentry Shop – 1:

1.1. Introduction to various types of wood such as Teak, Mango, Sheesham, etc. (Demonstration and their identification).
1.2. Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.
Job I Marking, sawing, planning and chiselling & their practice
1.3. Introduction to various types of wooden joints, their relative advantages and uses.
Job II Preparation of half lap joint
Job III Preparation of Mortise and Tenon Joint
1.4. Safety precautions in carpentry shop.

Unit-II
Fitting Shop – 2:

2.1. Introduction to fitting shop tools, common materials used in fitting shop.
2.2. Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.
Job I Marking of job, use of marking tools and measuring instruments.
Job II Filing a dimensioned rectangular or square piece of an accuracy of + 0.5 mm
Job III Filing practice (production of flat surfaces). Checking by straight edge.
Job IV Making a cutout from a square piece of MS Flat using hand hacksaw such as T-fit and V-fit
2.3. Care and maintenance of measuring tools like callipers, steel rule, try square.

Unit-III
House wiring – 3:

3.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, PVC Conduits.
3.2 Study of electrical safety measures and demonstration about use of protective devices such as fuses, and relays including earthing.
Job I I dentification of phase, neutral and earth of domestic appliances

and their connection to two pin/three pin plugs.
Job II Preparation of a house wiring circuit on wooden board using fuse, switches, socket, holder, ceiling rose etc. in PVC conduit and PVC casing and capping wiring system.
Job III Two lamps in series and parallel connection with one way switch
Job IV Two lamps in series and one lamp in parallel connection with one way switch.
Job V Stair case lamp connection with two way switch.

Unit-IV

Tin- smithy – 4:

4.1 Introduction to tin -smithy shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material and specifications.
4.2 Introduction and demonstration of hand tools used in tin -smithy shop.
4.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g. M.S. sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.
4.4. Preparation of a rectangle tray and open scoop/ funnel.

Reference books

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd.
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd.,New Delhi
5. Workshop Technology by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi.
6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING PHYSICS LAB

Course Code: GR14A1029 L:0 T:0 P:2 C:2
I Year I Semester

List of Experiments

` 1. Determine the energy gap of a given semiconductor.
2. Calculate the energy loss in a given Ferro magnetic material by plotting B-H curve.
3. Calculate the Numerical Aperture of a given optical fiber.
4. Determine the Dielectric constant and Curie temperature of PZT material.
5. Calculate the Acceptance angle of a given optical fiber.
6. Draw V-I & L-I Characteristics of LASER diode.
7. Determine the bending losses in a given optical fibers.
8. Determine the Air-gap losses in a given optical fibers.
9. Determine the Hall Coefficient in Ge semiconductor by using Hall Experimental setup.
10. Determine the carrier concentration, mobility of charge carrier in Ge semiconductor.
11. Measure Ac voltage and frequency through CRO.
12. Measure Resistance and Capacitance by using digital multimeter.
13. Diffraction Grating.
14. Newtons Ring.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER PROGRAMMING AND DATA STRUCTURES LAB

Course Code: GR14A1028 L:0 T:0 P:2 C:2
I Year II Semester

Task- I

a) The heights of three students are 165, 148, 154 cm. respectively. Write a c program to sort the heights of the students in descending order.
b) Write a C program to find the roots of a quadratic equation using if-else.
c) The program should request the user to input two numbers and display one of the following as per the desire of user.
   (a) sum of numbers
   (b) difference of numbers
   (c) product of the numbers
   (d) division of the numbers.

Write a C program using switch statement to accomplish the above task.

d) In a mathematical number sequence let the first and second term in the sequence are 0 and 1. Subsequent terms are formed by adding the preceding terms in the sequence. Write a C program to generate the first 10 terms of the sequence.

Task-II

a) Write a C program to construct pyramid of numbers.
b) The reliability of an electronic component is given by reliability $r=e^{-\lambda t}$ where λ is the component failure rate per hour and t is the time of operation in hours. Determine the reliability at various operating times from 0 to 3000 hours by plotting a graph using a C program. The failure rate λ is 0.001. Plot the graph with a special symbol.
c) Write a C program to accept the date of birth and the current date to find the age of the person . The output should specify the age of a person in terms of number of years, months and days.

Task-III

a) Write a C program to calculate the following Sum: Sum=1-x2/2!+x4/4!-x6/6!+x8/8!-x10/10!
b) For a certain electrical circuit with an induction (L) and Resistance (R) , the damped natural frequency is given by $f=\sqrt{(1/LC - R2/4C2)}$. Write a C program to calculate the frequency for different values of C starting from 0.01 to 0.1.

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Task-I V

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program to count the lines, words and characters in a given text.
c) Write a C program to sort the names of 5 students in the alphabetical order.
Ex: Rita, Sneha, Priti, Briya, kitti as Briya , Kitti, Priti, Rita, Sneha

Task-V

a) Write a C program to print all the rotations of a given string.
Ex: Rotations of the string "NEWS" are NEWS
EWSN WSNE SNEW
b) Write a C program to perform the following operations:
i) To insert a sub-string in a given main string at a given position.
Ii) To delete n Characters from a given position in a given string.

Task-VI

a) Write a C program that uses functions to perform the following:
i) Transpose of a matrix
ii) Addition of Two Matrices
iii) Multiplication of two matrices

Task-VII

a) Write a C programs that use both recursive and non-recursive functions
i) To find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.

Task-VIII

a) Using pointers, write a function that receives a character string and a character as argument and deletes all occurrences of this character in the string.
b) Write a function using pointer parameter that compares two integer arrays to see whether they are identical. The function returns 1 if they are identical, 0 otherwise.

Task-IX

a) Write a c program which accepts employee details like (outer structure : name, employid, salary and (inner structure : area, street number, houseno)).Display the employee names and id belonging to a particular area.

b) Write a C program that uses functions to perform the following operations:
   i) Addition of two complex numbers
   ii) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Task-X

a) Write a C Program to display the contents of a file.
b) Write a C Program merging of two files in a single file.
c) Write a C Program to append data into a file.
d) Write a C program to reverse the first n characters in a file.

(Note : The file name and n are specified on the command line.)

Task-XI

a) Write a C Program to Search for a given element using Linear & Binary Search Techniques.
b) Write a C Program to Sort a given list of integers using Bubble Sort Technique.

Task-XII

a) Write a C Program to Sort a given list of integers using Merge Sort Technique.
b) Write a C Program to Sort a given list of integers using Insertion Sort Technique.

Task-XIII

A) Write a C Program to Sort a given list of integers using Quick Sort Technique.
b) Write a C Program to Sort a given list of integers using Selection Sort Technique.

Task-XIV

a) Write a C program to implement the following using arrays.
   i) Push and pop operations of a stack
   ii) Insert and delete operations of a queue

Text Books

1. The C Programming Language, BRIANW. KERNIGHAN Dennis M.Ritchie, Second Edition, PHI.
2. Programming in C, Pradip Dey, Manas Ghosh, Second Edition, Oxford University Press.
3. Computer Programming and Data structures by EBalaguruswamy, published by Mc Graw Hill.

Reference Books

1. Data structures using C, A.K. Sharma,Pearson publication
2. Let Us C, Yashwanth Kanetkar, 10th Edition, BPB Publications.
3. C& Data structures, P.Padmanabham, B.S. Publications.
4. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
5. Programming with problem solving, J.A.Jones & K.Harrow, Dreamtech Press.
6. Programming in C, Stephen G.Kochan, III Edition, Pearson Education.
7. Data Structures and Program Designing, C,R.Kruse, C.L.Tondo, B P Leung, Shashi M, Second Edition, Pearson Education.
8. Programming in C, Ashok N Kamthane, 2nd edition, Pearson Publication.
9. Introduction to Data Structures in C, Ashok N Kamthane , Pearson Publication.

II-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROBABILITY AND STATISTICS

Course Code: GR14A2011 L:2 T:1 P:0 C:3
II Year I Semester

Unit-I

Probability: Basic concepts in Probability - Conditional probability–Addition and Multiplication theorems for two events, (Concepts without derivations)- Bayes theorem.

Random variables: Definition of a random variable, discrete and continuous random variables –Distribution function and statement of its properties. Probability mass function, probability density function with illustrations -Joint, marginal and conditional distributions with illustrations - Mathematical expectation and variance of ar. v with examples and statement of their properties.

Unit-II

Distributions: Binomial, Poisson, Uniform, Normal and Exponential distributions (definition, real life examples, Statements of their Mean, Mode and Variance and problems).fitting of Binomial and Poisson distributions.

Sampling distribution: Definition of Population and sample, Overview of types of sampling(Purposive, Random, SRS with and without replacement cases, Stratified and Systematic random samplings) - Sampling distribution, standard error, statements of sampling distribution of mean(s) (Population variance(s) known and unknown) and proportion(s) (Population proportion(s)known and unknown) with examples.

Unit-III

Estimation and Testing of Hypothesis: Definitions of Point and Interval estimation. Confidence intervals for single mean, difference of two means, single proportion and difference of two proportions. Concepts of Null and Alternative hypotheses, Critical region, Type I and Type II errors, one tail and two-tail tests, Level of significance and power of a test.

Large Samples Tests: Tests of hypothesis for mean(s) (single and difference between means), Tests of hypothesis for proportion(s) (single and difference between proportions), Chi-square test for testing goodness of fit, independence of attributes and single population variance.

Unit-IV

Small samples: Student's t-test for testing the significance of single mean, difference of means(independent samples and paired samples), F-test for equality of variances (Concepts and problem solving) .

Correlation & Regression: Product moment correlation coefficient, Spearman's rank correlation coefficient and Statements of their properties – Simple linear regression, Lines of Regression, Regression coefficients and Statements of their properties, Multiple regression for three variables only.

UNIT-V

Stochastic Process: Definitions of stochastic process, parameter space and state space. Classification of stochastic processes and stochastic matrices. Definitions of a Markov chain, transition probability matrix, initial probability distribution, joint distribution and n-step TPM. Classification of states in a Markov chain and limiting distribution.

Queuing theory: Queue description, characteristics of a queuing model, Poisson process, concept of Birth and death process, steady state solutions of (M/M/1: ∞/FIFO) and (M/M/1: N/FIFO)(Concepts and problem solving).

Teaching Methodologies

1. Chalk &Talk
2. ppts

Text Books

1. Probability and statistics for engineers (Erwin Miller and John E. Freund), R.A Johnson and C. B. Gupta, Pearson education.
2. Fundamentals of Stochastic process-Medhi (for Unit-V), New age international publications.
3. Probability and Statistics, Dr. T. K. V. Iyengar, Dr. B. Krishna Gandhi et.al, S. Chand.

Reference Books

1. Fundamentals of Mathematical Statistics, S.C. Gupta ,V. K. Kapoor, S. Chand.
2. Probability, Statistics and Queuing Theory with computer applications- Arnold O.Allen, Academic press.
3. Introduction to Probability and Statistics, 12th edition, W. Mendenhall, R.J. Beaverand, B.M. Beaver, Thomson. (Indian edition)
4. Probability, Statistics and Queuing Theory, 2nd Edition, Trivedi, John Wiley and Sons.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

KINEMATICS OF MACHINERY

Course Code: GR14A2019 L:3 T:1 P:0 C:4
II Year I Semester

Unit-I

Mechanisms: Elements, Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs - Types of constrained motions.

Machines: Classification of machines – kinematic chain – inversion of mechanism – inversions of quadric cycle chain, single and double slider crank chains.

Straight Line Motion Mechanisms: Exact, approximate and intermediate types – Peaucellier, Hart and Scott Russell – Grasshopper – Watt -T.Chebicheff and Robert Mechanisms - Pantograph.

Unit-II

Kinematics: Velocity and acceleration–Motion of link in machine –Determination of Velocity and acceleration diagrams–Graphical method –Application of relative velocity method four bar chain.

Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider–Acceleration diagram for a given mechanism, Klein's Construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous centre of rotation, centroids and axodes –relative motion between two bodies–Three centres inline theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

Unit-III

Cams and Followers: Definition of cam and follower – their uses – Types of followers and cams – Terminology – Types of follower motion - Uniform velocity– Simple harmonic motion and uniform acceleration. Maximum velocity and acceleration during outward and return strokes in the above cases. Analysis of motion of followers - Roller follower – circular cam with straight, concave and convex flanks.

Unit-IV

Gears: Higher pairs, friction wheels and toothed gears – types – Gear Terminology– Law of gearing, Condition for constant velocity ratio for transmission of motion- Form of teeth: Cycloidal and in volute profiles - Velocity of sliding – Phenomena of Interference – Condition for minimum number of teeth to avoid interference, Expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

Gear Trains: Introduction – Train value – Types – Simple and reverted wheel train – Epicyclic gear Train - Methods of finding train value or velocity ratio –Epicyclic gear trains - Selection of gear box - Differential gear box for an automobile.

Unit-V

Steering Mechanisms: Conditions for correct steering-Davis Steering gear, Ackerman's steering gear – velocity ratio.

Hooke's Joint: Single and double Hooke's joint-Universal coupling-application-problems.

