ACADEMIC REGULATIONS
COURSE STRUCTURE
& DETAILED
SYLLABUS

for

Bachelor of Technology

(Mechanical Engineering)

(***Effective for the students admitted from the Academic Year 2011-12***)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

(***Autonomous Institute under JNTU Hyderabad***)

Bachupally, Kukatpally, Hyderabad - 500 090

Bacheler of Technology (B.Tech) degree of Jawaharlal Nehru Technological University Hyderabad (JNTUH) shall be conferred on a candidate who is admitted to the programme and fulfils all the requirements for the award of the degree.

Academic Regulations GR11 for B.Tech (Regular)

(Effective for the students admitted into I year from the Academic Year 2011-12)

1. Admissions

Admission to the B.Tech programme shall be made subject to the eligibility and qualifications prescribed by the University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the qualifying candidate at EAMCET conducted by APSCHE or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time.

2. Award of Degree

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfils the following academic requirements:

(a) Pursued a course of study for not less than four academic years and not more than eight academic years.

(b) Registered for **200 credits** and secured **200 credits.** The marks obtained in all 200 credits shall be considered for the calculation of the final percentage of marks.

(c) Students, who fail to fulfil 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 course.

3. Courses of study

(a) Courses offered

The following courses of study are offered at present for specializations for B. Tech.

(b) There shall be no branch transfer after the completion of admission procedures.

Branch No.	Branch (Code)
01	Civil Engineering (**CE**)
02	Electrical and Electronics Engineering (**EEE**)
03	Mechanical Engineering (**ME**)
04	Electronics and Communication Engineering (**ECE**)
05	Computer Science and Engineering (**CSE)**
11	Biomedical Engineering (**BME**)
12	Information Technology (**IT**)
23	Biotechnology Engineering (**BT**)

4. Medium of Instruction

The medium of instruction (including examinations and reports) shall be English.

5. Course Pattern

(a) Each Academic year of study (I, II, III and IV Years) is divided into two semesters.

(b) Minimum number of instruction days in each semester is 90.

6. Attendance Requirements

(a) A student shall be eligible to appear for the end semester examinations if he/ she acquires a **minimum of 75% of attendance in aggregate of all the subjects** in the semester.

(b) Condonation of shortage of attendance in aggregate **up to 10% (65% and above and below 75%)** in a semester may be granted based on medical grounds with sufficient medical proof. 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 **below 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 examination 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-admitted.

7. Paper setting, Evaluation of Answer Scripts, Marks and Assessment

(a) The following is the **maximum** marks distribution for the subjects.

	End exams (External)	**Internal**	**Total**
Theory	75	25	100
Practical	50	25	75
Drawing	75	25	100
Industral Mini Project	50	25	75
Comprehensive Viva	100	-	100
Seminar	-	50	50
Project	150	50	200

(b) 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.

(c) For internal evaluation in theory subjects, there shall be **2 mid term examinations** during the semester. Each mid term examination consists of an **objective paper for 10 marks (20 questions)** and **subjective paper for 15 marks** (three out of four questions) with total **duration of 110 minutes** (**20 minutes** for objective and **90 minutes** for subjective paper). Objective paper shall be set with multiple choice questions, true/false, fill-in the blanks, matching type questions, etc. The total marks secured by the student in each mid term examination for **25** marks is considered and **the better of the two** mid term examinations shall be taken as the final marks secured by each candidate as internal marks for the subject.

(d) For internal evaluation in Practical's:

(i) Laboratory (including English laboratory): Marks: 25.

Day-to-day work in the laboratory: **15 marks.**

Two internal tests: Each of **10 marks** (conducted by the concerned laboratory Faculty members). The **better of the two** internal tests shall be considered for the award of marks.

The end examination shall be conducted at the end of the semester with the laboratory Faculty as internal examiner and an external examiner as appointed by the Controller of Examinations.

(ii) Engineering Graphics: **25 marks**

Day-to-day work: 15 marks.

Two internal tests: Each of **10 marks**. The **better of the two** internal tests shall be considered for the award of marks.

(e) End Semester examinations

This examination shall be set to 75 marks with time duration of 3 hours. The pattern of the examination paper shall be as per the guidelines of the Academic Council.

(f) (i) Industrial Mini Project:

Industrial Mini Project is to be taken up in collaboration with Industry during III year. At the end of the semester, Mini Project shall be displayed as a road show at the department level for the benefit of all students and staff. The same is to be evaluated by an internal committee of HOD, Supervisor and senior faculty member for **10** marks. The supervisor continuously assesses the student for **15** marks, ensuring that each student puts in effort equivalent of at least **80** periods. The mini project shall be submitted in a report form and should be presented before a committee consisting of an External Examiner, Head of Department, Supervisor and a senior faculty member. The report along with the presentation for **50 marks.**

(ii) Comprehensive Viva:

The comprehensive Viva shall be held in IV year II semester. The 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 subjects studied during the course of study. The Viva shall be evaluated for **100 marks.**

(iii) Seminar:

The seminar presentation shall be held in IV year II semester. For the seminar, the student shall collect information on a specialized Topic and prepare a technical report and submit to the department. The student's seminar shall be evaluated by a Committee consisting of HOD, seminar supervisor and a senior faculty member of the department. The student shall be assessed for his/her understanding of the topic, its application and its relation with various subjects studied during the course of study. The seminar shall be evaluated for **50 marks.**

(g) Project:

Out of **200 marks** for the project work, **50 marks** shall be for internal evaluation and **150 marks** for the End Semester Examination. A Report (in the form required by the Department) shall be submitted by the

student before the date announced by the HOD. The End Semester Examination on the project submitted is a Viva voce examination conducted by the same Committee appointed for Industrial mini project. In addition, the Project supervisor shall also be a member of the Committee. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of the project work shall be done at the end of IV year. The Internal Evaluation shall be based on the two seminars given by each student on the topic of his/ her project.

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 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 in a supplementary examination, the schedule of which shall be announced by the Institute separately. **The student has to clear all the backlog papers within the stipulated time of eight years.**

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

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in Para **6.**

(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 secures **not less than 35% (**26 out of 75 or 17 out of 50**)** of marks in the end examination and **a minimum of 40% of marks** in the sum total of the internal evaluation and 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 fulfils the academic requirement 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 - 1
II to III year	**37**	2 Regular	1 Regular	1 Regular	-- —	-- —
III to IV year	**62**	3 Regular	2 Regular	2 Regular	1 Regular	1 Regular

13. 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 *JNTUH*, 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 $\geq$ 70%
FIRST CLASS	60% $\leq$ Marks < 70%
SECOND CLASS	50% $\leq$ Marks < 60%
PASS CLASS	40% $\leq$ Marks < 50%

14. Withholding of results

The result of a student shall be withheld if (i) he/ she is involved in malpractices and is not cleared of the malpractice, (ii) disciplinary proceedings are pending against him/ her, or for any other reason approved by the Academic Council.

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 readmission 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 GR11 for B.Tech (Lateral Entry)

(Effective for the students admitted into II year from the Academic Year 2011-12)

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

   (a) **Pursued a course of study for not less than three academic years and not more than six academic years (para 2(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(para 2(b)).

   (c) Students, who fail to fulfil 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 course (para 2(c)).

2. Academic Requirements

A student shall be promoted from III year to IV year only if he/ she fulfils 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 *JNTUH*, 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)(para 13):

Class Awarded	% of Marks Secured
FIRST CLASS with DISTINCTION	Marks $\geq$ 70%
FIRST CLASS	60% $\leq$ Marks < 70%
SECOND CLASS	50% $\leq$ Marks < 60%
PASS CLASS	40% $\leq$ Marks < 50%

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech (MECHANICAL ENGINEERING)

COURSE STRUCTURE

I B.Tech (ME) — I Semester

Group	Subject code	Subject	L	T	P	Credits	Marks	Int	Ext
BAS	GR11A1001	Mathematics-I	4	1		**4**	100	25	75
BAS	GR11A1010	Mathematics-II	4	1		**4**	100	25	75
BAS	GR11A1011	Engineering Chemistry	3	1		**3**	100	25	75
EAS	GR11A1012	Engineering Graphics	3		4	**3**	100	25	75
EAS	GR11A1009	Environmental Science	3	1		**3**	100	25	75
BAS	GR11A1014	Engineering Chemistry Lab			3	**3**	75	25	50
EAS	GR11A1013	IT Workshop			3	**2**	75	25	50
HSS	GR11A1015	English Lab			3	**3**	75	25	50
		Total	**17**	**4**	**13**	**25**	**725**		

I B.Tech (ME) — II Semester

Group	Subject code	Subject	L	T	P	C	Marks	Int	Ext
BAS	GR11A1018	Mathematics-III	**4**	**1**		**4**	100	25	75
EAS	GR11A1021	Engineering Mechanics	**3**	**1**		**3**	100	25	75
BAS	GR11A1022	Physics for Engineers	**3**	**1**		**3**	100	25	75
HSS	GR11A1002	English	**3**	**1**		**3**	100	25	75
EAS	GR11A1003	Computer Programming and Data Structures	**4**	**1**		**4**	100	25	75
EAS	GR11A1006	Computer Programming and Data Structure Lab			**6**	**3**	75	25	50
BAS	GR11A1007	Engineering Physics Lab			**3**	**3**	75	25	50
EAS	GR11A1008	Engineering Workshop			**3**	**2**	75	25	50
		Total	**17**	**5**	**12**	**25**	**725**		

II B.Tech (ME) I Semester

Group	Subject code	Subject	L	T	P	C	Marks	Int	Ext
BAS	GR11F5004	Probability and Statistics	4	1		4	100	25	75
DC	GR11A2028	Kinematics of Machinery	4	1		4	100	25	75
DC	GR11A2029	Mechanics of Solids -I	4	1		4	100	25	75
DC	GR11A2031	Thermodynamics	4	1		4	100	25	75
DC	GR11A2030	Metallurgy and Material Science	4	1		3	100	25	75
DC	GR11A2034	Metallurgy Lab			3	2	75	25	50
DC	GR11A2032	Machine Drawing Lab			3	2	75	25	50
DC	GR11A2033	Mechanics of Solids Lab			3	2	75	25	50
		Total	**20**	**5**	**9**	**25**	**725**		

II B.Tech (ME) II Semester

Group	Subject code	Subject	L	T	P	C	Marks	Int	Ext
DC	GR11A2038	Mechanics of solids II	4	1		4	100	25	75
DC	GR11A2037	Fluid mechanics and Hydraulic Machinery	4	1		4	100	25	75
DC	GR11A2035	Applied Thermo dynamics-1	4	1		4	100	25	75
DC	GR11A2039	Production Technology	4	1		4	100	25	75
EAS	GR11A2036	Electrical Technology	4	1		3	100	25	75
EAS	GR11A2040	Electrical Technology Lab			3	2	75	25	50
DC	GR11A2042	Production Technology Lab			3	2	75	25	50
DC	GR11A2041	Fluid mechanics and Hydraulic Machinery Lab			3	2	75	25	50
		Total	**20**	**5**	**9**	**25**	**725**		

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) I Semester

MATHEMATICS - I

Objectives:

Mathematics is the backbone of all Engineering disciplines. Mathematics – I is common to All Branches except BT. Mathematics – I provides all the basic requirements for application of Mathematics to the Engineers. At the end of the course, the students will be able to apply the concepts of (i) Integration over two and three dimensions, (ii) Vector fields and Vector integration theorems, (iii) Matrix theory, in their fields of study.

L: 4, T: 1, Credits: 4 **Total Marks: 100 (Int: 25, Ext: 75)**

UNIT - I

Matrices: Real matrices – Symmetric, skew-symmetric, orthogonal matrices. Complex matrices: Hermitian, skew-Hermitian, Unitary matrices. Elementary row transformations, rank, echelon form, normal form. Solution of linear systems: Consistency and inconsistency of a system of equations.

Eigen values and eigen vectors: Eigen values and eigen vectors of a matrix and their properties. Modal and spectral matrices. Condition number of a matrix. Cayley-Hamilton theorem (without proof) and its application to find the inverse and powers of a matrix. Diagonalisation of a matrix.

Eigen values and eigenvectors of complex matrices and their properties.

UNIT- II

Linear Transformations and quadratic forms: Linear transformation: Orthogonal transformation. Singular value decomposition of a matrix.Quadratic forms: Definition, positive definite, negative definite, indefinite, semi-definite quadratic forms. Rank, index and signature of a quadratic form. Sylvester law. Reduction of a quadratic form to a canonical form.

UNIT –III

Functions of a single and several variables: Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, generalized mean value theorem (all theorems without proof).

Radius, center and circle of curvature. Evolutes and envelopes.

Functional dependence – Jacobian - Maxima and minima of functions of two variables with and without constraints.

UNIT -IV

Applications of Integration: Representation of curves and surfaces in cartesian, parametric and polar co-ordinates. Integral representation of lengths, areas, volumes and surface areas of revolution.

Double integrals: Evaluation of double integrals, changing the order of integration, change of variables, evaluation of plane areas by double integration.

Triple integrals: Evaluation of triple integrals, evaluation using cylindrical and spherical polar co-ordinates, evaluation of the volume of a solid using triple integration.

UNIT –V

Vector Calculus & Tensors: Gradient, divergence, curl and their related properties. Potential function. Line integral - work done - conservative fields - Green's theorem in a plane. Surface integrals - Flux of a vector valued function - Stoke's and Gauss divergence theorems (statement and their verification)-Introduction to tensors.

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.

4. Schaum's outline series on Vector Analysis. Linear Algebra.

Reference Books:

1. Schaum's outline series on Linear Algebra.

2. Introduction to Linear Algebra. Gilbert Strang.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) I Semester

MATHEMATICS - II

Objectives: Mathematics is the backbone of all Engineering disciplines. Mathematics – II is common to All Branches except BT. At the end of the course, the students will be able to

(i) Understand and apply the methods of solving the differential equations directly or using Laplace transforms,

(ii) Solve linear and some nonlinear partial differential equations,

(iii) Understand the basic of Fourier series and its representation.

L: 4, T: 1, Credits: 4 **Total Marks: 100 (Int: 25, Ext: 75)**

UNIT- I

First order ordinary differential equations: Formation of ODE. Solution of separable, homogeneous, exact, linear and Bernoulli linear equations

Applications to Newton's law of cooling, Law of natural growth and decay, orthogonal trajectories and geometrical applications.

UNIT- II

Second and higher order ODE with constant coefficients: Solution of second and higher order linear homogeneous differential equations. Non- homogeneous differential equations with RHS term of the type $f(x) = e^{ax}$, sin ax, cos ax, x^n, $e^{ax}V(x)$, $x^nV(x)$. Method of variation of parameters-Applications to bending of beams, electrical circuits, simple harmonic motion.

Unit -III

Laplace transform and its application to ordinary differential equations: Laplace transform of standard functions - inverse Laplace transform - First shifting theorem, Transform of derivatives and integrals - Unit step function - Second shifting theorem - Differentiation and integration of transforms - Dirac's delta function.

Convolution theorem - Periodic function - Application of Laplace transforms to ordinary differential equations

UNIT- IV

Fourier series: Fourier series on the interval ($-\pi$, π): Determination of coefficients, Fourier series of even and odd functions, convergence. Fourier series on an arbitrary interval. Half range Fourier cosine and sine series using even and odd extensions.

UNIT -V

Partial differential equations: Formation of partial differential equations by eliminating arbitrary constants or arbitrary functions. Solutions of first order linear (Lagrange) equation. Solution of nonlinear first order equations (four standard types). Solution using separation of variables. Application to heat equation (one dimension), wave equation (one dimension) and Laplace equation (two dimensions).

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.