Belt, Rope and Chain Drives: Introduction, Belt and rope drives, selection of belt drive- types of belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

Teaching Methodology

White Board and Marker, PPTs, Models

Text Books

1. Theory of Machines and Mechanisms-S.S.Rattan, Tata McGraw Hill Publishers
2. Theory of Machines R.S Khurmi & J.K Gupta

References Books

1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of Machines / R.K Bansal
3. Theory of Machines Sadhu Singh Pearson's Edition
4. Theory of Machines /Shigley/ Oxford.
5. Theory of machines – PL. Balaney/khanna publishers.
6. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MECHANICS OF SOLIDS

Course Code: GR14A2020 L:3 T:1 P:0 C:4
II Year I Semester

Unit-I

Simple stresses & strains: Concept of stresses and strains (linear, lateral, shear, thermal and volumetric), Hooke's law, Poisson's ratio, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus. Stress-strain diagrams for ductile & brittle materials, Proof stress, True stress & strain - True stress strain Curve Various strengths of material- Yield strength, Ultimate tensile strength, Factor of safety, Strain energy-Gradual, sudden and Impact Loads. Relation between elastic constants, Axial forces, stresses and strains in composite bars, bars under axial loads and self-weight.

Unit-II

Shear Force and Bending Moment Diagrams: Shear forces and bending moments of beams due to concentrated loads, uniformly distributed loads, uniformly varying loads and couples; Shear Force and Bending Moment diagrams for cantilevers, simply supported beams, and their construction- Maximum bending moment & point of contra flexure. Relation between shear force, bending moment and load intensity.

Unit-III

Slope and Deflection of Beams: Relation between Bending Moment and slope, slope & deflection of beams, double integration method (Macaulay's method), derivation of formula for maximum slope & deflection for standard cases like cantilever, simply supported carrying point loads and UDL loads.

Unit-IV

Principal Stresses and Strains: Normal and shear stresses on any oblique plane - Concept of principal planes, derivation for principal stresses and maximum shear stress, position of principal planes & planes of maximum shear, graphical solution using Mohr's circle of stresses, combined effect of axial force, bending moment & torsional moment on circular shafts (solid as well as hollow).

Torsional Stresses: Derivation of torsion equation, stresses, strain & deformations in solid & hollow Shafts, homogeneous & composite circular cross section subjected to twisting moment, stresses due to combined torsion, bending & axial force on shafts.

Unit-V

Stresses in Machine Elements. Bending stresses: Theory of simple bending, assumptions, derivation of flexural formula, Bending of common cross sections like rectangular, I,T,C with respective centroidal & parallel axes, bending stress distribution diagrams, moment of resistance and section modulus. Shear stresses:Concept, derivation of shear stress distribution formula, shear stress distribution diagrams for I, T and C symmetrical sections, maximum and average shears stresses.

Teaching Methodology

Power point Presentations, Working models, white board & marker

Text Books

1. Strength of Materials: Ramamrutham.
2. Strength of Materials R K Bansal, Laxmi Publications

Reference Books

1. Analysis of structures byVazirani and Ratwani.
2. Mechanics of StructuresVol-III,by S.B.Junnarkar.
3. Strength of Materials by S.Timshenko
4. Strength of Materials by Andrew Pyteland Ferdinond L.Singer Longman.
5. Solid Mechanics,by Popov

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING THERMODYNAMICS

Course Code: GR14A2021 L:3 T:1 P:0 C:4
II Year I Semester

Unit-I

Introductory Concepts and Energy: System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State and in Transition, Types, Work and Heat, Point and Path function.

Zeroth Law, First Law of Thermodynamics and Steady Flow Energy Equation: Zeroth Law of Thermodynamics – Concept of quality of Temperature – Principles of Thermometry –Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale – PMM I - Joule's Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process –applied to a flow system – Steady Flow Energy Equation, Limitations of the First Law.

Unit-II

Second Law of Thermodynamics and Entropy: Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence /Corollaries, PMM-II, Carnot cycle and its significance, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the third Law of Thermodynamics.

Unit-III

Pure Substances and Perfect Gas Laws: Pure Substances: P-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry. Perfect Gas Laws – Equation of State, specific and Universal Gas constants – various Non-flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes – Deviations from perfect Gas Model – Vander Waals Equation of State – Compressibility charts – variable specific Heats – Gas Tables.

\Unit-IV

Mixtures of Perfect Gases and Air conditioning Concepts: Mixtures of perfect Gases – Mole Fraction, Mass fraction, Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction , Volume fraction and partial pressure, Equivalent Gas constant, Molecular Internal Energy, Enthalpy, Specific heat and Entropy of Mixture of perfect Gases and Vapour. Air conditioning Concepts: Psychrometric Properties – Atmospheric air, Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation , Carrier's Equation – Psychometric chart.

Unit-V

Power Cycles: Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericcson Cycle, Lenoir Cycle, Brayton and Rankine cycles - Performance Evaluation – combined cycles – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressure on Air standard basis – comparison of Cycles. Refrigeration Cycles: Reversed Carnot Cycle-Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.

Teaching Methodology

1. Power point Presentations, Working models, white board & marker

Text Books

1. Engineering Thermodynamics / PK Nag /TMH, III Edition
2. Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen / John Wiley & sons (ASIA) Pte Ltd.

Reference Books

1. Engineering Thermodynamics – Jones & Dugan
2. Thermodynamics – An Engineering Approach – YunusCengel& Boles /TMH
3. Thermodynamics – J.P.Holman / McGrawHill
4. An introduction to Thermodynamics / YVC Rao / New Age
5. Engineering Thermodynamics – K. Ramakrishna / Anuradha Publishers.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MATERIAL SCIENCE AND METALLURGY

Course Code: GR14A2022 L:3 T:1 P:0 C:4
II Year I Semester

Unit-I

Structure of Metals: Bonds in Solids – Metallic bond , crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size. Crystal systems indices for planes and directions, crystal defects and dislocations, Mechanism of plastic deformation.

Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rothery's rule, intermediate alloy phases, and electron compounds.

Unit-II

Equilibrium of Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state –allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cu-Sn and Fe-Fe_3C.

Unit-III

Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

Unit-IV

Heat treatment of Alloys: Effect of alloying elements on Fe-Fe_3C system, Annealing, normalizing, Hardening, TTT diagrams, tempering , Harden ability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

Unit-V

Ceramic materials: Crystalline ceramics, glasses, cermets, abrasive materials, nano materials –definition, properties and applications of the above.

Composite materials: Classification of composites, various methods of

manufacture of composites, particle–reinforced materials, fibre-reinforced materials, metalceramicmixtures, metal–matrix composites and Carbon–Carbon composites.

Teaching Methodology
Power point Presentations, Working models, white board & marker

Text Books
1. Introduction to Physical Metallurgy / Sidney H. Avener/TMH
2. Materials Science and engineering / William and Callister/WILEY

Reference Books
1. Material Science and Metallurgy/kodgire.
2. Science of Engineering Materials / Agarwal
3. Essential of Materials science and engineering/ Donald R.Askeland/Thomson.
4. Elements of Material science / V. Raghavan
5. Engineering Materials and Their Applications – R. A Flinn and P K Trojan / Jaico Books.
6. Engineering materials and metallurgy/R.K.Rajput/ S.Chand.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MACHINE DRAWING LAB

Course Code: GR14A2023 L:0 T:0 P:2 C:2
II Year I Semester

Unit-I

Machine Drawing Conventions: Need for drawing conventions – introduction to IS conventions

a) Conventional representation of materials, common machine elements and parts such as Screws, nuts, bolts, keys, gears, webs, ribs
b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centres, curved and tapered features.
d) Title boxes, their size, location and details – common abbreviations& their liberal usage
e) Types of Drawings – working drawings for machine parts.

Unit-II

a) Forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
b) Keys, cottered joints and knuckle joint.

Unit-III

a) Rivetted joints for plates
b) Shaft coupling, spigot and socket pipe joint.
c) Journal, pivot and collar and foot step bearings.

Unit-IV

Assembly Drawings: Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions. Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.

Unit-V

Machine parts: Screws jacks, Machine Vices Plummer block, Tailstock. Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock.

Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock.

Note: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

Teaching Methodology
Power point Presentations, Working models, white board & marker

Text Books
1. Machine Drawing – Dhawan, S.Chand Publications
2. Machine Drawing –K.L.Narayana, P.Kannaiah& K. Venkata Reddy / New Age/ Publishers

Reference Books
1. Machine Drawing – P.S.Gill.
2. Machine Drawing – Luzzader
3. Machine Drawing - Rajput
4. Machine Drawing – N.D.Bhatt

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MATERIAL SCIENCE AND METALLURGY LAB

Course Code: GR14A2024 L:0 T:0 P:2 C:2
II Year I Semester

List of Experiments

1. Preparation and study of the micro structure of Mild steel and Low carbon steel.
2. Preparation and study of the micro structure of High carbon steel and Stainless steel.
3. Preparation and study of the micro structure of Grey cast iron and White cast Iron.
4. Preparation and study of the micro structure of Malleable cast iron and Spheroidal cast iron.
5. Preparation and study of the micro structure of Aluminium.
6. Preparation and study of the micro structure of copper.
7. Preparation and study of the micro structure of Titanium (Ti6Al4V).
8. Preparation and study of the micro structure of Inconel 718 –Super alloy.
9. Study of the microstructure of Heat treated steels.
10. Harden ability of steels by Jominy End Quench test.
11. Find out the hardness of various treated and untreated steels.

Teaching Methodology: Experimental Test rigs & Microscopes

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MECHANICS OF SOLIDS LAB

Course Code: GR14A2025 L:0 T:0 P:2 C:2
II Year I Semester

List of Experiments

1. To determine the resistance of a material to indentation using Brinnel's Hardness Test
2. To determine the resistance of a material to indentation using Rockwell's Hardness Test
3. To determine the resistance of a material to indentation using Vicker's Hardness Test
4. To determine the rigidity modulus of a spring using Compression Test
5. To determine the strength of material in tension using Tension Test
6. To determine the strength of material under compression using Compression Test
7. To determine the young's modulus of the given structural material using Cantilever Beam
8. To determine the young's modulus of the given structural material using Simply Supported Beam
9. To determine the young's modulus of the given structural material using Maxwell's Reciprocal Theorem
10. To determine the young's modulus of the given structural material using Continuous Beam
11. To determine the tensional strength and stiffness of a material using Torsion Test
12. To determine the ultimate shear strength of the given structural material using Direct Shear Test.

Teaching Methodology: Experimental Test rigs

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

VALUE EDUCATION AND ETHICS

Course Code: GR14A2002 L:2 T:0 P:0 C:0
II Year I Semester

Unit-I
Values and self development –social values and individual attitudes, Work ethics, Indian vision of, Moral and non-moral valuation, Standards and principles, Value judgments. Importance of cultivation of values, Sense of duty, Devotion, Self reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

Unit-II
Personality and Behavior Development-Soul and scientific attitude, God and scientific attitude, Positive thinking, Integrity and discipline, Punctuality, Love and Kindness, Avoiding fault finding, Free from anger, Dignity of labor, Universal brotherhood and religious tolerance, True friendship, Happiness Vs suffering love for truth, Aware of self destructive habits, Association and cooperation, Doing best, Saving nature.

Unit-III
Character and Competence-Science Vs God, Holy books Vs blind faith, Self management and good health, Equality, Nonviolence, Humanity, Role of women, All religions and same message, Mind your mind, Self control, Honesty, Studying effectively.

Unit-IV
Professional consciousness Ethics: Ethical Human conduct, Development of human consciousness, Implications of value based living, Holistic technologies, Production systems, Universal human order, Code of conduct.

Unit-V
Legislative procedures: Rights and Rules. Human Rights, Valuable groups, Copy rights, IPR, RTI Act, Lokpal, Ombudsman.

Text Books
1. Chakraborty,S.K., Values and Ethics for Originations Theory and Practice, Oxford University Press, New Delhi, 2001
2. R R Gaur, R Saugal, G P Bagaria, “A foundation course in Human values and Professional Ethics”, Excel books, New Delhi, 2010.

Reference Books

1. Frankena, W.K., Ethics, Prentice Hall of India, New Delhi, 1990.
2. Kapoor, S.K., Human rights under International Law and Indian Law, Prentice Hall of India, New Delhi, 2002.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL AND ELECTRONICS TECHNOLOGY

Course Code: GR14A2026 L:2 T:0 P:1 C:3
II Year II Semester

Unit-I
DC Machines: Principle of operation of DC Generator – EMF equation - types – DC motor types –torque Equation – applications – three point starter.

Unit-II
Transformers: Principle of operation of single phase transformers –EMF equation – losses – efficiency and Regulation.

AC Machines: Principle of operation of alternators – regulation by synchronous impedance method –Principle of Operation of induction motor – slip – torque characteristics – applications

Unit-III
Semiconductors and pn Junction Diode: Types of semiconductors, Conductivity, Energy bands, charge carriers, doping. Fermi level, temperature effects, Drift and diffusion currents, recombination and life time, Diode current equations, Junction capacitance, Diode switching characteristics, Zener and avalanche break down Diodes.

Unit-IV
Diode Applications, Special Diodes: Types of Rectifiers: Half wave, Full wave and Bridge rectifiers, operation and analysis of rectifiers without filters, Operation of rectifiers with filters types: L , C, LC, and pi. Special Diodes; Tunnel, LDR, LED, LCD, Varactor Didode.

Unit-V
B**ipolar Junction Transistor:** Transistor Diode Equivalent Circuit, Transistor biasing, DC load line, current components in BJT, Modes of transistor operation, BJT input and output characteristics in CB, CE CC configuration, BJT as an amplifier, BJT stabilizing and biasing techniques, Thermal runway, heat sinks.

Teaching Methodologies
1. Power Point presentations
2. Tutorial Sheets
3. Assignments
4. Lab experiments with Multisim software

Text Books

1. Electrical machines P.S Bimbra Khanna Publishers
2. David A. Bell; Electronic Devices and Circuits, Oxford University Press, 5th edition, 2008.
3. R.L. Boylestad and Louis Nashelsky; Electronic Devices and Circuits, Pearson/Prentice Hall, 9th Edition, 2006.