Reference Books:

1. Schaum's outline series on Vector Analysis; Laplace Transforms; Differential Equations.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) I Semester

ENGINEERING CHEMISTRY

Objectives: At end of the course, the student should be able to understand the

1. Role of polymers and nano materials in engineering applications.

2. Role of chemistry (conducting polymers) in the energy production.

3. Material behavior for application in environmental applications.

4. Basic concepts of application of materials in all fields of engineering.

L : 3, T : 1, P : 0, Credits : 3 **Total Marks : 100**
(Int : 25 , Ext : 75)

UNIT- I

Electrochemistry: Concept of Conductance- Specific, Equivalent and molar conductance and ionic conductance, electrolytic cells - Galvanic Cells, Potentiometric titrations - strong acid vs strong base, electrochemical series Concentration Cells

Corrosion - causes and effects of corrosion , theories of corrosion – Chemical, Electrochemical corrosion, factors affecting Corrosion control methods – Cathodic protection, sacrificial anode, impressed current cathode. Surface coatings – methods of application on metals- hot dipping, galvanizing, tinning, cladding, electroplating, Paints – constituents and their functions.

UNIT- II

Water Technology: Introduction, Hardness: Causes, expression of hardness – units – types of hardness, estimation of temporary & permanent hardness of water complexometric method , Boiler troubles – Scale & sludge formation, caustic enbrittlement, priming & foaming, Softening of water - Internal and external treatment , Ion exchange process and Numerical problems, Desalination of brackish water - Reverse osmosis, electro dialysis.

UNIT -III

Polymer Technology: Types of Polymerization, Plastics: Thermoplastic resins & Thermo set resins. Compounding & fabrication of plastics, preparation, properties, engineering applications of polyethylene, PVC, poly styrene, Teflon, Bakelite, Nylon. Conducting Polymers: Poly acetylene, polyaniline, applications. Liquid Crystal polymers: Characteristics and uses, Rubber – Natural rubber, vulcanization. Elastomers – Butyl rubber, Thiokol rubbers, Fiber reinforced plastics (FRP), Biodegradable polymers.

UNIT- IV

Energy sources: Concept and classification of fuels - solid, liquid, gaseous , Solid fuels – coal – analysis – proximate and ultimate analysis and their significance, Liquid fuels – petroleum, refining of petroleum – definition of cracking and its significance, knocking - octane number, cetane number, synthetic petrol – Bergius and Fischer Tropsech's process method, Gaseous fuels – natural gas, LPG, CNG, Calorific value of fuel – HCV, LCV, Introduction to biodiesel, problems.

UNIT- V

Engineering Materials

Cement: Composition and manufacture of port land Cement, setting & hardening of cement .

Lubricants: Definition and classification , theories of lubricants, properties - Cloud point, pour point, flash and fire point, Viscosity.

Refractories: Classification, Characteristics of a good refractory and failure mechanism of refractory materials.

Batteries: Definition and classification, Primary - dry cell, Secondary cells - lead-Acid cell, Ni-Cd cell, and Lithium cells , Fuel cells – Hydrogen – Oxygen fuel cells and uses. Nanomaterials – Introduction, general methods of preparation, applications.

Text Books:

1. Text book of Engineering Chemistry: Y. Bhathi kumara and C. Jyosna , VGS Book links, Vizayawada, A.P, Edition June 2009.
2. Text Book of Engineering Chemistry: C.P. Murthy, C.V. Agarwal, and A. Naidu, B.S. Publications,Hyd.
3. Text book of Engineering Chemistry by P.C Jain and Monika Jain, Dhanpat Rai Publishing company (p) Ltd , K.K. Group , New Delhi(2006)

Reference Books

1. Chemistry of Engineering Materials: R.P Mani and K.N.Mishra, CENGAGE learning.
2. Text of Engineering Chemistry: S.S. Dara & Mukkati S. Chand & Co,New Delhi(2006)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) I Semester

ENGINEERING GRAPHICS

Objectives: At the end of the course the student is expected to

1. Learn the fundamental concepts of Engineering Graphics.
2. Drafting Practice for Geometrical Drawing and Projections.
3. Introduction to Auto CAD.

L: 3, T: 0, P: 4: Credits: 3 **Total Marks: 100 (Int: 25, Ext: 75)**

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

UNIT-II

Drawing of Projections or Views of Orthographic Projection in First Angle Projection only:

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

UNIT- III

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

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

UNIT – IV

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.

UNIT – V

Introduction to Computer Aided Drafting

Generation of points, lines, curves, polygons, simple solids and their dimensioning.

Text Books

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

Referecnce Books

1. Engineering Drawing and Graphics, Venugopal, New age.
2. Engineering Drawing- Johle, Tata Macgraw Hill.
3. Computer Aided Engineering Drawing- Trymbaka Murthy- I.K. International.
4. Engineering Drawing, Narayana and Kannaiah, Scietech publishers.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) I Semester

ENVIRONMENTAL SCIENCE

L: 3, T: 1, Credits: 3 **Total Marks: 100 (Int: 25, Ext: 75)**

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, Type 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 building and Clean Development Mechanism (CDM).

Text Books

1. Text Book of Environmental Studies, Erach BArucha. 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, Dhanpat Rai & 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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) I Semester

ENGINEERING CHEMISTRY LABORATORY

Objectives : At end of the course, the student should be able to understand

1. The characteristics and preparation of rubber.

2. The characteristics and nature of lubricating oils.

3. The hard water analysis process.

4. Basic concepts of analysis and application of materials in all fields of engineering.

L : 0, T : 0, P : 3 Credits : 3 **Total Marks : 75**
(Int : 25 , Ext : 50)

LIST OF EXPERIMENTS

1. **Conductometry:** Conductometric titrations of strong acid verses strong base.

2. **Potentiometry:** Potentiometric titration of strong acid verses strong base.

3. **Lubricants:** Determination of viscosity of a sample oil by Redwood viscometer-I.

4. **Lubricants:** Determination of surface tension of lubricants by stalagmometer.

5. **Organic preparations:** Preparation of Aspirin and Thiokol rubber.

6. **Complexometry:** Estimation of hardness of water by using standard EDTA solution.

7. **Complexometry:** Estimation of copper by using standard EDTA solution.

8. **Permanganometry:** Estimation of ferrous iron by using standard potassium permanganate solution.

9. **Permanganometry:** Estimation of ferric iron by using standard potassium dichromate solution.

10. **Colorimetry:** Estimation of ferrous iron in cement by using colorimeter.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) I Semester

IT WORKSHOP

L: 0, T: 0, P: 3 **Total Marks: 75 (Int: 25, Ext: 50)**

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, 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 disassemble and assemble to working condition and 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.

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: **Hardware Troubleshooting :** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They

should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Task 6: **Software Troubleshooting :** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Task- 7: **Orientation & Connectivity Boot Camp :** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task- 8: **Web Browsers, Surfing the Web :** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task-9: **Search Engines & Netiquette :** 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. This should be demonstrated to the instructors by the student.

Task-10: **Cyber Hygiene :** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Productivity Tools

Task-11: introducing features of professional word documents like opening, closing, editing, saving, printing, and text formatting.

Task-12: students would be exposed to create word documents with images, tables, formulas, and with additional word processing features.

Task -13: introducing features of professional spread sheets like opening, closing, editing, saving, printing, and text formatting.

Task -14: students would be exposed to compile spread sheets using formulas, different number formats, text formats and conditional formatting.

Task-15: introducing features of professional slide presentations like opening, closing, editing, saving, printing, and text formatting.

Task-16: students would be exposed to create slide presentations with tables, different views of slide presentations, master slides, custom animations.

References:

1. Introduction to Information Technology, ITL Education Solutions Limited, Pearson Education.
2. Introduction to Computers, Peter Norton, 6/e Mc Graw Hil.l
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).

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) I Semester

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB Objectives: To expose the students to a variety of self-instructional, learner-friendly modes of language learning.

(i) To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such GRE, TOEFL, GMAT etc.

(ii) To enable them better pronunciation through stress on word accent, intonation, and rhythm.

(iii) To train students to use language effectively to face interviews, group discussions, public speaking.

(iv) To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

L: 0, T: 0, P: 3, C:2 **Total Marks : 75 (Int : 25 , Ext : 50)**

SYLLABUS: The following course content is prescribed for the English Language Laboratory sessions:

(i) Introduction to the sounds of English –Vowels, Diphthongs & Consonants.

(ii) Situational Dialogues/Role-play.

(iii) 'Just A Minute' Sessions (JAM).

(iv) Describing Objects/Situations/People.