Reference Books

1. Electrical Technology B.L.Theraja, Schand Publishers
2. T.F. Bogart Jr J.S.Beasley and G.Rico; Electronic Devices and Circuits – Pearson Education, 6th edition, 2004.
3. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, Prentice Hall of India(p) Ltd,3rd Ed., 2002.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRODUCTION TECHNOLOGY

Course Code: GR14A2027 L:3 T:2 P:0 C:4
II Year II Semester

Unit-I

Metal Casting Processes: Sand casting – Sand moulds - Type of patterns – Pattern materials – Pattern allowances – Types of Moulding sand – Properties – Core making – Methods of Sand testing – Moulding machines – Types of moulding machines - Melting furnaces –Special casting processes – Shell, investment casting – Ceramic mould – Lost Wax process – Pressure die casting – Centrifugal casting – CO2 process– Sand Casting defects – Inspection methods

Unit-II

Joining Processes Fusion welding processes – Types of Gas welding – Equipments used – Flame characteristics – Filler and Flux materials - Arc welding equipments - Electrodes –Coating and specifications – Principles of Resistance welding – Spot/butt, seam welding – Percusion welding - Gas metal arc welding – Flux cored – Submerged arc welding – Electro slag welding – TIG and MIG welding – Principle and application of special welding processes - Plasma arc welding – Thermit welding – Electron beam welding –Friction welding – Diffusion welding – Weld defects – Brazing and soldering process –Methods and process capabilities – Filler materials and fluxes – Types of Adhesive bonding.

Unit-III

Bulk Deforming Processes: Hot working and cold working of metals – Forging processes – Open, impression and closed die forging – Characteristics of the process – Types of Forging Machines –Typical forging operations – Rolling of metals – Types of Rolling mills - Flat strip rolling– Shape rolling operations – Defects in rolled parts - Principle of rod and wire drawing -Tube drawing — Principles of Extrusion – Types of Extrusion – Hot and Cold extrusion— Equipments used.

Unit-IV

Sheet Metal Processes: Sheet metal characteristics - Typical shearing operations, bending and drawing operations – Stretch forming operations — Formability of sheet metal – Test methods– Working principle and application of special forming processes - Hydro forming –Rubber pad forming – Metal spinning – Introduction to Explosive forming, Magnetic pulse forming, Peen forming, Super plastic forming.

Unit-V

Manufacturing of Plastic Components: Types of plastics - Characteristics of the forming and shaping processes – Moulding of Thermoplastics – Working principles and typical applications of - Injection moulding –Plunger and screw machines – Compression moulding, Transfer moulding – Typical industrial applications – Introduction to Blow moulding – Rotational moulding – Film blowing – Extrusion - Thermoforming, - Bonding of Thermoplastics.

Teaching Methodology

1. Power point Presentations, Working models, white board & marker

Text Books

1. Hajra Choudhury, "Elements of Workshop Technology, Vol. I and II", Media Promotors Pvt Ltd., Mumbai, 2001
2. S.Gowri, P.Hariharan, and A.Suresh Babu, "Manufacturing Technology 1", Pearson Educatio , 2008.
3. P.N. Rao," Manufacturing Technology", Tata McGraw-Hill Publishing Limited, IIEdition, 2002.

Reference Books

1. B.S. MagendranParashar & R.K. Mittal," Elements of Manufacturing Processes", Prentice Hall of India, 2003.
2. P.C. Sharma, "A text book of production technology", S. Chand and Company, IVEdition, 2003.
3. Begman, 'Manufacturing Process", John Wilely & Sons, VIII Edition, 2005.
4. SeropeKalpajian, Steven R.Schmid, Manufacturing Engineering and Technology, Pearson Education, Inc. 2002(Second Indian Reprint).
5. Beddoes.J and Bibby M.J, 'Principles of Metal Manufacturing Processes', Elsevier, 2006.
6. Rajput R.K, 'A text book of Manufacturing Technology', Lakshmi Publications, 2007.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

FLUID MECHANICS AND HYDRAULIC MACHINERY

Course Code: GR14A2028 L:3 T:1 P:0 C:4
II Year II Semester

Unit-1

Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapour pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure –measurement of pressure- Piezometer, U-tube and differential manometers.

Fluid Kinematics: Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational and irrotational flows-equation of continuity for three dimensional flows.

Unit-II

Fluid Dynamics: Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend. Steam function and Velocity potential

Unit-III

Internal and External Flows: Flow through tubes and plates -Shear stress and velocity distributions- Navier-stokes equations of fluid motion(Explanation only)- Reynolds's experiment- Darcy-Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pilot tube, venture meter and orifice meter.

Unit-IV

Basics of turbo machinery : Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes. Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

Unit-V

Hydraulic Turbines: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube theory- functions and efficiency. Performance of hydraulic turbines: Geometric similarity, Unit and specific

quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

Hydraulic Pumps: Classification, working, work done – manomertic head-losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH. Reciprocating pumps : Working, Discharge, slip, indicator diagrams. Power required to drive the pump. Air vessels

Teaching Methodology

1. Power point Presentations, Working models, white board & marker

Text Books

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by R K Rajput.

Reference Books

1. luid Mechanics and Hydraulic machines by R K Bansal, Laxmi publications.
2. Fluid Mechanics & Hydraulic Machines : Problems & Solutions by K.Subrmanya /TMH private limited.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

INTERNAL COMBUSTION ENGINES

Course Code: GR14A2029 L:3 T:1 P:0 C:4
II Year II Semester

Unit-I

Introduction and Analysis of Actual Cycles I.C. ENGINES: Classification - Working principles, Valve and Port Timing Diagrams, Air – Standard air-fuel and actual cycles. Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.Engine systems, cooling and lubrication systems.

Unit-II

Combustion S.I. Engines: Fuel system components, Carburetor, Fuel Injection System, Ignition systems Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

C.I. Engines: Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

Unit-III

Testing and Performance Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

Unit-IV

Reciprocating and Rotary Compressors Compressors: Classification-positive displacement and roto dynamic machinery-Power producing and power absorbing machines, fan, blower and compressor-positive displacement and dynamic types-reciprocating and rotary types.

Reciprocating: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression.

Rotary (Positive displacement type): Roots Blower, vane sealed compressor, Lysholm compressor –mechanical details and principle of working – efficiency considerations.

Unit-V

Dynamic and Axial Flow Compressors Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation –velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- Pressure rise calculations –Polytropic efficiency.

Teaching Methodology

Power point Presentations, Working models, white board & marker

Text Books

1. I.C. Engines / V. GANESAN- TMH
2. Thermal Engineering / Rajput / Lakshmi Publications

Reference Books

1. I C Engines – Mathur & Sharma – DhanpathRai& Sons.
2. Engineering fundamentals of IC Engines – Pulkrabek / Pearson /PHI
3. Thermal Engineering / Rudramoorthy– TMH
4. Thermodynamics & Heat Engines / B. Yadav/ Central Book

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED MECHANICS OF SOLIDS

Course Code: GR14A2030 L:3 T:1 P:0 C:4
II Year II Semester

Unit-I
Thin Cylinders and Spherical Shells: Stresses and strains in thin cylinders, thin spherical shell.

Thick cylinders: Thick cylinders subjected to internal and external pressure and compound cylinders.

Unit-II
Fixed Beams: Fixing moments and Reactions for a fixed beam of uniform section, Effect of sinking support, slope and deflection. Construction of shear force and bending moment diagrams.
Unit-III
Continuous Beams: Reaction at the supports, and support moments Effect of sinking of supports.

Unit-IV
Columns and Struts: Columns with one end free and the other fixed, Both ends fixed, One end fixed and other hinged, Limitation of Euler's formula, Rankine's Formula, Column with initial curvature, Column carrying eccentric load, Laterally loaded columns.

Unit-V
Bending of Curved Beams: Stresses in bars of circular, rectangular and trapezoidal sections.

Stresses due to rotation: Wheel rim, disc of uniform thickness, disc of uniform strength.

Teaching Methodology
Power point Presentations, Working models, white board & marker

Text Books
1. Strength of materials by Dr. Sadhu Singh, Khanna Publishers
2. Strength of Materials by R.K .Rajput

Reference Books

1. Analysis of Structures, Vol. 1, 1993 edition, by Vazirani and Ratwani.
2. Mechanics of solids by Crandal, Dahl and Lardner.
3. Theory of structures by S.Ramamrutham and R. Narayan, Dhanpat Rai Publishers

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRODUCTION TECHNOLOGY LAB

Course Code: GR14A2031 L:0 T:0 P:2 C:2
II Year II Semester

List of Experiments

I. CASTING

1. Pattern Design and making-for one casting drawing.
2. Sand properties testing-Exercise-for strengths and permeability–1
3. Moulding, Melting and Casting-1Exercise

II. WELDING

1. ARC Welding Lap & Butt Joint-2Exercises
2. Spot Welding-1Exercise
3. TIG Welding-1Exercise
4. Plasma welding and Brazing - 2 Exercises (Water Plasma Device)

III. MECHANICAL PRESS WORKING

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press: Deep drawing and extrusion operation.
3. Bending and other operations

IV. PROCESSING OF PLASTICS

1. Injection Moulding
2. Blow Moulding

Teaching Methodology

Welding Equipment, Plastic Moulding Equipment, Casting Equipment

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL TECHNOLOGY LAB

Course Code: GR14A2032 L:0 T:0 P:2 C:2
II Year II Semester

Contents

1. Verification of KCL and KVL.
2. Verification of Superposition and Reciprocity Theorem.
3. Verification of Maximum Power Transfer Theorem.
4. Verification of Thevenin's Theorem.
5. Magnetization characteristics of D.C. Shunt generator.
6. Speed control of DC motor.
7. Swinburne's Test on DC shunt machine.
8. Brake test on DC shunt motor.
9. OC and SC tests on Single-phase transformer.
10. Brake test on 3-phase Induction motor.
11. Regulation by an alternator by synchronous impedance method.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Code: GR14A2033 L:0 T:0 P:2 C:2
II Year II Semester

List of Experiments

1. Verification of Bernoulli's theorem and draw the HGL, TEL
2. Determine the Coefficient discharge of Venturi meter and Orifice meter
3. Determine the Darcy's Friction factor in various diameters of pipes
4. Determine the Minor Losses (Different Valve connections, Sudden Expansion, Sudden Contraction, Bends, joints) in various pipe fittings
5. Determine the coefficient of impact of Jet on given Vanes
6. Determine the overall efficiency of Pelton wheel Turbine at Constant Speed and Constant Head
7. Determine the overall efficiency of Francis Turbine at Constant Speed and Constant Head
8. Determine the overall efficiency of Kaplan Turbine at Constant Speed and Constant Head
9. Determine the overall efficiency of Single Stage Centrifugal pump at Constant Speed and Constant Head
10. Determine the overall efficiency of Multistage Centrifugal pump at Constant Speed and Constant Head
11. Determine the overall efficiency of Reciprocating pump at Constant Speed and Constant Head
12. Determine the Turbine Speed and Flow rate by using Turbine Flow meter

Teaching Methodology

Experimental Test Rigs, Turbines and Pumps

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENVIRONMENTAL SCIENCE

Course Code: GR14A2001 L:4 T:0 P:0 C:0
II Year II Semester

Unit-I

Introduction to Environment, Ecology and Ecosystems: Definition, Importance and Scope of Environmental Studies, Public Awareness and Participation. Ecology, Concept of Ecosystem, Classification of Ecosystem, Structure, Components and Function of Ecosystem. Typical Ecosystem, Food Chain, Food Web. Biodiversity- Types and values.

Unit–II

Natural Resources: Definition, Occurrence, Classification of resources, Important natural resources for human society, Utilization-positive and negative effects of Water resources, Mineral resources, Forest resources, Energy resources, Land resources. Role of individuals in conservation of important natural resources.

Unit-III

Environmental Pollution: Definition, Classification of Pollution, Types of Pollution and Pollutants. Causes, effects and control of – Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal Pollution and Nuclear Pollution.

Unit–IV

Environmental Problems and Management Policies: Natural Disasters-Types, causes and effects; Global warming, Climate change-El Nino-La Nina, Ozone layer- location, role and degradation; Deforestation and desertification. Management: Technological solutions, Preventive methods, control techniques; Green Belt development, Rainwater harvesting, Renewable and alternate resources.

Unit-V

National Policy on Environment Protection and Sustainability: Air (Pollution and prevention) act 1981; Water (Pollution and prevention) Act 1974; Pollution Act 1977; Forest Conservation Act; Wildlife Protection Act; Municipal solid waste management and handling Act; Biomedical waste management and handling Act; Hazardous waste management and handling rules. Role of IT in environment, environmental ethics, environmental economics.

Sustainable development: Cause and Threats to sustainability; Strategies for achieving sustainable development; Concept of Green buildings and Clean Development Mechanism (CDM).

Teaching Methodology

1. White board and marker
2. OHP and Field visit

Text Books

1. Text Book of Environmental Studies, ErachBarucha. University Press
2. Text book of Environmental Science and Technology by M.Anji Reddy 2007

Reference Books

1. Biotechnology & Environmental Chemistry. Surinder Jeswal& Anupama Deswal, DhanpatRai & Co Pvt. Ltd.
2. A Text Book of Environmental Science. Aravind Kumar. APH Publishing Corporation.
3. Glimpses of Environment. Dr. KVSG. Murali Krishna. Environmental Protection Society

III-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: GR14A2104 L:2 T:1 P:0 C:3
III Year I Semester

Unit-I

Introduction & Demand Analysis: Definition and Scope: Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting:Factors governing demand forecasting, methods of demand forecasting.

Unit-II

Production & Cost Analysis: Production Function: Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit-III

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business:Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types. New Economic Environment: Changing Business Environment in Post-liberalization scenario.

Unit-IV

Capital Budgeting: Capital:Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method and Internal Rate of Return (IRR) (simple problems).

Unit-V

Introduction to Financial Accounting & Financial Analysis: Accounting Concepts and Conventions - Double-Entry Book Keeping. Accounting Cycle:

Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital structure Ratios and Profitability ratios. Du Pont Chart.

Teaching methodologies

- Lectures
- Power Point presentations
- Seminars
- Working out problems on black/white boards,
- Conducting tutorials
- Giving homework and/or assignments etc.

Text Books

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2009.
2. Atmanand: Managerial Economics, Excel, 2008.

Reference Books

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2009
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 2009
3. Lipsey&Chrystel, Economics, Oxford University Press, 2009

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MACHINE DESIGN

Course Code: GR14A3026 L:3 T:1 P:0 C:4
III Year I Semester

UNIT-I
INTRODUCTION: General considerations in design, Engineering Materials and their properties –Selection of Materials –Manufacturing consideration in design. Tolerances and fits.
Stresses in Machine Members: Simple stresses – Combined stresses -factor of safety- Principal stresses– Various theories of failure.

UNIT-II
Strength of Machine Elements: Stress concentration – Theoretical stress Concentration factor – Fatigue stress concentration factor-notch sensitivity – Endurance limit – Design of members subjected to variable loading –Estimation of Endurance strength – Goodman's line – Soderberg's line – Gerber's parabola.

UNIT-III
Bolted, Rivetted and Welded Joints: Design of bolts with pre-stresses – Design of joints under eccentric loading, Riveted and Welded Joints: Design of joints with initial stresses – eccentric loading.

UNIT-IV
Keys, Cotters and Knuckle Joints: Design of Keys-stresses in keys- Cotter joints-Spigot and Socket, Sleeve and Cotter, Gib and Cotter joints-Knuckle joints.

UNIT -V
Shafts: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined,axial, bending and torsional loads – Shaft sizes – BIS codes. Shaft Couplings: Rigid couplings – Muff, Split Muff and Flange couplings. Flexible couplings-Bushed pin type coupling–Universal coupling-Oldham's coupling,

TEXT BOOKS
1. Machine Design, V.Bandari TMH Publishers
2. Machine Design by Shigley,MH Publishers
3. Machine design – Pandya and Shah.

REFERENCES BOOKS

1. Machine design / Schaum Series.
2. Design Data hand Book, S MD Jalaludin, AnuRadha Publishers.
3. Machine design – R.S.Khrumi& J K Gupta

TEACHING METHODOLOGY

Power point Presentations, Working models, white board & marker

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

APPLIED THERMODYNAMICS

Course Code: GR14A3027 L:3 T:1 P:0 C:4
III Year I Semester

UNIT-I

Steam Power Cycles: Carnot cycle, Rankine cycle, Modified Rankine - Schematic layouts, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration &Reheating. Binary vapour cycle Combustion: Fuels and combustion, basic chemistry, combustion equations, stoichiometric air fuel ratio, volumetric and mass basis conversion, Flue gas analysis by Orsat apparatus.

UNIT-II

Boilers : Classification – Working principles – with sketches including H.P.Boilers, L.P.Boilers and Modern H.P.Boilers – Mountings and Accessories – Working principles, Boiler horse power, equivalent of evaporation, efficiency and heat balance.Draught, classification – Height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – Artificial draught: induced, forced, balanced and steam jet draught,

UNIT-III

Steam Nozzles: Function of a nozzle – applications - types, Flow through nozzles, thermodynamic analysis, assumptions -velocity of nozzle at exit-Ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio, criteria to decide nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line.

Steam Condensers: Requirements of steam condensing plant – Classification of condensers – workingPrinciple of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its affects, Air pump- cooling water requirement. Cooling towers.

UNIT-IV

Steam Turbines: Classification – Impulse turbine ,De-Laval Turbineits features; Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency.-.

Reaction Turbine: Mechanical details – principle of operation, thermodynamic analysis of a stage.-Degree of reaction –velocity diagram – Parson's reaction turbine – condition for maximum efficiency.

Compounding: Methods to reduce rotor speed-Velocity compounding and pressure compounding, pressure velocity compounding, Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine.

UNIT-V

Gas Turbines: Simple gas turbine plant – Ideal cycle, essential components – actual cycle –methods for improvement of performance - regeneration, inter cooling and reheating –Closed and Semi-closed cycles – merits and demerits, Brief concepts about compressors, combustion chambers and turbines of Gas Turbine Plant.

Jet Propulsion: Principle of Operation –Classification of jet propulsive engines – Working Principles withSchematic diagrams and representation on T-S diagram - Thrust, Thrust Power and Propulsion Efficiency– Turbo jet engines – Needs and Demands met by Turbo jet – Schematic Diagram, Thermodynamic Cycle,Performance Evaluation Thrust Augmentation – Methods.

Rockets: Working Principle – Classification – Propellant Type – Thrust, Propulsive Efficiency – Specific Impulse – Solid and Liquid propellant Rocket Engines.

TEXT BOOKS

1. Thermal Engineering / R.K. Rajput / Lakshmi Publications
2. Thermal Engineering-P.L.Ballaney/ Khanna publishers
3. Thermal Engineering/R.S.Khurmi/JS Gupta/S.Chand.

REFERENCE BOOKS

1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot
2. Gas Turbines and Propulsive Systems – P.Khajuria&S.P.Dubey - /Dhanpatrai
3. Gas Turbines / Cohen, Rogers and SaravanaMuttoo / Addison Wesley – Longman
4. Thermal Engineering-M.L.Marthur& Mehta/Jain bros
5. Gas Turbines – V.Ganesan /TMH

Teaching Methodology

Power Point Presentations, Working models, White Board & Marker

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DYNAMICS OF MACHINERY

Course Code: GR14A3028 L:3 T:1 P:0 C:4
III Year I Semester

UNIT-I
Gyroscopes: Effect of precession, Stability of moving vehicles such as motor car, motor cycle, aeroplanes and ships.

UNIT-II
Turning Moment Diagram and Fly Wheels: Turning moment–Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams–Fluctuation of energy–Flywheels and their design.

Unit-III
Friction: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis: lubricated surfaces, boundary friction, and film lubrication.
Clutches: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.

Unit-IV
Governors: Watt, Porter and Proell governors. Spring loaded governors–Hartnell and hartung with auxiliary springs. Sensitiveness, isochronism and hunting.

Vibration: Free Vibration of mass attached to vertical spring–oscillation of pendulums, centers of oscillation and suspension. Transverse loads, vibrations of beams with concentrated loads.

Unit-V
Balancing of Rotating Masses: Balancing of rotating masses Single and multiple–single and different planes.
Balancing of Reciprocating Masses: Primary, Secondary, and higher balancing of reciprocating masses, Analytical and graphical methods. Unbalanced forces and couples – examination of "V" multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing–Hammerblow, Swaying couple, variation of tractive efforts.

Text Books
`1. `Theory of Machines / S.S Ratan/ Mc. GrawHill Publ.
`2. `Theory of Machines / Jagadish Lal & J.M.Shah / Metro politan.

Reference Books

1. Theory of Machines / Shiegly / MGH
2. Theory of Machines / Thomas Bevan / CBS Publishers
3. Theory of machines / Khurmi / S.Chand.

Teaching Methodology

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MACHINE TOOLS

Course Code: GR14A3029 L:3 T:1 P:0 C:4
III Year I Semester

UNIT - I
Metal Cutting: Elementary treatment of metal cutting theory – Elements of cutting process – Geometry of single point tool and angles chip formation and types of chips – built up edge and its effects chip breakers. Mechanics of orthogonal cutting –Merchant's Force diagram, cutting forces –tool life equation, cutting fluids, machinability – MRR, Tool materials.

UNIT II
Engine lathe : working principle, specification of lathe – types of lathe – work piece holders, tool holders –Taper turning methods - thread cutting – Lathe attachments. Turret and capstan lathes – collet chucks – other work holders – tool holding devices – box and tool layout. Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes

UNIT-III
Shaping, slotting and planning machines – Principles of working – Principal parts – specification classification, operations performed. Kinematic scheme of the shaping slotting and planning machines, machining time calculations.
Drilling and Boring Machines – Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines – Jig Boring machine - Deep hole drilling machine.

UNIT-IV
Milling machine: working principle – specifications – classifications of milling machines – Principal features of horizontal, vertical and universal milling machines – machining operations, Types geometry of milling cutters – milling cutters – methods of indexing – Accessories of milling machines, kinematic scheme of milling cutters .

UNIT-V
Grinding machine: Fundamentals – Theory of grinding – classification of grinding machine – cylindrical and surface grinding machine – Tool and cutter grinding machine – special types of grinding machines – Different types of abrasives – bonds specification of a grinding wheel and selection of a grinding wheel - Kinematic scheme of grinding machines.

Lapping, honing and broaching machines – comparison to grinding – lapping and honing

Jigs and Fixtures: Design principles of Jigs and fixtures and uses. Classification of Jigs & Fixtures – Principles of location and clamping – Types of clamping & work holding devices. Typical examples of jigs and fixtures.

TEXT BOOKS

1. Production Technology by R.K. Jain and S.C. Gupta.
2. Workshop Technology – B.S.RaghuVamshi – Vol II

REFERENCES

1. Machine Tools – C.Elanchezhian and M. Vijayan / Anuradha Agencies Publishers.
2. Production Technology by H.M.T. (Hindustan Machine Tools).
3. Metal Cutting by Juneja

Teaching Methodology

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

Course Code: GR14A3100 L:0 T:0 P:2 C:2
III Year I Semester

Unit-I
Functional English: Starting a conversation, responding appropriately and relevantly. Body Language, Role play in different situations

Unit-II
Vocabulary: Synonyms & Antonyms, Word Roots, One word substitutes, Prefixes & Suffixes, Study of word origin, Idioms and Phrases, Analogy.

Unit- III
Group Discussion: Introduction to Group Discussion its features and qualities desired in a participant of Group Discussion.

Unit-IV
Presentation Skills: Knowing audience; acquiring content; organizing ideas; foreseeing the possible clarifications sought; adopting of appropriate medium; positive stage presence; Presenting and feedback

Unit-V
Letter Writing & Résumé Writing: Manual and Emailing; types and formats; content and body of the letter. Email etiquettes; Resume Writing, tools required for writing resume's, role of cover letter in a resume.

Unit-VI
Interview Skills: Introduction, various types of questions asked in an interview, qualities required to be a competent interviewee.

Unit-VII
Reading comprehension: Introduction, types of reading, qualities of a good reader

Unit-VIII
Technical Report Writing: Formats and types of reports

Reference Books:

1. English language laboratories: A Comprehensive Manual; NiraKonar, PHI Learning Pvt.Ltd.,Delhi.
2. Effective Technical Communication: A Guide for Scientist and Engineers;Barun K. Mitra, OUP.
3. Great Answers to Though Interview Questions; Martin John Yate; Seventh Edition;Kogan Page.
4. Business Communication; HorySankarMukerjee;OUP.
5. Technical Communication, Meenakshi Raman, Sangeeta Sharma, Oxford higher Education.
6. Professional Presentations; Malcom Goodale; Cambridge University Press.
7. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
8. Effective Technical Communication, M. Ashraf Rizvi, Tata McGraw Hill.
9. Communication Skills, Sanjay Kumar, PushpLatha, Oxford Higher Education.
10. Business communication; Second Edition,Prentice Hall of India , New Delhi.
11. English for Engineers Made Easy, AedaAbidi, Ritu Chaudhry, Cengage Learning.
12. Effective Business Communication ; Seventh Edition; Murphy, HertaA.,Herbert W. Hildebrandt, and Jane P.Thomas 2009,Tata Mc Graw-Hill Publishing Company Limited, New Delhi.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

THERMAL ENGINEERING LAB

Course Code: GR14A3030 L:0 T:0 P:2 C:2
III Year I Semester

List of Experiments

1. I.C.Engines Valve / Port Timing Diagrams
2. I.C.Engines Performance Test (4-Stroke Diesel Engines)
3. I.C. Engines Performance Test on 2-Stroke Petrol
4. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Petrol Engine and retardation and motoring test on 4-stroke diesel engine
5. I.C.Engines Heat Balance.
6. I.C.Engines Air / Fuel Ratio and Volumetric Efficiency
7. Performance Test on Variable Compression Ratio Engines, economical speed test
8. Performance Test on Reciprocating Air–Compressor Unit
9. Study of Boilers
10. Dis-assembly /Assembly of Engines.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MACHINE TOOLS LAB

Course Code: GR14A3031 L:0 T:0 P:2 C:2
III Year I Semester

List of Experiments

1. Preparation of Work specimen for lathe, drilling, shaping, slotting and milling
2. Plain &Step Turning operation on Lathe machine
3. Taper Turning on Lathe machine
4. Thread cutting operation on-lathemachine and Grooving operation.
5. Knurling operation on-lathemachine.
6. Drilling operation and boring operation on lathe machine
7. Drilling and counter boring operation on lathe machine
8. Drilling and internal thread cutting using Radial drilling machine
9. Edge preparation using Shaping machine
10. Key way cutting operation in Slotting machine
11. Face milling operation using Milling machine
12. Grinding of tool angles using Cylindrical /Surface grinding machine

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DESIGN OF MACHINE MEMBERS

Course Code: GR14A3032 L:3 T:1 P:0 C:4
III Year II Semester

Unit-I
Bearings: Types of Journal bearings – Lubrication – Bearing Modulus – Full and partial bearings–Clearance ratio–Heat dissipation of bearings, bearing materials–Journal bearing design–Ball and roller bearings–Static loading of Ball& Roller bearings, Bearing life. Dynamic load equivalent radial load design-selection of Ball and Roller bearings.