(v) Information Transfer. (vi) Debate.

(vii) Telephone Skills. (viii) Giving Directions.

Suggested Software:

(i) Cambridge Advanced Learners' English Dictionary with CD.

(ii) The Rosetta Stone English Library.

(iii) Clarity Pronunciation Power-Part 1.

(iv) Mastering English in Vocabulary, Grammar, Spelling, and Composition.

(v) Dorling Kindersley series of Grammar, Punctuation, Composition etc.

(vi) Language in use , Foundation Books Pvt Ltd with CD.

(vii) Oxford Advanced Learner's Compass, 7th Edition.

(viii) Learning to speak English-4 CDs.

(ix) Vocabulary in Use, Michael McCarthy, Felicity O' Den, Cambridge.

(x) Murphy's English Grammar, Cambridge with CD.

(xi) English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Books (to be located within the lab in addition to the CDS of the text book which are loaded on the systems):

1. **English Language Communication Skills –** A Reader cum Lab Manual Course content and Practice (with CD) Dr. A. Rama Krishna Rao, Dr.G.Natanam, Prof .S.A Sankaranarayanan.Publishers:Anuradha Publications, Chennai
2. **A Handbook of English for professionals-**Fourth Edition Dr.P.Eliah, BS Publications.
3. **Better English Pronunciation,** JD O' Connor,Cmabridge University Press.
4. **A Foundation English Course for undergraduates** (Practice exercises on skills) Paul Gunashekar Shyamala Kumar Das Sachil Mahadevan, Oxford University Press.
5. **Improve Your Writing, V.N. Arora & Lakshmi Chandra,**Oxford University Press.
6. **Speaking English Effectively,**Krihna Mohan & N.P. Singh, Macmillian Publishers.
7. **English Conversation for Indian Students,** Y.V. Yardi,Orient Longman.
8. **The Written Word,** B Vandana R.Singh, Oxford University Press.
9. **Strengthen Your Writing,**V.R. Narayanaswami,Orient Longman Publishers.
10. **A Handbook of Standard English and Indian Usage,** J.Sethi Prentice Hall.
11. **Essential Telephoning in English,**Tony Garside and Barbara Garside,Cambridge press.
12. **English Conversation Practice Spoken English**, Grant Taylor, Tata McGraw Hill
13. **English Conversation Practice Spoken English, Jayashree Balan, Vijay Nicole Imprints Pvt.Ltd**
14. **How to Prepare for Group Discussion and Interview,** V.Sasi Kumar P V Dhamija, Tata McGraw Hill
15. **Speaking English Effectively,** Hari Mohan Prasad Rajnish Mohan Krishna Mac Millan Publishers

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) II Semester

MATHEMATICS – III

Objectives: Mathematics is the backbone of all Engineering disciplines. Mathematics – III is common to All Branches except BT. The course is Numerical solution of problems in various fields. At the end of the course, the students will be able to solve numerically various problems in (i) nonlinear algebraic equations, (ii) systems of linear algebraic equations, (iii) integration, and (iv) initial and boundary value problems in *ODE*.

L: 4, T: 1, Credits: 4 **Total Marks: 100 (Int: 25, Ext: 75)**

UNIT- I

Solution of a non-linear equation & Solution of linear systems: Solution of non-linear equations: Bisection method, Method of false position, Iteration method and Newton-Raphson method.

Solution of linear systems: Gauss elimination, Gauss elimination with partial pivoting, Gauss-Jordan method, Jacobi and Gauss-Seidel iterative methods. Convergence of iterative methods (without proof).

UNIT- II

Interpolation – 1 (Interpolation for uniform data): Finite differences – Forward, backward and central differences. Relationship between operators. Differences of a polynomial. Newton's forward and backward difference formulas.

UNIT -III

Interpolation – 2 (Interpolation for non-uniform data & Splines): Lagrange and Newton's divided difference formulas for unevenly spaced data.

Splines: Cubic splines and B-splines.

UNIT- IV

Curve fitting (Method of least squares), Numerical differentiation and numerical integration: Curve fitting: Fitting a first degree (linear) and second degree (parabola), exponential, power curves for a data by the Method of least squares.

Numerical differentiation using the Newton's forward and backward difference formulas.

Numerical integration: Trapezoidal and Simpson's 1/3rd rules. Gauss-Legendre one point, two point and three point rules for integration.

UNIT -V

Numerical solution of Initial Value Problems and Boundary Value problems in ODE: Numerical solution of 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.

Numerical solution of Boundary Value Problems in ODE: Finite difference methods for solving second order linear ODE.

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.

4. Mathematical Methods: S.R.K. Iyengar and R.K. Jain, Narosa Publishing House.

Reference Books:

1. Numerical Methods for Scientific & Engineering Computation: M.K. Jain, S.R.K. Iyengar, and R.K. Jain. New Age International Publications.

2. Introductory Methods of Numerical Analysis. S.S. Sastry, Prentice Hall.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) II Semester

ENGINEERING MECHANICS

Objectives: This is EAS (Engineering Applied Science) subject common to ME and Civil branches of UG Engineering. At the end of the course the student is expected to

1. Learn the fundamental concepts of Engineering Mechanics.
2. Learn the mathematical formulations of trusses and frames.
3. Analyse the energy concepts.

L: 3, T: 1, P: 0; Credits: 3 Total Marks: 100 (Int: 25, Ext: 75)

UNIT- I

Forces, Moments, Equilibrium: Introduction to Engineering Mechanics –Basic concepts.

Systems of forces: Coplanar concurrent forces- Resultant-moment of force and its application –Couples and resultant of force system.

Equilibrium of systems of forces: Free body diagrams, equations of equilibrium of coplanar systems, Lamis 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 condition of equilibrium.

UNIT- II

Properties of Surfaces and Solids: Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, - Angle section, Hollow section by using standard formula.

Second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia.

UNIT- III

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

UNIT -IV

Analysis of Trusses: Introduction – Classification of trusses-Assumptions made in the analysis of perfect truss- Methods of analysis- Method of joints and Method of sections.

UNIT- V

Work Energy Method: Equations for translation, work-energy Applications to particle motion, connected system.

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

Text Books:

1. L. Singer's Engineering Mechanics, K Vijaya Kumar Reddy & J Suresh Kumar, BS Publications.
2. Engineering Mechanics, A Nelson, Tata-McGraw Hill.
3. Engineering Mechanics, A.K.Tayal, Umesh publications.

Reference Books:

1. Engineering Mechanics, S.S. Bhavikatti & J.G.Rajasekharappa.
2. Engineering Mechanics, Shames L.H., Prentice Hall, New Delhi.
3. Engineering Mechanics, Timoshenko &Young.
4. Engineering Mechanics, K.L. Kumar, Tata McGraw Hill.
5. Engineering Mechanics, R.S. Khurmi, S.Chand.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) II Semester

PHYSICS FOR ENGINEERS

Objectives: (1)To equip the student the nature and concept of various solids and to gain the knowledge of various properties of materials.(2) To gain the knowledge on the acoustics at various usages.(3) To make the student learn the electrical and magnetic properties of various materials.(4) The student gain familiarity about the various techniques to evolve in order to identify the flaws in materials by using ultrasonics.(5) To gain knowledge about the various application of lasers and fiber optics and to gain familiarity with the latest developments and trends in nanotechnology

L: 3, T: 1, P: 0; Credits: 3 **Total Marks: 100 (Int: 25, Ext: 75)**

UNIT-I

Crystal Structure: Cohesive energy of a solid, Calculation of Cohesive Energy of Ionic crystal, Seven Crystal Systems, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC.

Defects in Crystals: Point Defects: Vacancies, Substitution, Interstitial, concentration of Frenkel and Scotty Defects; Qualitative treatment of line (Edge and Screw Dislocations) Defects, Burger's Vector, Surface Defects and Volume Defects.

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, Quieting for Specific Observers, Mufflers, Sound-proofing.

UNIT- III

Dielectric Properties: Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities -Internal Fields in Solids, Clausius -Mossotti Equation, Piezo-electricity, Pyro-electricity and Ferro-electricity.