Unit-II
Engine parts: Pistons, Forces acting on piston–Construction Design and proportions of piston, Cylinder, Cylinder liners.

Unit-III
Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends .
Crank and Crank shafts: Crank pin, Crank shaft - strength and proportions of over hung and center cranks.

Unit-IV
Gears: Spur gears-Helical gears–Load concentration factor–Dynamic load factor. Surface compressive strength – Bending strength – Design analysis of spur gears – Estimation of centre distance, module and face width, check for plastic deformation. Check for dynamic and wear considerations.

Unit-V
Design of power screws: Design of screw-Stresses in power screws, Design of screw jack, design of nut, compounds crew, differential screw -possible failures.

Mechanical Springs: Stresses and deflections of helical springs–Extension-compression springs – Springs for fatigue loading – natural frequency of helical springs–Energystoragecapacity–helicaltorsionsprings–Co-axialsprings,leaf springs.

TEXT BOOKS
1. Machine Design by Joseph Edward Shigley- TMH 2001
2. Machine design – R.S.Khrumi & J K Gupta

REFERENCES

1. Design Data hand Book, S MD Jalaludin, Anuradha Publishers
2. Data Books : (I) P.S.G. College of Technology (ii) Mahadevan
3. Design Data hand Book, S MD Jalaludin, AnuRadha Publishers

TEACHING METHODOLOGY

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

HEAT TRANSFER

Course Code: GR14A3033 L:3 T:1 P:0 C:4
III Year II Semester

UNIT-I

INTRODUCTION AND CONDUCTION HEAT TRANSFER: Modes and mechanisms of heat transfer – Basic laws of heat transfer -- General discussion about applications of heat transfer. General heat conduction equation in Cartesian, cylindrical and spherical coordinates – Simplification and forms of the field equation – Steady, unsteady and periodic heat transfer – Initial and boundary conditions.

UNIT-II

ONE DIMENSIONAL STEADY STATE CONDUCTION HEAT TRANSFER

One dimensional steady state conduction heat transfer through homogeneous slabs, hollow cylinders and spheres – Overall heat transfer coefficient – Electrical analogy – Critical radius of insulation. Variable Thermal conductivity – Systems with heat sources or heat generation. Extended surface (fins) heat transfer – Long fin, Fin with insulated tip and short fin, Performance of fins, Application to error measurement of temperature.

ONE DIMENSIONAL TRANSIENT CONDUCTIVE HEAT TRANSFER

One dimensional transient conduction heat transfer in systems with negligible internal resistance. Significance of Biot and Fourier numbers. Chart solutions of transient conduction systems – Sensitivity of thermometer – Significance of time constant -- Concept of Functional Body.

UNIT-III

CONVECTIVE HEAT TRANSFER: Classification of systems based on causation of flow, condition of flow, configuration of flow – Applications for developing semi empirical non- dimensional correlation for convective heat transfer – dimensional analysis – significance of non-dimensional numbers – Concepts of Continuity, Momentum and energy equation.

Forced convection: External flows: Concepts about hydrodynamic and thermal boundary layer – Use of empirical correlations for convective heat transfer over flat plates, cylinders and spheres. Internal flows: Concepts about Hydrodynamic and thermal entry lengths – use of empirical relations for horizontal pipe flow and annulus flow.

Free convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate – use of empirical relations for vertical plates and pipes.

UNIT-IV

HEAT TRANSFER WITH PHASE CHANGE AND HEAT EXCHANGERS

Boiling – Pool boiling – Regimes Calculations on Nucleate boiling, Critical Heat flux and film boiling.

Condensation – film wise and drop wise condensation – Nusselt's theory of condensation on vertical plate – Film condensation on vertical and horizontal cylinders using empirical correlations.

Heat Exchangers: Classification of heat exchangers – Overall heat transfer coefficient and fouling factor – Concepts of LMTD and NTU methods – Effectiveness of heat exchangers.

UNIT-V

RADIATION HEAT TRANSFER

Emission characteristics and laws of black body radiation – Total and monochromatic quantities – laws of Planck, Wein, Kirchoff, Lambert, Stefan and Boltzmann – Heat exchange between two black bodies – Concept of shape factor – Emissivity – Heat exchange between grey bodies – radiation shields – Electrical analogy for radiation networks – Irradiation, radiosity.

Practicals:

TEXT BOOKS

1. Heat and Mass transfer – D.S. Kumar / S.K.Kataria& Sons
2. Fundamentals of Engg. Heat and Mass Transfer – R.C.Sachdeva / New Age International

REFERENCE BOOKS

1. Heat transfer – P.K.Nag / TMH
2. Heat transfer – Holman / TMH
3. Heat and Mass transfer – Cengel / McGraw Hill
4. Heat and Mass transfer – R.K.Rajput / S.Chand& Company Ltd
5. Heat and Mass Transfer – Kodandaraman

Teaching Methodology

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

METROLOGY AND SURFACE ENGINEERING

Course Code: GR14A3034 L:2 T:1 P:0 C:3
III Year II Semester

UNIT-I

Systems of limits and fits: Introduction, normal size, tolerance, limits, deviations, allowance, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly. Indian standard Institution system – British standard system, International Standard system for plain and screwed work.

UNIT-II

Linear Measurement : Length standard, line and end standard, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.

MEASUREMENT OF ANGLES AND TAPERS :Different methods – Bevel protractor – angle slip gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.

LIMIT GAUGES :Taylors principle – Design of Go and No Go gauges, plug ring, snap, gap, taper, profile and position gauges.

UNIT-III

Optical Measuring Instruments : Tool maker's microscope and its uses – collimators, optical projector – optical flats and their uses, interferometer.

FLAT SURFACE MEASUREMENT :Measurement of flat surfaces – instruments used – straight edges – surface plates – optical flat and auto collimator.

UNIT-IV

Surface Roughness Measurement: Differences between surface roughness and surface waviness-Numerical assessment of surface finish – CLA, R.M.S Values – Rz values, Methods of measurement of surface finish-profilograph,Talysurf, ISI symbols for indication of surface finish.

MEASUREMENT THROUGH COMPARATORS :Comparators – Mechanical, Electrical and Electronic Comparators, pneumatic comparators and their uses in mass production.

UNIT-V

Screw Thread Measurement: Element of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch, profile thread gauges.

Machine Tool Alignment Tests: Requirements of Machine Tool Alignment Tests, Alignment tests on lathe, milling, drilling machine tools.. Preparation of acceptance charts.

Gear Measurement: Gear measuring instruments, Gear tooth profile measurement. Measurement of diameter, pitch pressure angle and tooth thickness.

Coordinate Measuring Machines: Types of CMM, Role of CMM, and Applications of CMM.

TEXT BOOKS

1. Engineering Metrology / I C Gupta./DanpathRai
2. Engineering Metrology / R.K. Jain / Khanna Publishers

REFERENCES

1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson
3. Hndbook of Tribology: Materials, Coating, and Surface Treatments/ Bharat Bhushan and B.K.Gupta.
4. Surface Engineering with Lasers/ Dehosson J.T.
5. Surface Engineering for corrosion and wear resistance / JR Davis/ Woodhead Publishers.

Teaching Methodology

Power point Presentations, Working models, white board & marker

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

INDUSTRIAL MANAGEMENT

Course Code: GR14A3035 L:3 T:1 P:0 C:4
III Year II Semester

UNIT-I

Concepts of Management and Organisation – Functions of Management **–** Evolution of Management Thought : Taylor's Scientific Management, Fayol's Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne Experiments, Hertzberg's Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs – Systems Approach to Management.

Designing Organisational Structures : Basic concepts related to Organisation - Departmentation and Decentralisation, Types of Organisation Structures (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, operations management, inverted pyramid structure, and their merits, demerits.

UNIT-II

Plant Layout: Plant location, definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant- Matrix approach. Plant Layout – definition, objectives, types of production, types of plant layout – various data analyzing forms-travel chart.

Work study - Definition, objectives, Method study - definition, objectives, steps involved- various types of associated charts-difference between micromotion and memomotion studies. Work measurement- definition, time study, steps involved-equipment, different methods of performance rating- allowances, standard time calculation. Work Sampling – definition, steps involved, standard time calculations, and differences with time study.

UNIT-III

Materials Management-Objectives, Inventory – functions, types, associated costs, inventory classification techniques, EOQ, EPQ, Selective inventory controll - ABC and VED analysis. Inventory Control Systems-Continuous review system-periodical review system.

Stores Management: Objectives, Stores Records. Purchase management: Objectives, duties of purchase of manager, associated forms Supply chain management.

UNIT-IV

Project Management PERT / CPM: Project management, network modeling-probabilistic model, various types of activity times estimation-programme

evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.

Human Resource Management & Marketing Management: Functions of HRM, Job Evaluation, different types of evaluation methods. Job description, Merit Rating.- difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs selling, marketing mix, product life cycle Channels of distribution .

UNIT-V

Inspection and quality control: types of inspections - Statistical Quality Control-techniques-variables and attributes - assignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan- single sampling and double sampling plans-OCcurves. Introduction to TQM - Quality Circles, ISO 9000 series procedures.

Contemporary management practices & Strategic management: SWOT Analysis, Basic cocepts of Just-in-Time (JIT), Six Sigma, Capability Maturity Model (CMM), Enterprise Resource Planning (ERP), Business Process Outsoursing (BPO), Bench Marking, Deming's contributions to quality and Kiazen, Poka Yoke.

TEXT BOOKS

1. Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004.
2. Industrial Engineering and Management O.P. Khanna DhanpatRai.

REFERENCE

1. Industrial Engineering & Production management , M. Mahajan, Dhanpatrai Publication
2. Management Stoner, Freeman, Gilbert, , 6th Ed, Pearson Education, New Delhi, 2005.
3. Production and Operations Management Panner Selvam, , PHI, 2004.
4. Reliability Engineering & Quality Engineering Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, , Galgotia Publications, Pvt., Limited.
5. Motion and Time Studies Ralph M Barnes, John Wiley and Sons, 2004.
6. Operations Management Chase, Jacobs, Aquilano, TMH 10th Edition, 2003.
7. PERT / CPM L.S.Srinath, affiliate East-West Press, New Delhi, 2000.
8. Human Resource Management Gary Dessler, Pearson Education Asia, 2002.
9. Marketing Management, Phillip Kotler, Pearson, 2004.
10. Management Science for JNTU (B.Tech), A.R.Aryasri, Tata McGraw-Hill, 2002.

Teaching Methodology

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

AUTOMOBILE ENGINEERING

Course Code: GR14A3036 L:3 T:1 P:0 C:4
III Year II Semester

UNIT-I
INTRODUCTION, ENGINE AND LUBRICATION SYSTEM
Components of four wheeler automobile – chassis and body – power unit –power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobileengines, Engine construction, turbo charging and super charging, Engine lubrication, splashand pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service,reboring, decarbonisation, Nitriding of crank shaft.
Emissions :Emission from Automobiles – Pollution standards National and international – Pollution Control – Techniques – Multipoint fuel injection for SI Engines. Common rail diesel injection Energy alternatives – Solar, Photo-voltaic, hydrogen, Biomass, alcohols, LPG,CNG, liquid Fuels and gaseous fuels, electrical-their merits and demerits.

UNIT-II
FUEL SYSTEM AND COOLING SYSTEM
Fuel System in S.I. Engine : Fuel supply systems, Mechanical and electrical fuel pump – filters– carburettor – types – air filters – petrol injection.
Fuel System in C.I. Engines :Requirements of diesel injection systems, types of injection systems, fuel pump,nozzle, spray formation, injection timing, testing of fuel pumps.
Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water andForced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat,evaporating cooling – pressure sealed cooling – antifreeze solutions.

UNIT-III
IGNITION SYSTEM AND ELECTRICAL SYSTEM
Ignition System :Function of an ignition system, battery ignition system, constructionalfeatures of storage, battery, auto transformer, contact breaker points, condenser and sparkplug – Magneto coil ignition system, electronic ignition system using contact breaker, electronicignition using contact triggers – spark advance and retard mechanism.

Electrical System : Charging circuit, generator, current – voltage regulator – starting system,bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressuregauge, engine temperature indicator etc.

UNIT-IV
TRANSMISSION AND STEERING SYSTEM

Transmission System :Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box , over drive torque converter. Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles –types – wheels and tyres. Steering System :Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

UNIT-V
SUSPENSION AND BRAKING SYSTEM

Suspension System :Objects of suspension systems – rigid axle suspension system, torsion
bar, shock absorber, Independent suspension system.
Braking System :Mechanical brake system, Hydraulic brake system, Master cylinder, wheel
cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

TEXT BOOKS

1. Automotive Mechanics – Vol. 1 & Vol. 2 / Kripal Singh
2. Automobile Engineering / William Crouse

REFERENCE BOOKS

1. Automotive Engineering / Newton Steeds & Garrett
2. Automotive Mechanics / G.B.S. Narang
3. Automotive Mechanics / Heitner
4. Automotive Engines / Srinivasan
5. Automobile Engineering – K.K. Ramalingam / Scitech Publications (India) PVT.

Teaching Methodology

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MECHATRONICS
(Elective -I)

Course Code: GR14A3037 L:3 T:1 P:0 C:4
III Year II Semester

Unit-I

Introduction: Definition – Trends - Control Methods: Standalone, PC Based (Real Time Operating Systems, Graphical User Interface , Simulation) - Applications: SPM, Robot, CNC, FMS, CIM.

Signal Conditioning: Introduction – Hardware - Digital I/O , Analog input – ADC, resolution , speed channels. Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps –Software - Digital Signal Processing – Low pass , high pass , notch filtering

Unit-II

Precision mechanical systems: Pneumatic Actuation Systems - Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems - Timing Belts – Ball Screw and Nut - Linear Motion Guides - Linear Bearings - Harmonic Transmission - Bearings- Motor / Drive Selection.

Electronic interface subsystems: TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isoation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers , over current sensing , resetable fuses , thermal dissipation - Power Supply - Bipolar transistors/ mosfets

Unit-III

Electromechanical drives : Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives – Drive System load calculation.

Microcontrollers overview: 8051 Microcontroller , micro-processor structure – Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications. Programming –Assembly , C (LED Blinking , Voltage measurement using ADC).

Unit-IV

Programmable Logic Controllers (PLC): Basic Structure - Programming : Ladder diagram -Timers, Internal Relays and Counters - Shift Registers - Master and Jump Controls - Data Handling -Analog input / output - PLC Selection - Application.

Unit - V

Programmable motion controllers: Introduction - System Transfer Function – Laplace transform and its application in analysing differential equation of a control system - Feedback Devices : Position , Velocity Sensors - Optical Incremental encoders - Proximity Sensors : Inductive , Capacitive , Infrared - Continuous and discrete processes - Control System Performance & tuning - Digital Controllers – P , PI , PID Control - Control modes – Position , Velocity and Torque – Velocity Profiles – Trapezoidal - S. Curve - Electronic Gearing - Controlled Velocity Profile - Multi axis Interpolation , PTP , Linear , Circular - Core functionalities – Home , Record position , Go to Position - Applications : SPM, Robotics.

TEXT BOOKS

1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

REFERENCES

1. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics – N. Shanmugam / Anuradha Agencies Publisers.
3. Mechatronics System Design / Devdas shetty/Richard/Thomson.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER PLANT ENGINEERING

Course Code: GR14A3038 L:3 T:1 P:0 C:4
III Year II Semester

UNIT-I

Introduction to the Sources of Energy – Resources and Development of Power in India.

STEAM POWER PLANT: Plant Layout, Working of different Circuits, Fuel and handling equipments.

Types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems.

COMBUSTION PROCESS: Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

UNIT-II

INTERNAL COMBUSTION ENGINE PLANT: DIESEL POWER PLANT: Introduction – IC Engines, types, construction– Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system – super charging.

GAS TURBINE PLANT: Introduction – classification - construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines. Combined Cycle Power Plants and comparisons.

UNIT-III

HYDRO ELECTRIC POWER PLANT: Water power – Hydrological cycle / flow measurement – drainage area characteristics – Hydrographs – storage and Pondage – classification of dams and spill ways.

HYDRO PROJECTS AND PLANT: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT-IV

POWER FROM NON-CONVENTIONAL SOURCES: Utilization of Solar-Collectors- Principle of Working, Wind Energy – types – HAWT, VAWT -Tidal Energy.

DIRECT ENERGY CONVERSION: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT-V

NUCLEAR POWER STATION: Nuclear fuel – breeding and fertile materials – Nuclear reactor, reactor operation.

REACTORS: Types, Pressurized water reactor, Boiling water reactor, sodium-graphite reactor, fast Breeder Reactor, Homogeneous Reactor, Gas cooled Reactor, Radiation hazards and shielding – radioactive waste disposal.

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, and load duration curve. Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor –Related exercises. Effluents from power plants and Impact on environment – pollutants and pollution standards – Methods of Pollution control.

TEXT BOOK

1. A Text Book of Power Plant Engineering / Rajput / Laxmi Publications
2. Power Plant Engineering – P.C.Sharma / S.K.Kataria Pub

REFERENCES

1. Power Plant Engineering: P.K.Nag/ II Edition /TMH.
2. Power plant Engineering/ Ramalingam/ Scietech Publishers
3. A Course in Power Plant Engineering: / Arora and S. Domkundwar.
4. Power station Engineering – ElWakil / McHill.
5. An Introduction to Power Plant Technology / G.D. Rai.
6. Power plant Engg - Elanchezhian- I.K. International Pub.

Teaching Methodology

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

HEAT TRANSFER LAB

Course Code: GR14A3039 L:0 T:0 P:2 C:2
III Year II Semester

1. Composite Slab Apparatus – Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere
4. Thermal Conductivity of given metal rod.
5. Heat transfer in pin-fin
6. Heat transfer in forced convection apparatus.
7. Heat transfer in natural convection
8. Parallel and counter flow heat exchanger.
9. Emissivity apparatus.
10. Stefan Boltzman Apparatus.
11. Heat transfer in drop and film wise condensation.
12. Critical Heat flux apparatus.
13. Study of heat pipe and its demonstration.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

METROLOGY LAB

Course Code: GR14A3040 L:0 T:0 P:2 C:2
III Year II Semester

List of Experiments

1. Measurement of lengths, heights, diameters by vernier callipers and vernier height gauge.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear tooth, Vernier callipers and checking the chordal addendum and chordal height of spur gear.
4. Machine tool alignment test on lathe.
5. Machine tool alignment test on milling machine.
6. Tool maker's microscope and its application.
7. Angle and taper measurements by Bevel protractor, Sine bars.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by three wire method or Tool makers' microscope.
10. Surface roughness measurement by surface roughness tester.
11. Measurement of screw thread by using Profile Projector.
12. Measurement of internal, external diameters using internal and external micrometres.

IV-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

FINITE ELEMENT METHODS

Course Code: GR14A4039 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I
Introduction to finite element method for solving field problems. Stress and equilibrium. Strain displacement relations. Stress- strain relations.

UNIT-II
One dimensional problems: finite element modelling coordinates and shape functions. Potential energy approach: assembly of global stiffness matrix and load vector. Finite element equations, treatment of boundary conditions, quadratic shape functions.

UNIT-III
Finite element modelling of two dimensional stress analysis with constant strain traingles and treatment of boundary conditions LST element.

UNIT-IV
Analysis of beams: Element stiffness matrix for two node two degrees of freedom per node beam element.
Finite element modeling of axisymmetric solids subjected to axisymmetric loading with triangular elements.

UNIT-V
Steady state heat transfer analysis: one dimensional analysis of a fin and two dimensional analysis of thin plate. Dynamic analysis: formulation of finite element model, element matrices, evaluation of eigen values and eigen vectors for stepped bar and a beam.

TEXT BOOKS
1. Introduction to Finite Elements in Engineering/Chandraputla, Ashok and Belegundu/ Prentice-Hall
2. The Finite Element Methods in Engineering/SS Rao/ Pergamon

REFERENCES
1. An introduction to Finite Element Method/ JN Reddy / Me Graw Hill
2. Finite Element Methods/ Alavala/TMH

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CAD/CAM

Course Code: GR14A4040 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I
Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.

UNIT-II
Computer Graphics: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT-III
Geometric modeling: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT-IV
Drafting and Modeling systems: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.
Numerical control: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming : fundamentals, manual part-programming methods, Computer Aided Part Programming.
Group Tech :Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT-V
Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, non contact inspection methods-optical, non contact inspection methods-non-optical, computer aided testing, integration of CAQC with CAD/CAM.
Computer integrated manufacturing systems: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

TEXT BOOK

1. CAD / CAM A Zimmers&P.Groover/PE/PHI
2. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH

REFERENCE BOOKS

1. Automation , Production systems & Computer integrated Manufacturing/ Groover/P.E
2. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age
3. Principles of Computer Aided Design and Manufacturing / FaridAmirouche / Pearson
4. CAD/CAM: Concepts and Applications/Alavala/ PHI
5. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson.

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OPERATION RESEARCH

Course Code: GR14A4041 L:2 T:1 P:0 C:3
IV Year I Semester

UNIT-I
INTRODUCTION: Development – Definition– Characteristics and Phases of operations Research– Types of models – operation Research models– applications.
ALLOCATION: Linear Programming Problem Formulation – Graphical solution – Simplex method –Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

UNIT-II
TRANSPORTATION MODELS: Formulation – Methods for finding feasible solution,Optimal solution, unbalanced transportation problem –Degeneracy.
ASSIGNMENT MODELS - Formulation – Optimal solution - Variants of Assignment Problem

UNIT-III
SEQUENCING: Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs throughthree machines – Job shop sequencing – two jobs through 'm' machines.

INVENTORY: Introduction – Single item – Deterministic models – Purchase inventory models with oneprice break and multiple price breaks – shortages are not allowed – Stochastic models – demand may bediscrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuousdemand and no set up cost.

UNIT-IV
THEORY OF GAMES: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution ofgames with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle– m X 2 & 2 X n games - graphical method.
WAITING LINES: Introduction – Single Channel – Poisson arrivals – exponential service times – withinfinite population and finite population models– Multichannel – Poisson arrivals – exponential service timeswith infinite population single channel Poisson arrivals.

UNIT-V

REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money valueis not counted and counted – Replacement of items that fail completely, group replacement.

DYNAMIC PROGRAMMING : Introduction – Bellman's Principle of optimality – Applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.

TEXT BOOK

1. Operations Research/ Prem Kumar Gupta,Dr.D.S. Hira
2. Operations Research / S.D.Sharma-Kedarnath
3. Operation Research /J.K.Sharma/MacMilan.

REFERENCE BOOKS

1. Operations Research / R.Pannerselvam,PHI Publications.
2. Introduction to O.R /Taha/PHI
3. Operations Research / Wagner/ PHI Publications.
4. Introduction to O.R/Hiller &Libermann (TMH).
5. Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson Education.
6. Operations Research: Methods & Problems / Maurice Saseini, ArhurYaspan& Lawrence Friedman
7. O.R/Wayne L.Winston/Thomson Brooks/cole

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FLEXIBLE MANUFACTURING SYSTEM

Course Code: GR14A4042 L:3 T:1 P:0 C:4
IV Year I Semester

Unit-I
FMS Introduction and Description: Introduction – Basic components of FMS – Types of FMS layouts – The Principle Objectives of FMS– Advantages and Disadvantages of FMS Implementation - Various Equipment's and their Functions Required for an FMS - CIMTechnology&CIMTechnology - FMS Concepts.

UNIT-II
Manufacturing Cell & Just in time System: Manufacturing Cell: Introduction and definition of cell - Classification of Cells - Stand alone NC Machine Tools - Single NC Machine Cellor MiniCell - Integrated Multi Machine Cell - Unattended Machining - Differences between FMC and FMS.
Just in time (JIT) System: Introduction and definition of JIT – goals of JIT and concept – objectives and ingredients of JIT - Quality and Quantity Principles ofJIT – Benefits and implementations of JIT.

UNIT-III
Group Technology & Machining Centres: Introduction and definition of Group Technology - Reasons for Adopting Group Technology - Benefits of Group Technology Affecting Many Areas of a Company - Obstacles to Application of GT.
Introduction and types of machining centres – horizontal Machining Centres merits and demerits – vertical machine centre merits and demerits - Automated Features and Capabilities of Machining Center.

UNIT-IV
CMM & AVGS: Coordinate Measuring Machines&Automated Material Movement and Storage System Introduction – CMM construction – probe – machine structure - types of CMM – functions of CMM Computers - Operational Cycle Description - CMM Applications and advantages.

Introduction – types of AVGS - Unit Load Carries: - Side Loading and High Lifting Types - Automated Guided Transport Carts - Analysis of AGV Systems - Automated Storage and Retrieval Systems (AS/RS) - Unit Load AS/RS -Mini Load AS/RS - Carousel AS/RS - Analysis of AS/RS - Industrial Robots - Basic Components types of a Robotic System - Applications of Industrial Robots.

UNIT-V

Cutting Tools and Tool Management: Introduction - Tool Management - Tool Room Service - Tool Delivery, allocation and data transfer- Fault Sensing - Tool Strategies - Tool Preset, Identification and Data Transfer - Bar Code Scanning - Radio Frequency Identification - The Microchip - Data Transfer - Tool Monitoring and Fault Detection - Experimental Setup and Data Collection.

TEXT BOOKS

1. Flexible manufacturing system by H. K. Shivanand, M. M. Benal and V. Koti.

REFERENCE BOOKS

1. Hand books of flexible manufacturing systems by Nand K. Jha
2. Flexible manufacturing system: Recent Developments by A. Raouf and M.Ben - Daya

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ROBOTICS

Course Code: GR14A4043 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I
Introduction: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – presentand future applications – classification by coordinate system and control system.

UNIT- II
Components of the Industrial Robotics: Function line diagram representation of robot arms, commontypes of arms. Components, Architecture, number of degrees of freedom – Requirements and challengesof end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatictypes of locomotion devices.

UNIT- III
Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.
Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinatesForward and inverse kinematics – problems.

UNIT-IV
Differential transformation and manipulators, Jacobians – problems.Dynamics: Lagrange – Euler andNewton – Euler formations – Problems.
Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages.

UNIT-V
Robot actuators and Feed back components: Actuators: Pneumatic, Hydraulic actuators, electric &stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocitysensors.
Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading-Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K &Nagrath I J / TMH.