Magnetic Properties: Permeability, Field Intensity, Magnetic Field Induction, Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr

Magnetron, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Domain Theory of Ferro Magnetism on the basis of Hysteresis Curve, Soft and Hard Magnetic Materials, Properties of Anti-Ferro and Ferri Magnetic Materials, Ferrites and their Applications.

UNIT- IV

Lasers: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Lasing Action, Einstein's Coefficients and Relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.

Fiber Optics: Principle & construction of Optical Fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers and Refractive Index Profiles, Attenuation in Optical Fibers, Application of Optical Fibers.

UNIT -V

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

Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Bottom-up Fabrication: Sol-gel, Precipitation, Combustion Methods; Top-down Fabrication: Chemical Vapor Deposition, Physical Vapor Deposition, Carbon Nano Tubes, Applications.

Text Books:

1. Engineering Physics: P.K.Palaniswamy, SciTech Publishers.
2. Applied Physics: T.Bhima Sankaram, G Prasad, BS Publications.

Reference Books:

1. Solid State Physics: Charles Kittel, Wiley & Sons (Asia) Pte Ltd.
2. Engineering Physics: R K Gaur & S L Gupta, Dhanpat Rai & Sons

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) II Semester

ENGLISH

L: 3, T: 1, P: 0; Credits: 3 **Total Marks: 100 (Int: 25, Ext: 75)**

Objectives: (1) to improve English language proficiency of the students with an emphasis on LSRW skills (2) to equip the students study the academic subjects with better perspective through the theoretical and practical components of the designed syllabus (3) To al and informal situationsdevelop the study skills and communication skills in form

UNIT- I

1. Sir C.V. Raman: Subhasree Desikhan, from "Enjoying Everyday English".

2. Mother Teresa: From, "Inspiring Speeches and Lives".

UNIT- II

1. The Connoisseur: Nergis Dalal, from "Enjoying Everyday English".

2. Sam Pitroda: From "Inspiring Speeches and Lives".

UNIT- III

1. The Cuddlore Experience: Anu George, from "Enjoying Everyday English".

2. Amartya Kumar Sen: From "Inspiring Speeches and Lives".

UNIT- IV

1. Bubbling Well Road: Rudyard Kipling, from "Enjoying Everyday English".

2. I Have a Dream: Martin Luther King Jr., from "Inspiring Speeches and Lives".

UNIT –V

Exercises on

1. Reading and writing Skills

2. Reading Comprehension

3. Situational Dialogues

4. Letter Writing

5. Essay writing

Practice exercises on remedial grammar covering

1. Common Errors in English

2. Subject-Verb Agreement

3. Use of Articles

4. Use of Prepositions

5. Tense and Aspect

Vocabulary Development

1. Synonyms & Antonyms 2. One-Word Substitutes 3. Prefixes & Suffixes 4. Idioms and Phrases 4. Pairs of Words Often Confused

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) II Semester

COMPUTER PROGRAMMING AND DATA STRUCTURES Objectives (1) To express algorithms and draw flowcharts in a language independent manner, thus exemplifying the professional ethics (2) To provide the skills necessary for the effective application of computation and computer programming in engineering applications (3) To understand the concepts of C-programming language such as branching, loops, functions, input/output, arithmetic rules, arrays, pointers and files

L: 4, T: 1, Credits: 4 **Total Marks: 100 (Int: 25, Ext: 75)**

UNIT -I

Introduction to Computers: System Software, Program Developing Steps, Algorithms, Flowcharts. **Introduction to C:** Structure of C- Program**,** Variable Names, Data Types, Constants, Operators, Type Conversions, Expressions, Precedence and Order of Evaluation. **Managing I/O**: Input-Output Statements, formatted I/O.

UNIT- II

Control Flow: Statements and Blocks, if, switch statements, **Loops**: while, do-while, for, break and continue, goto and Labels.

Arrays and Strings: Introduction, One- dimensional arrays, Declaring and initializing Arrays, Multidimensional arrays, Strings, String Handling Functions.

UNIT- III

Functions: Introduction, Function Definition, Function Declaration, Return values and their Types, Function Calls, Categories of Functions, nesting of Functions, Recursion, Passing arrays to Functions, Storage Classes.

Structure: Basics of Structures, Structures to Functions, Arrays of Structures, Structures with in Structures, Arrays with in structures, Unions**.**

UNIT -IV

Pointers: Pointers and Addresses, Pointers and function Arguments, Pointers and arrays, Address Arithmetic, Character pointers and Functions, Pointer Arrays, Pointers to Structures, Pointers to Pointers, Command Line Arguments.

Files: Introduction, Types of Files, File Access Functions, I/O on Files, Random Access to Files, Error Handling.

UNIT- V

Sorting: Bubble sort, Merge sort, Insertion Sort, Selection Sort, Quick Sort.

Searching: Linear Search, Binary Search.

Introduction to Data Structures: Basics of Linear and Non-Linear Data structures.

Text Books

1. The C Programming Language, BRIAN W.KERNIGHAN Dennis M.Ritchie, Second Edition, PHI.
2. Computer Programming and Datastructures by E Balaguruswamy, published by Mc GrawHill.

Reference Books

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) II Semester

COMPUTER PROGRAMMING AND DATA STRUCTURE LAB Objectives:

(1) To introduce the fundamentals of C programming language and develop the skills for solving problems (2) To develop the proficiency in writing programs in a procedural programming language (3) To use the concepts of searching and sorting for solving real-time problems

L: 0, T: 0, P: 6; Credits: 3 Total Marks: 75 (Int: 25, Ext: 50)

Task- I:

a) Write a C program to find the sum of individual digits of a positive integer.

b) A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

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-II:

a) Write a C program to calculate the following Sum: $Sum=1-x^2/2!+x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$

b) Write a C program to find the roots of a quadratic equation using if-else.

Task -III:

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 - IV:

a) The total distance travelled by a vehicle in ‘t’ seconds is given by distance $S= u*t+1/2at^2$ where ‘u’ and ‘a’ are the initial velocity (m/sec.) and acceleration (m/sec2). Write a C program to find the distance travelled by a vehicle at regular intervals of time given the values of ‘u’ and ‘a’. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of ‘u’ and ‘a’.

b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*,/,% and use Switch Statement)

Task - V:

a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices

ii) Multiplication of Two Matrices

Task - VI:

a) Write a C program that uses functions to perform the following operations:

i) To insert a sub-string in to given main string to a given position.

ii) To delete n Characters from a given position in a given string.

b) Write a C program to determine if the given string is a palindrome or not?

Task - VII:

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.

b) Write a C program to count the lines, words and characters in a given text.

Task - VIII:

a) Write a C program to generate Pascal's triangle.

b) Write a C program to construct a pyramid of numbers.

Task - IX:

a) Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum perform error checking. For example, the formula does not make sense for negative exponents (–), if n is less than 0. Have your program to print an error message if n d" 0, without computing the sum.

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.

Task - Xl:

a) Write a C program which copies one file to another.

b) 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 - XII:

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 - XIII:

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 - XIV:

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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) II Semester

ENGINEERING PHYSICS LABORATORY

Objectives: (1)To enable the student to draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.(2) To analyze the behavior and characteristics of various materials for its optimum utilization.

L: 0, T: 0, P: 3; Credits: 3 **Total Marks: 75 (Int: 25, Ext: 50)**

LIST OF EXPERIMENTS

1. Measurements using Multimeter.

2. Measurement of voltage and Frequency using CRO.

3. B-H curve.

4. Determination of Dielectric constant.

5. Energy gap of a semi conductor

6. Study of magnetic field along the axis of a circular coil.

7. Study of Hall Voltage

8. Determination of carrier concentration and carrier mobility of a semiconductor.

9. Numerical Aperture of optical fiber.

10. Bending losses in optical fiber.

11. Air gap losses in optical fiber

12. Characteristics of LASER diode

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

I B.Tech (ME) II Semester

ENGINEERING WORKSHOP

Objectives: At the end of the course the student is expected to

1. Know the various trades applicable to industries.
2. Hands on experience for common trades.

L: 0, T: 0, P: 3; Credits: 2 **Total Marks: 75 (Int: 25, Ext: 50)**

TRADES FOR PRACTICE:

1. Carpentry
2. Fitting
3. Tin – Smithy and Development of jobs carried out and soldering.
4. House – Wiring

DEMONSTRATION

5. Black Smithy-
6. Foundry
7. Welding
8. Plumbing
9. Power tools

Text Books:

1. Work Shop Manual : P.Kannaiah, K.l.Narayana, Scitech Publishers.
2. Work Shop Manual: Venkat Reddy.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) I Semester

PROBABILITY AND STATISTICS

UNIT- I

Probability: Basic concepts in Probability - Sample space, event, mutually exclusive and exhaustive events – The axioms of probability –Conditional probability and independence of events –Addition and Multiplication theorems for two events - Bayes theorem ,Boole's inequality.