REFERENCES

1. Robotics / Fu K S/ McGraw Hill.
2. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
3. Robotic Engineering / Richard D. Klafter, Prentice Hall
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Introduction to Robotics / John J Craig / Pearson Edu.
6. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.

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INSTUMENTATION AND CONTROL SYSTEM

Course Code: GR14A4044 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT -I
Definition – Basic principles of measurement – Measurement systems, generalized configuration and functional descriptions of measuring instruments – examples. Dynamic performance characteristics –sources of error, Classification and elimination of error.

UNIT-II
Measurement of Displacement: Theory and construction of various transducers to measure displacement Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.
MEASUREMENT OF TEMPERATURE :Classification – Ranges – Various Principles of measurement– Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers – Temperature Indicators.

UNIT-III
Measurement of Pressure: Units – classification – different principles used. Manometers,Piston, Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement – Thermalconductivity gauges – ionization pressure gauges, Mcleod pressure gauge.
Measurement of Level: Direct method – Indirect methods – capacitative, ultrasonic, magnetic,cryogenic fuel level indicators – Bubler level indicators.
FLOW MEASUREMENT :Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot – wire anemometer,Laser Doppler Anemometer (LDA).

UNIT -IV
Measurement of Speed: Mechanical Tachometers – Electrical tachometers – Stroboscope, Noncontacttype of tachometer
Measurement of Acceleration and Vibration:Different simple instruments – Principles of Seismicinstruments – Vibrometer and accelerometer using this principle.

UNIT-V
Stress Strain Measurements: Various types of stress and strain measurements – electricalstrain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive andtensile strains – usage for measuring torque,

Strain gauge Rosettes.
EASUREMENT OF HUMIDITY – Moisture content of gases, sling psychrometer, Absorptionpsychrometer, Dew point meter.

MEASUREMENT OF FORCE,TORQUE AND POWER- Elastic force meters, load cells, Torsionmeters, Dynamometers.
ELEMENTS OF CONTROL SYSTEMS:Introduction, Importance – Classification – Open and closedsystems Servomechanisms–Examples with block diagrams–Temperature, speed & position control systems.

TEXT BOOKS

1. Measurement Systems: Applications & design by D.S Kumar.
2. Mechanical Measurements / BeckWith, Marangoni,Linehard, PHI / PE

REFERENCES

1. Measurement systems: Application and design, Doeblin Earnest. O. Adaptation by ManikandDhanesh/ TMH
2. Instrumentation and Control systems/ S.Bhaskar/ Anuradha Agencies.
3. Experimental Methods for Engineers / Holman.
4. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers.
5. Instrumentation & mech. Measurements by A.K. Tayal ,Galgotia Publications
6. Instrumentation, measurement & analysis by B.C.Nakra&K.K.Choudhary, TMH
7. Mechanical Measurements /sahani

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UNCONVENTIONAL MACHINING PROCESSES
(ELECTIVE – II)

Course Code: GR14A4045 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I
INTRODUCTION: Need for non-traditional machiningmethods-Classification of modern machining processes – considerationsin process selection. Materials. Applications.

UNIT-II
MECHANICAL PROCESSES: Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economicconsiderations, applications and limitations, recent development.

UNIT-III
Abrasive jet machining, Water jet machining and abrasive water jetmachine: Basic principles, equipments, process variables, mechanics ofmetal removal, MRR, application and limitations. Magnetic abrasivefinishing, Abrasive flow finishing

UNIT-IV
THERMO ELECTRIC PROCESSES: General Principle and applications ofElectric Discharge Machining, Electric Discharge Grinding and electricdischarge wire cutting processes – Power circuits for EDM, Mechanicsof metal removal in EDM, Process parameters, selection of toolelectrode and dielectric fluids, methods surface finish and machiningaccuracy, characteristics of spark eroded surface and machine toolselection. Wire EDM, principle, applications.

Generation and control of electron beam for machining, theory ofelectron beam machining, comparison of thermal and non-thermalprocesses –General Principle and application of laser beam machining –thermal features, cutting speed and accuracy of cut. Application ofplasma for machining, metal removal mechanism, process parameters,accuracy and surface finish and other applications of plasma inmanufacturing industries.

UNIT-V
ELECTRO CHEMICAL & CHEMICAL PROCESSES: Fundamentals of electrochemical machining, electrochemical grinding, electro chemical honinganddeburring process, metal removal rate in ECM, Tool design,

Surfacefinish and accuracy economic aspects of ECM – Simple problems forestimation of metal removal rate, Electro stream drilling, Shaped tube electrolytic machining.Fundamentals of chemical machining, Chemicalmachining principle, maskants, etchants, advantages and applicationsof chemical machining.metal removal rate, Electro stream drilling,Shaped tube electrolytic machining.Fundamentals of chemical machining,Chemical machining principle, maskants, etchants, advantages andapplications of chemical machining.

TEXT BOOKS

1. Advanced machining processes by VK Jain/ Allied publishers.

REFERENCE BOOKS

1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.
2. New Technology / Bhattacharya A/ The Institution of Engineers, India 1984.
3. Modern Production / Operations Management / Baffa&RakeshSarin.
4. Operations Management – S.N. Chary.
5. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
6. Reliability Engineering & Quality Engineering by Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Galgotia Publications, Pvt., Limited.
7. Production Control A Quantitative Approach / John E. Biegel.
8. Production Control / Moore.
9. Operations Management / Joseph Monks.

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RENEWABLE ENERGY RESOURCES
(ELECTIVE - IV)

Course Code: GR14A4046 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I

PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.
GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT-V

OCEAN ENERGY: Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, seebeck, peltier and joule Thomson effects, materials, applications, MHD generators, principles,

dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, Faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXTBOOKS

1. Renewable energy resources / Tiwari and Ghosal / Narosa.
2. Non-ConventionalEnergySources/G.D.Rai

REFERENCE BOOKS

1. Renewable Energy Sources/Twidell&Weir
2. Solar Energy/Sukhame
3. Solar Power Engineering/B.SMagalFrankKreith&J.FKreith.
4. Principles of Solar Energy/Frank Krieth & John FKreider.
5. Non-Conventional Energy/AshokVDesai/WileyEastern.
6. Non-Conventional Energy Systems/KMittal/Wheeler
7. Renewable Energy Technologies / Ramesh & Kumar/Narosa

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTATIONAL FLUID DYNAMICS

Course Code: GR14A4047 L:3 T:1 P:0 C:4
IV Year I Semester

UNIT-I

Elementary details in numerical Techniques: Number system and errors, Representation of integers,Fractions, Floating point Arithmetic, loss of significance and error propagation, condition and instability,computational methods for error estimation, Convergence of Sequences.

Applied Numerical Methods: Solution of a system of simultaneous Linear Algebraic Equations, iterativeschemes of Matrix Inversion, Direct Methods for Matrix inversion, Direct Methods for banded matrices.

UNIT-II

Finite Difference Applications: Heat conduction and Convention – steady heat conductionin a rectangular geometry, transient heat conduction, finite difference application in convective heattransfer, closure.

Finite Differences, discretization, consistency, stability, and Fundamentals of fluid flow modeling:Introduction, elementary finite difference quotients, implementation aspects of finite-difference equations,consistency, explicit and implicit methods.

UNIT-III

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluidflowmodeling, conservative property, the upwind scheme.

Review of Equations Governing Fluid Flow and Heat Transfer: Introduction, conservation of mass, Newton'ssecond law of motion, expanded forms of Navier-stokes equations, conservation of energy principle, specialforms of the Navier-stokes equations.

UNIT-IV

Steady flow, dimension less form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function - Vorticity formulation.

Finite Volume Method: Approximation of surface integrals, volume integrals, interpolation and differentiationpractices, Upwind interpolation, Linear interpolation and Quadratic interpolation.

UNIT-V

Treatment of compressible flows: Potential equation, Euler equations, Navier-stokes system of equations, flow field-dependent variation methods, boundary conditions, example problems. Standard Variational methods: Linear fluid flow problems, steady state problems, Transient problems.

TEXT BOOK

1. Numerical heat transfer and fluid flow / Suhas V. Patankar- Butter-worth Publishers
2. Computational fluid dynamics - Basics with applications - John. D. Anderson / McGraw Hill.
3 Computational fluid dynamics/ T. J.C'hung/ Cambridge University press,2002.
4. Introduction to Computational fluid dynamics, Finite Voume Method H.Versteeg,Malala Sekra
5. Computational fluid dynamics for Engineers Vol.1,2& 3Klaus A. Hoffmann and Steve T. Chiang
6. Computational Methods for Fluid Dynamics 3rd Edition Joel H. Ferziger&MilovanPeric

REFERENCE BOOKS

1. Computational Fluid Flow and Heat Transfer/ Niyogi, Pearson Publications
2. Fundamentals of Computational Fluid Dynamics – Tapan K. Sengupta / Universities Press.

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CAD/CAM LAB

Course Code: GR14A4048 L:0 T:0 P:2 C:2
IV Year I Semester

1.Drafting: Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting. Study of script, DXE AND IGES FILES.

2. Part Modeling: Generation of various 3D Models through Protrusion, revolve, sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modeling surface and Assembly Modeling. Study of various standard Translators. Design simple components.

3. Analysis

a) Determination of deflection and stresses in 2D and 3D trusses and beams.
b) Determination of deflections component and principal and Von-mises Stresses in plane stress, plane strain and Axisymmetric components.
c) Determination of stresses in 3D and shell structures (at least one example in each case)
d) Estimation of natural frequencies and mode shapes Harmonic response of 2D beam.
e) Steady state heat transfer Analysis of plane and Axisymmetric components.

4. Software Packages

SOLID WORKS, ANSYS, CATIA, Auto CAD

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INSTUMENTATION AND CONTROL SYSTEM LAB

Course Code: GR14A4049 L:0 T:0 P:2 C:2
IV Year I Semester

List of Experiments

1. Calibration of Pressure Gauges
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVD Ttransducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermo-couple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of arotameter for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bedat various loads.
11. Study and calibration of Macleod gauge for low pressure.

GOKARAJU RANGARAJU
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PRODUCTION DRAWING PRACTICE

Course Code: GR14A4050 L:0 T:0 P:2 C:2
IV Year I Semester

UNIT-I
Conventional representation of materials- conventional representation of parts-screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits.

UNIT-II
Limits and Fits: types of fits, exercises involving selection/ interpretation of fits and estimation of limits from tables

UNIT-III
Form and Positional tolerances: introduction and indication of the tolerances of form and position on drawings, deformation of runout and total runout and their indication.

UNIT-IV
Surface roughness and its indication: definitions-finishes obtainable from various manufacturing processes, recommened surface roughness on mechanical components.

UNIT-V
Detailed and part drawings: drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.
Part drawings using computer aided drafting by CAD software

TEXT BOOKS
1. Production drawing-K.L.Narayana&P.Kannaiah/New Age
2. Machine drawing with Auto CAD-Pohit and ghosh, PE

REFERENCE BOOKS
1. Geometric dimensioning and tolerancing-James D. meadows/ B.S Publications
2. Engineering Metrology, R.K Jain, Khanna publications

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REFRIGERATION AND AIR CONDITION

Course Code: GR14A4051 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-

Introduction: Definition of refrigeration & air conditioning; Necessity; Methods of refrigeration; Unit of refrigeration; Coefficient of performance (COP), Fundamentals of air-conditioning system; Refrigerants- Definition, Classification, Nomenclature, Desirable properties, Comparative study, secondary refrigerants, Introduction to eco-friendly Refrigerants; Introduction to Cryogenics.

Air Refrigeration Systems: Carnot refrigeration cycle. Temperature Limitations; Brayton refrigeration or the Bell Coleman air refrigeration cycle; Necessity of cooling the aeroplane; Air craft refrigeration systems, Simple cooling and Simple evaporative types, Boot strap and Boot strap evaporative types, Regenerative type and Reduced Ambient type system, Comparison of different systems, problems.

UNIT-II

Vapour Compression (VC) Refrigeration Systems: (A) Simple Vapour Compression (VC) Refrigeration systems- Limitations of Reversed Carnot cycle with vapour as the refrigerant; Analysis of VC cycle considering degrees of sub cooling and superheating; VC cycle on p-v, t-s and p-h diagrams; Effects of operating conditions on COP; Comparison of VC cycle with Air Refrigeration cycle.

Other Refrigeration Systems:(A) Vapour Absorption Refrigeration Systems – Basic Systems, Actual COP of the System, Performance, Relative merits and demerits; Properties of aqua ammonia; Electrolux Refrigeration; Problems(B) Steam Jet Refrigerating System- Introduction, Analysis, Relative merits and demerits, Performance Applications, Problems.
(C) Cascade Refrigerating Systems- Necessity Selection of Pairs of refrigerants for the system, Concept of cascade temperature, Analysis, Multistaging, Comparison with V.C. systems, Applications, Problems..

UNIT-III

Psychrometry of Air & Air Conditioning Processes: Properties of moist Air-Gibbs Dalton law, Specific humidity, Dew point temperature, Degree of saturation, Relative humidity, Enthalpy, Humid specific heat, Wet bulb temp.,

Thermodynamics wet bulb temp., Psychrometric chart; Psychrometry of air-conditioning processes, Mixing Process, Basic processes in conditioning of air; Psychrometric processes in air washer, Problems

Air- Conditioning Load Calculations: Outside and inside design conditions; Sources of heating load; Sources of cooling load; Heat transfer through structure, Solar radiation, Electrical applications, Infiltration and ventilation, Heat generation inside conditioned space; Apparatus selection; Comfort chart, Problems

UNIT-IV

Air Conditioning Systems with Controls & Accessories: Classifications, Layout of plants; Equipment selection; Air distribution system; Duct systems Design; Filters; Refrigerant piping; Design of summer air-conditioning and Winter air conditioning systems; Temperature sensors, Pressure sensors, Humidity sensors, Actuators, Safety controls; Accessories; Problems.