Random variables: Definition of a random variable, discrete and continuous random variables – Distribution function , probability mass function, probability density function with illustrations - Joint, marginal and conditional distributions with illustrations - Mathematical expectation of a r.v and of a function of a r.v. and its properties –Addition and Multiplication theorems of expectation for two variables- Moment Generating Function and Characteristic function, statements of their properties .

UNIT -II

Distributions: Binomial, Poisson distributions, Mean, variance, moment generating function, fitting of these distributions - Uniform, Normal, Exponential distributions, properties of these distributions, fitting of Normal distribution.

Sampling distribution: Definition of Population and sample, Overview of types of sampling(Random, Purposive, SRS, Stratified and Systematic random samplings) - Sampling distribution, standard error, sampling distribution of mean (known and unknown) and proportions.

UNIT- III

Estimation & Testing of Hypothesis: Point estimation – Interval estimation - Bayesian estimation- Confidence interval for mean, difference of means and for proportions. Concepts of Null hypothesis, Alternative hypothesis, Critical region, Type I and Type II errors, one tail and two-tail tests, Level of significance

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

UNIT -IV

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

Small samples: Student's t-test for testing the significance of single mean, difference of means (independent samples and paired samples), significance of observed sample correlation coefficient - F-test for equality of variances and ANOVA(1-way &2-way),Concept and problem solving.

UNIT -V

Stochastic Process: Introduction to Stochastic Process-Markov process, Classification of states-Examples of Markov chains, stochastic matrix, limiting probabilities.

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).

TEXT BOOKS:

1. Probability and statistics for engineers (Erwin Miller and John E. Freund), R.A Johnson and C. B. Gupta.
2. Fundamentals of Stochastic process-B.R. Bhat
3. Probability, Statistics and Queuing Theory, 2nd Edition, Trivedi, John Wiley and Sons
4. Operations Research by Manmohan, Kantiswaroop &Gupta.

REFERENCE BOOKS:

1. Fundamentals of Mathematical Statistics, S.C.Gupta, V.K.Kapoor
2. Probability, Statistics and Queuing Theory with computer applications-Arnold O.Allen
3. Introduction to Probability and Statistics, 12th edition, W.Mendenhall, R.J. Beaverand B.M.Beaver, Thomson. (Indian edition)
4. Probability and Statistics in Engineering, 4th Edition, William W.Hines, Douglas C.Montgomery, David M.Goldsman, Connie M.Borror, Wiley Student Edition.

5. Introduction to Probability and Statistics, J.S.Milton, Jesse C.Arnold, 4th edition, TMH.

6. Mathematical Statistics: Biswas & ,Srivastav

Objective: At the end of the course the student is expected to

1. Know the fundamentals of Probability and Statistics
2. Understand and apply the Tests of Hypothesis, Correlation & Regression
3. Understand simple Queuing models.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) I Semester

KINEMATICS OF MACHINERY

UNIT – I

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

MACHINES : Mechanism and 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 and approximate copiers and generated 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 center of rotation, centroids and axodes – relative motion between two bodies – Three centers in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT – III

CAMS AND FOLLOWERS: Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 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 involute 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 for an automobile.

UNIT – V

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.

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.

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:

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

II B.Tech (ME) I Semester

MECHANICS OF SOLIDS-I

UNIT – I

SIMPLE STRESSES & STRAINS : Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT – II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXTURAL STRESSES AND SHEAR STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R. Position of Neutral axis – section modulus of Rectangular, Circular sections (Solid and Hallow),I ,T sections, Angular and Channel sections. Practical Application of bending equation, Shear stresses in beams, Variation shear stress distribution for rectangular, circular and I sections -problems

UNIT – IV

COMBINED STRESSES: Uni-axial and biaxial loading, complementary shear stress, stresses on oblique plane, shear ,pure shear and combined stresses.

TORSION OF CIRCULAR SHAFTS: Torsion of shafts, shear stresses in shaft , comparison of solid and hollow shafts ,combined bending torsion.

UNIT – V

DEFLECTION OF BEAMS : Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly

varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

TEXT BOOKS :

1. Strength of Materials: Ramamrutham.
2. Strength of Materials: R.S.Khurmi and Gupta
3. Strength of materials by Bhavikatti, Lakshmi publications.
4. Solid Mechanics, by Popov

REFERENCES :

1. Strength of Materials -By Jindal, Umesh Publications.
2. Analysis of structures by Vazirani and Ratwani.
3. Mechanics of Structures Vol-III, by S.B.Junnarkar.
4. Strength of Materials by S.Timshenko
5. Strength of Materials by Andrew Pytel and Ferdinond L. Singer Longman.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) I Semester

THERMODYNAMICS

UNIT – I

Introduction: **Basic Concepts** : 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., Zeroeth Law of Thermodynamics — Concept of quality of temperature – Principles of Thermometry- Reference points – Constant volume gas Thermometer – Scales of temperature, Ideal gas scale - PMMI - Joule's Experiments – First law of Thermodynamics – Corollaries – Limitations of the First Law- First law applied to a Process –applied to a flow system – Steady Flow Energy Equation.

UNIT – II

Second Law of Thermodynamics – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, 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: 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 – 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 – Mole Fraction, Mass friction 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 const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour, Atmospheric air - **Psychrometric Properties:** 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 – Psychrometric chart.

UNIT - V

Ideal Cycles: Sterling Cycle, Atkinson Cycle, Ericcson Cycle, Lenoir Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency,

Power Cycles : Otto, Diesel, Dual Combustion cycles, Mean Effective Pressures on Air standard basis – Brayton and Rankine cycles – Performance Evaluation – combined cycles - comparison of Cycles.

Refrigeration Cycles: Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.

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.

REFERENCES :

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) I Semester

METALLURGY AND MATERIAL SCIENCE

UNIT – I

Crystallography: Space lattice and unit cells, Crystal systems –indices for planes and directions, structures of common metallic materials, crystal defects, dislocations –mechanism of plastic deformation.
Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds

UNIT–II

Construction of equilibrium diagrams ,lever rule, eutectic , isomorphous systems, Experimental methods of constructing the equilibrium diagrams, Coring and Miscibility gaps, Transformations in the solid state, intermediate phases, eutectic, eutectoid, peritectic, peritectoid reactions, relations between phase diagrams, properties of alloys, study of important binary phase diagrams for example Cu-Ni, Pb-Sn, Al-Cu, Fe-Fe3C

UNIT–III

Cast Irons and Steels : Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal 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. Effect of alloying elements of the properties of steel and Cast Iron.

UNIT-IV

Heat treatment of Alloys: Annealing, normalizing, Hardening, TTT diagrams, tempering , Hardenability, Age hardening treatment,. Cryogenic treatment of alloys.

Ceramic Materials: Crystalline ceramics, Glasses, cremates, abrasive materials and nono materials

UNIT – V

Non-ferrous alloys: Structure and properties of Copper, Titanium and aluminum alloys.

Composite Materials: Classification of composite, various methods of manufacturing composites, particle reinforced materials, metal matrix composites, metal ceramic composites and Carbon - Carbon composite.

TEXT BOOKS:

1. Introduction to Physical Metallurgy / Sidney H. Avener.
2. Essential of Materials science and engineering/ Donald R.Askeland/ Thomson.

REFERENCES :

1. Material Science and Metallurgy/kodgire.
2. Science of Engineering Materials / Agarwal
3. Materials Science and engineering / William and collister
4. Elements of Material science / V. Rahghavan
5. An introduction to materialscience / W.g.vinas & HL Mancini
6. Material science & material / C.D.Yesudian & harris Samuel
7. Engineering Materials and Their Applications – R. A Flinn and P K Trojan / Jaico Books.
8. Engineering materials and metallurgy/R.K.Rajput/ S.Chand.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) I Semester

METALLURGY LAB

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) I Semester

MACHINE DRAWING LAB

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, centers, 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.

I. Drawing of Machine Elements and simple parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.

b) Keys, cottered joints and knuckle joint.

c) Rivetted joints for plates

d) Shaft coupling, spigot and socket pipe joint.

e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.

b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.

c) 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.

TEXT BOOKS:

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

REFERENCES:

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

II B.Tech (ME) I Semester

MECHANICS OF SOLIDS LAB

1. Direct tension test
2. Bending test on
   a) Simple supported
   b) Cantilever beam
3. Torsion test
4. Hardness test
   a) Brinell's hardness test
   b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) II Semester

MECHANICS OF SOLIDS - II

UNIT-I

Fixed Beams: Fixing moments for a fixed beam of uniform section, Effect of sinking support, slope and deflection.

Continuous Beams: Analysis, Reaction at the supports, and Effect of sinking of supports.

UNIT-II

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, Column with initial curvature, Column carrying eccentric load, Laterally loaded columns, Empirical formulae.

UNIT-III

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

UNIT-IV

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

UNIT- V

Thin Cylinders and Spherical Shells: Stresses and strains in thin cylinders, thin spherical shell

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

Text Books:

1. Strength of materials by Dr. Sadhu Singh.

References:

1. Analysis of Structures, Vol. 1, 1993 edition, by Vazirani and Ratwani.
2. Mechanics of solids by Crandal, Dahl and Lardner.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) II Semester

FLUID MECHANICS AND HYDRAULIC MACHINERY

UNIT - I

Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor 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.

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 - II

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, venturimeter and orifice meter.

UNIT - III

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 - IV

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.

UNIT - V

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

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4. Fluid Mechanics and Hydraulic machines by R K Bansal, Laxmi publications.

REFERENCES:

1. Theory and Design of Hydraulic Machines including Basic Fluid Mechanics by V P Vasandani / Khanna Publishers
2. Fluid Mechanics & Hydraulic Machines : Problems & Solutions by K.Subrmanya /TMH private limited

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) II Semester

APPLIED THERMODYNAMICS - I

UNIT – I

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles Of CI Engines.

I.C. ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, Air – Standard, air-fuel and actual cycles. Numerical problem on Actual Cycles.

UNIT – II

Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication.

Combustion in S.I. Engines : 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.

Combustion in 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 for dry as well as wet combustion products.

UNIT – IV

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, undercooling, 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 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.

TEXT BOOKS:

1. I.C. Engines / V. GANESAN- TMH
2. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.
3. Heat Engineering by Vasandani
4. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad
5. I.C. Engines / Heywood /McGrawHIll.

REFERENCES:

1. Internal Combustion engines / P L Ballaney/ Khanna Publishers
2. A Text Book of Internal Combustion Engines / R K Rajput / Laxmi publications.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) II Semester

PRODUCTION TECHNOLOGY

UNIT – I

CASTING : Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems.

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, special casting processes 1) Centrifugal 2)Die, 3) Investment.

Methods of Melting : Crucible melting and cupola operation, steel making processes, special.

UNIT – II

WELDING: Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding. Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals.

Special welding processes: Inert Gas welding, TIG & MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive nondestructive testing of welds.

UNIT – III:

HOT WORKING & COLD WORKING: Hot working, cold working, strain hardening, recovery, recrystallization and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements.

UNIT – IV:

METAL FORMING:

Stamping, forming and other cold working processes : Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing –

coining – Hot and cold spinning – Types of presses and press tools. Forces and power requirement in the above operations. Industrial examples & exercises.

UNIT- V

EXTRUSION OF METALS : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion. & industrial applications with mass & batch productions

Forging processes: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers : Rotary forging – forging defects.

Plastics: Processing of Plastics: Types of Plastics, Properties, applications and their Processing methods & Equipment (blow &injection modeling), & Industrial examples.

TEXT BOOKS :

1. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson Edu.
2. Manufacturing Technology / P.N. Rao/TMH

REFERENCES :

1. Production Technology / R.K. Jain
2. Process and materials of manufacturing –Lindberg/PE
3. Principles of Metal Castings / Roenthal.
4. Welding Process / Paramar /
5. Production Technology /Sarma P C /
6. Production Engineering – Suresh Dalela & Ravi Shankar / Galgotia Publications Pvt. Ltd.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) II Semester

ELECTRICAL TECHNOLOGY

UNIT-I

ELECTRICAL CIRCUITS: Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, Capacitive networks, Series, Parallel circuits and Star-delta and deltastar transformations.

UNIT -II

DC MACHINES AND AC MACHINES: Principle of operation of DC Generator – emf equation - types – DC motor types – torque equation – applications – three point starter.

Principle of operation of alternators – regulation by synchronous impedance method
– Principle of operation of induction motor – slip – torque characteristics – applications.

UNIT -III

TRANSFORMERS AND INSTRUMENTS: Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation.

Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

UNIT -IV

DIODE AND IT'S CHARACTERISTICS: P-N junction diode, symbol, V-I Characteristics, Diode Applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems)

UNIT -V

TRANSISTORS: P-N-P and N-P-N Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

CATHODE RAY OSCILLOSCOPE

Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

TEXT BOOKS:

1. Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin
2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.

REFERENCES :

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) II Semester

ELECTRICAL TECHNOLOGY LAB

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne's test on D.C. Shunt machine. (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors)
3. Brake test on 3-phase Induction motor (Determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.

   In addition to the above four experiments, any one of the experiments from the following list is required to be conducted:

5. Speed control of D.C. Shunt motor by

   a) Armature Voltage control b) Field flux control method

6. Brake test on D.C Shunt Motor

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) II Semester

PRODUCTION TECHNOLOGY LAB

I. METAL CASTING LAB :

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

II. WELDING LAB :

1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME) II Semester

FLUID MECHANICS AND HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

Note : Any 10 of the above 12 experiments are to be conducted.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech (MECHANICAL ENGINEERING)

COURSE STRUCTURE

III B.Tech (ME) I Semester

Group	Subject	T	L	P	C	Marks	Ext	Int
HSS	Managerial Econ.& Fin.Accou.	1	4		**3**	100	75	25
DC	Dynamics of Machines	1	4		**4**	100	75	25
DC	Machine Tools	1	4		4	100	7	25
DC	Design of machine members -I	1	4		**4**	100	75	25
DC	Advanced Thermodynamics -II	1	4		**4**	100	75	25
DC	Machnine Tools lab			3	**2**	75	50	25
EAS	Advanced English Comm. Lab			3	**2**	75	50	25
DC	Thermal Engg. Lab			3	**2**	75	50	25
	Total	**5**	**19**	**9**	**25**	**725**	**525**	**200**

III B.Tech (ME) II Semester

Group	Subject	T	L	P	C	Marks	Ext	Int
DC	Metrology & Surface engg.	1	4		**4**	100	75	25
DC	Heat Transfer	1	4		**4**	100	75	25
MS	Industrial Management	1	3		**4**	100	75	25
DC	Design of Mach.Mem -II	1	4		**4**	100	75	25
DE	Open Elective	1	3		**3**	100	75	25
DC	Metrology Lab			3	**2**	75	50	25
DC	Heat Transfer Lab			3	**2**	75	50	25
DC	Ind. MINI Projects			3	**2**	75	50	25
	Total	**20**	**19**	**9**	**25**	**725**	**525**	**200**
Open	Elective	**T**	**L**	**P**	**C**	**Marks**	**Ext**	**Int**
DE	Automobile Engineering	1	3		**3**	100	75	25
DE	Mechatronics	1	3		**3**	100	75	25
DE	Computational Fluid Dynamics	1	3		**3**	100	75	25