UNIT-V

Refrigeration and Air Conditioning Equipments: Type of compressors and their performance curves; Types of Condensers, Heat transfer in condensers; Types of expansion devices; types of evaporators, Cooling and Dehumidifying coils, Problems.

Text Books

1. Refrigeration & Air conditioning –R.C. Jordan and G.B. Priester, Prentice Hall of India.
2. Refrigeration & Air conditioning –C.P. Arora, TMH, New Delhi.

Reference Books

1. A course in Refrigeration & Air Conditioning – Arora&Domkundwar, DhanpatRai& sons.
2. Refrigeration & Air conditioning –W.F. Stocker and J.W. Jones, TMH, New Delhi.
3. Refrigeration & Air conditioning- Manohar Prasad Wiley Estern limited, New Delhi.

Teaching Methodology

Power point Presentations, Working models, white board & marker

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRODUCTION PLANNING AND CONTROL

Course Code: GR14A4052 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I

Introduction: Definitions- objectives of production on planning and control-functions of production planning and control- elements of production control-types of production – organization of production planning and control – internal organizations of department.

UNIT-II

Forecasting – importance of forecasting – types of forecasting, their uses – general principles of forecasting techniques- Qualitative methods and quantitative methods MRP: Introduction to MRP and ERP, LOB (Line Of Balance). JIT – Japanese concepts.

UNIT-III

Routing & Scheduling -Routing- Definition – routing procedure – Route sheets – Bill of material – factors affecting routing procedure, Schedule – definition – difference with loading.

UNIT-IV

Scheduling: Scheduling policies – techniques, standard scheduling methods-job shop, flow shop.

Line balancing, aggregate planning – methods for aggregate planning – Chase planning, expediting, control aspects.

UNIT-V

Activities of dispatcher – Dispatching procedure – follow up – definition – reasons for existence of functions – types of follow up, applications of computer in production planning control.

TEXT BOOKS

1. Production Planning and Control-M.Mahajan –Dhanpatirai& Co.
2. Production Planning and Control – Jain & Jain – Khanna publications

REFERENCE BOOKS

1. Production Planning and Control – Text & cases/ SK Mukhopadhyaya / PHI.
2. Production Planning and Control – R.PaneerSelvam – PHI
3. Operations Management by Chase/PHI
4. Management Science- A R Aryasri-4e-TMH
5. Operations management – Heizer – Pearson

Teaching Methodology

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

PLANT LAYOUT & MATERIAL HANDLING

Course Code: GR14A4053 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I
Introduction: Classification of Layout, Advantage and Limitations of different layouts, Layout design procedures. Overview of the plant layout
Process Layout & Produdt Layout: Selection, specification, implementation and follow up, comparison of product and process layout.

UNIT-II
Heuristics of Plant layout – ALDEP, CORELAP, CRAFTGroupLayout , Fixed position layout – Quadratic assignment model , Branch and bound method.

UNIT-III
Introduction, Material Handling systems, Material Handling principles, Classification of Material Handling Equipment, Relationship of material handling to plant layout.

UNIT-IV
Basic Material Handling systems: Selection, Material Handling method- path, Equipment, function oriented systems.

UNIT-V
Methods to minimize cost of material handling – Maintenance of Material Handling Equipment, Safety in handling
Ergonomics of Material Handling equipment. Design, Miscellaneous equipment.

TEXT BOOKS
1. Operations Management/PB Mahapatra/PHI
2. Aspects of Material handling /Dr.KcArora&Shinde , Lakshmi Publications

REFERENCE BOOK
1. Facility Layout & Location an analytical/RL Francis/ LF McLinnisJr,White/PHI
2. Production and Operations Management / R Pannerselvam/PHI
3. Introduction to Material handling/ Ray, Siddhartha/ New Age.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

TRIBOLOGY

Course Code: GR14A4054 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I

Introduction to Tribology: Properties of oils and equation of flow: Viscosity, Newton's Law of viscosity, Hagen-Poiseuille Law, Flow between parallel stationary planes, viscosity measuring apparatus. Lubrication principles, classification of lubricants.

UNIT-II

Hydrodynamic Lubrication: Friction forces and power loss in lightly loaded bearing, Petroff's law, Tower's experiments, mechanism of pressure development in an oil film, Reynold's investigation and Reynold's equation in 2D.
UNIT-III Idealized Journal Bearing: Introduction to idealized journal bearing, load carrying capacity, condition for equilibrium, Sommerfeld's numbers and significance of it; Partial bearings, end leakages in journal bearing, numerical problems.
Slider / Pad Bearing With A Fixed And Pivoted Shoe: Pressure distribution, Load carrying capacity, coefficient of friction, frictional resistance in a pivoted shoe bearing, numerical examples.

UNIT-IV

Oil Flow And Thermal Equilibrium Of Journal Bearing: Oil flow through bearings, self-contained journal bearings, bearings lubricated under pressure, thermal equilibrium of journal bearings. Hydrostatic Lubrication: Introduction to hydrostatic lubrication, hydrostatic step bearings, load carrying capacity and oil flow through the hydrostatic step bearing. 06 Hours

UNIT-V

Bearing Materials: Commonly used bearings materials, properties of typical bearing materials. Advantages and disadvantages of bearing materials. BehaviorOfTribological Components: Selection, friction, Wear of ceramic materials, wear measurements, effects of speed, temperature and pressure. Tribological measures, Material selection, improved design, surface engineering

TEXT BOOKS

1. Fundamentals of Tribology ,Basu S K., Sengupta A N., Ahuja B.B., , PHI 2006
2. Introduction to Tribology Bearings, Mujumdar B. C., S. Chand company pvt. Ltd 2008.

REFERENCE BOOKS

1. Theory and Practice of Lubrication for Engineers, Fuller, D., New York company 1998
2. Principles and Applications of Tribology, Moore, Pergamaon press 1998
3. Tribology in Industries, Srivastava S., S Chand and Company limited, Delhi 2002
4. Lubrication of bearings – Theoretical Principles and Design, Redzimovskay E I., Oxford press company 2000

Teaching Methodology

Power point Presentations, Working models, white board & marker

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MECHANICAL VIBRATIONS

Course Code: GR14A4055 L:2 T:1 P:0 C:3
IV Year II Semester

Unit-I
Single degree of freedom systems – Introduction – Free and forced vibrations – Damping classification and damped systems – Transient (shock) vibrations as applied to Single degree of freedom systems.

Unit-II
Two degree of freedom systems – Principal modes – undamped and damped free and forced vibrations – undamped vibration absorbers - Transient (shock) vibrations as applied to Two degree of freedom systems.

Unit-III
Multi degree of freedom systems – free and forced vibrations in longitudinal, lateral and torsional modes – damped and undamped, critical speeds of rotors.Continuous systems - free and forced vibrations of string, bars and beams.

Unit-IV
Numerical methods in vibration analysis by matrix iteration, Rayleigh's, Stodala's, Rayeigh – Ritz and Holzer'smethod.

Vibration measurements and analysis – Transducers and mounting methods – Data acquisition using instrumentation recorders, Time domain signal analysis, orbit analysis, filters, frequency domain analysis (Narrow band FFT analysis), Nyquist criteria.

Unit-V
Acoustics and Noise Control-Acoustic wave equation, Acoustic energy and sound intensity. Propagation of sound, Concept of Acoustic impedance. Sound power transmission, Transmission Loss. Human Response and ratings, Various Measures of Sound. Weighting filters, Loudness, Indices of Loudness. Acoustic radiation from spherical source and piston source.

Text Books
1. Mechanical Vibrations by G.K. Groover.
2. Mechanical ViabrationsbyV.Ram Murthy.

Reference Books

1. Vibrations by W.T. Thomson
2. Mechanical Vibrations – Schaum series.
3. Vibration problems in Engineering by S.P. Timoshenko.

Teaching Methodology

Power point Presentations, Working models, white board & marker

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

NUCLEAR POWER PLANT

Course Code: GR14A4056 L:2 T:1 P:0 C:3
IV Year II Semester

Unit-I
Introduction – Sources of Energy, types of Power Plants, Direct Energy Conversion System, Energy Sources in India, Recent developments in Power Generation. Combustion of Coal, Volumetric Analysis, Gravimetric Analysis, Flue gas Analysis.

Unit-II
Introduction to Nuclear Engineering: Theories of nuclear reactions, conservation laws, Q-value equation, Nuclear fission, explanation on the basis of liquid drop model, energy available from fission, Nuclear chain reaction, Nuclear fusion.

Unit-III
Nuclear Reactors: Nuclear reactor-Basic principle, classification, constituent parts, Heterrogeneous reactor, swimming pool reactor, Breedor reactor, heavy water cooled and moderated CANDU type reactors, Gas cooled reactors.

Unit-IV
Nuclear Power Plants: Nuclear Physics, Nuclear Reactors, Classification – Types of Reactors, Site Selection, Methods of enriching Uranium, Applications of Nuclear Power Plants.Nuclear Power Plants Safety: By-Products of Nuclear Power Generation, Economics of Nuclear Power Plants, Nuclear Power Plants in India, Future of Nuclear Power. Economics of Power Generation: Factors affecting the economics, Load Factor, Utilization factor, Performance and Operating Characteristics of Power Plants. Economic Load Sharing, Depreciation, Energy Rates, Criteria for Optimum Loading, Specific Economic energy problems.
Power Plant Instrumentation: Classification, Pressure measuring instruments, Temperature measurement and Flow measurement. Analysis of Combustion gases, Pollution – Types, Methods to Control.

Unit-V
Nuclear material: Structure of a power plant, Requirements of reactor materials, fuel materials, plutonium,uranium and thorium and their alloys, and compound core materials, beryllium, graphite control and shielding materials-magnesium

and its alloys-coolant used in reactors radiation embrittlement-corrosion reactor materials-Mechanical properties of materials.

TEXT BOOKS

1. D.C Tayal, Nuclear physics, Himalayan Publication house, Bombay,1980
2. Kopelman, Materilas for nuclear reactors,McGrawhill,1970

REFERENCE BOOKS

1. Kenneth joy, Nuclear power- today and tomorrow,Methven,1961
2. J.J.Duderstadt and L.J.Hamilton, Nuclear reactor analysis, Johnwiley,1976

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPTIMIZATION TECHNIQUES

Course Code: GR14A4057 L:2 T:1 P:0 C:3
IV Year II Semester

UNIT-I
Linear programming – Formulation – Sensivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints.

UNIT-II
SINGLE VARIABLE NON-LINEAR UNCONSTRAINED OPTIMIZATION:
One dimensional Optimization methods:-Uni-modal function, elimination methods, ,, Fibonacci method, golden section method, interpolation methods – quadratic & cubic interpolation methods.

Multi variable non-linear unconstrained optimization: Direct search method – Univariant method – pattern search methods – Powell's- Hook -Jeeves, Rosenbrock search methods- gradient methods, gradient of function, steepest decent method, Fletcher Reeves method, variable metric method.

UNIT-III
GEOMETRIC PROGRAMMING: Polynomials – arithmetic - geometric inequality – unconstrained G.P- constrained G.P

UNIT IV
DYNAMIC PROGRAMMING: Multistage decision process, principles of optimality, examples, conversion of final problem to an initial value problem, application of dynamic programming, production inventory, allocation, scheduling replacement.

UNIT-V
Integer Programming- Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method

STOCHASTIC PROGRAMMING: Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, co variance, joint probability distribution- stochastic linear, dynamic programming.
Simulation – Introduction – Types- steps – application – inventory – queuing – thermal system

Text Books

1. Optimization theory & Applications / S.S.Rao / New Age International.
2. Introductory to operation Research / Kasan& Kumar / Springar
3. Optimization Techniques theory and practice / M.C.Joshi, K.M.Moudgalya/ Narosa Publications.
4. Optimization Techniques by N V S Raju/PHI

Reference Books

1. S.D.Sharma / Operations Research
2. Operation Research / H.A.Taha /TMH
3. Optimization in operations research / R.LRardin
4. Optimization Techniques /Benugundu&Chandraputla / Pearson Asia

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

CAM AND SIMULATION LAB

Course Code: GR14A4058 L:0 T:0 P:2 C:2
IV Year II Semester

List of Experiments conducting during the Course

1. Simulation and Execution of CNC Program on Turning machine using G01 code
2. Simulation and Execution of CNC Program on Turning machine using G02 and G03code
3. Simulation and Execution of CNC Program on Turning machine using G90cycle
4. Simulation and Execution of CNC Program on Turning machine using G94 cycle
5. Simulation and Execution of CNC Program on Turning machine using G70 & G71 Turning cycle
6. Simulation and Execution of CNC Program on Turning machine using G74 drilling Cycle and G70 and G71 Turning cycle
7. Simulation and Execution of CNC Program on Turning machine using G74 drilling Cycle, G75 grooving cycle and G70 & G71 Turning cycle
8. Simulation and Execution of CNC Program on Turning machine using G74 drilling Cycle, G75 grooving cycle G76 threading cycle and G70 & G71 Turning cycle
9. Simulation and Execution of CNC Programs on Milling machine using G91surface millingCycle for given profiles
10. Practice of APT programs for end milling operation for a given profiles.
11. Practice in automatic generation of CNC programs using Master CAM software-Turning
12. Practice in automatic generation of CNC programs using Master CAM software-Milling