IV B.Tech (ME) I Semester

Group	Subject	T	L	P	C	Marks	Ext	Int
EAS	Operations Research	1	4		**4**	100	75	25
DC	Finite Element Methods	1	4		**4**	100	75	25
DC	CAD/CAM	1	3		**4**	100	75	25
DE	Elect.I	1	4		**4**	100	75	25
DE	Elect.II	1	4		**3**	100	75	25
DC	Instrumentation & ControL lab			3	**2**	75	50	25
DC	Computer Aided Design Lab			3	**2**	75	50	25
DC	Production Drawing Practice Lab			3	**2**	75	50	25
	Total	**5**	**19**	**9**	**25**	**725**	**525**	**200**
	Elective 1	**T**	**L**	**P**	**C**	**M**	**Ext**	**Int**
DE	Robotics	1	3		**3**	100	75	25
DE	Instrumentation and Control	1	3		**3**	100	75	25
DE	Vibrations	1	3		**3**	100	75	25
	Elective 2							
DE	Unconventional Machining Process	1	3		**3**	100	75	25
DE	Tribology	1	3		**3**	100	75	25
DE	Automation in Manufacturing	1	3		**3**	100	75	25

IV B.Tech (ME) II Semester

Group	Subject	T	L	P	C	Marks	Ext	Int
DC	Production Planning Control	**1**	**3**		**3**	100	75	25
DE	Elective III	**1**	**3**		**3**	100	75	25
DE	Elective IV	**1**	**3**		**3**	100	75	25
DC	CAM &Mfg.sim LAB			**3**	**2**	75	50	25
	Seminar		**3**	**2**	50			
DC	Comprehensive VIVA		**3**	**2**	00			
	Main project	**15**		**10**	00	160	40	
	Total	**12**	**24**	**9**	**25**	**725**	**435**	**140**
	Elective 3							
DE	Database Management	1	3		**3**	100	75	25
DE	Power Plant Engineering	1	3		**3**	100	75	25
DE	Reliability Engineering	1	3		**3**	100	75	25
	Elective 4							
DE	Renewable Energy Resources	1	3		**3**	100	75	25
DE	Plant Layout and Material Handling	1	3		**3**	100	75	25
DE	Refrigeration and Air-conditioning	1	3		**3**	100	75	25

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) I Semester

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Codes/Tables: Present Value Tables need to be permitted into the examinations Hall.

Unit - I
Introduction to Managerial Economics & Elasticity of Demand:

Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

Unit - II
Theory of Production and Cost Analysis & Introduction to Markets & Pricing Policies:

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, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

Objectives and Policies of Pricing- Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing,

Bundling Pricing, Peak Load Pricing, Cross Subsidization.

Unit - III
Business & New Economic Environment & Capital and Capital Budgeting:

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

Unit - IV
Introduction to Financial Accounting:

Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Unit - V
Financial Analysis through ratios:

Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.

2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.
9. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
10. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.
11. Dwivedi:Managerial Economics, 6th Ed., Vikas.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) I Semester

DYNAMICS OF MACHINERY

Unit - I

Precision: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes 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 – Fly wheels 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: 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 – Hammer blow, Swaying couple, variation of tractive efforts.

TEXT BOOKS:

1. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publ.
2. Theory of Machines / Jagadish Lal & J.M.Shah / Metropolitan.

REFERENCES:

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. Theory of Machines / Shiegly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of machines / Khurmi/S.Chand.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) I Semester

MACHINE TOOLS

Unit - I

Elementary Treatment of Metal Cutting Theory: Element 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 – cutting speeds, feed, depth of cut, Tool life.

Coolants, Machinability: Tool materials, Kinematic schemes of machine tools – Constructional features of speed gear box and feed gear box.

Unit - II

Engine Lathe: – Principle of working, specification of lathe – types of lathe – work holders, tool holders – Box tools Taper turning thread turning – for Lathes and 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–tool layout and cam design.

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. Kinematics scheme of the drilling and boring machines

Unit - IV

Milling Machine: Principles of working – 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 to milling machines, kinematic scheme of milling cutters – milling cutters – methods of indexing.

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.

Unit - V

Lapping, Honing and Broaching Machines: comparison to grinding – lapping and honing. Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed Units, machining time calculations

Principles of Design 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. Production Technology by H.M.T. (Hindustan Machine Tools).

REFERENCES:

1. Machine Tools – C.Elanchezhian and M. Vijayan / Anuradha Agencies Publishers.
2. Workshop Technology – B.S.Raghu Vamshi – Vol II

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) I Semester

DESIGN OF MACHINE MEMBERS-I

Unit - I

Introduction: General considerations in the design of Engineering Materials and their properties – selection –Manufacturing consideration in design. Tolerances and fits –BIS codes of steels.

Stresses in Machine Members: Simple stresses – Combined stresses – impact stresses – stress strain relation – Various theories of failure – factor of safety – Design for strength and rigidity. The concept of stiffness in tension, bending, torsion and combined situations.

Unit - II

Strength of Machine Elements: Stress concentration – Theoretical stress Concentration factor – Fatigue stress concentration factor notch sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Goodman's line – Soderberg's line – Modified goodman's line.

Unit - III

Design of fasteners: Riveted joints, welded joints and bolted joints– Design of bolts with initial stresses – Design of joints under eccentric loading.

Unit - IV

Keys, cotters and knuckle joints: Design of Keys-stresses in keys-cottered joints-spigot and socket, sleeve and cotter, jib and cotter joints-Knuckle joints.

Unit -V

Shafts and shaft coupling:

Shafts: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code. Use of internal and external circlips, Gaskets and seals (stationary & rotary).

Shaft Coupling: Rigid couplings – Muff, Split muff and Flange couplings. Flexible couplings – Flange coupling (Modified).

TEXT BOOKS:

1. Machine Design, V.Bandari Tmh Publishers
2. Machine Design, S MD Jalaludin, AnuRadha Publishers
3. Machine Design – R.S. Khurmi & J.S.Gupta / S.Chand Pub.

REFERENCES:

1. Design of Machine Elements / V.M. Faires
2. Machine design / Schaum Series.
3. Machine design – Pandya & shah.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) I Semester

APPLIED THERMODYNAMICS-II

Unit - I

Basic Concepts : Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration & reheating.

Unit - II

Boilers : Classification – Working principles – with sketches including H.P.Boilers – Mountings and Accessories – Working principles, Boiler horse power, equivalent 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 and forced.

Unit - III

Steam Nozzles : Function of 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 – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its affects, air pump- cooling water requirement

Unit - IV

Steam Turbines : Classification – Impulse turbine; Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-Laval Turbine - its features. Methods to reduce rotor speed-Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine.

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.

Unit - V

Gas Turbines : Simple gas turbine plant – Ideal cycle, essential components –

parameters of performance – actual cycle – 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 with schematic 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 : Application – 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. Gas Turbines – V.Ganesan /TMH
3. Thermal Engineering-R.S Khurmi/JS Gupta/S.Chand.

REFERENCES :

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 Saravana Muttoo / Addison Wesley – Longman
4. Thermal Engineering-P.L.Bellaney/ khanna publishers.
5. Thermal Engineering-M.L.Marthur & Mehta/Jain bros.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) I Semester

ADVANCED ENG.COM.LAB

1. Introduction

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be an integrated theory and lab course to enable students to use 'good' English and perform the following:

Gather ideas and information, to organise ideas relevantly and coherently.

Engage in debates.

Participate in group discussions.

Face interviews.

Write project/research reports/technical reports.

Make oral presentations.

Write formal letters.

Transfer information from non-verbal to verbal texts and vice versa.

To take part in social and professional communication.

2. Objectives:

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.

Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.

Vocabulary building – synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.

Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.

Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.

Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.

Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, and critical reading.

Technical Report writing – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.

4. Minimum Requirement:

The English Language Lab shall have two parts:

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor

a) Speed – 2.8 GHZ

b) RAM – 512 MB Minimum

c) Hard Disk – 80 GB

ii) Headphones of High quality

5. Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

Clarity Pronunciation Power – part II

Oxford Advanced Learner's Compass, 7th Edition

DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.

Lingua TOEFL CBT Insider, by Dreamtech

TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

The following software from 'train2success.com'

Preparing for being Interviewed,

Positive Thinking,

Interviewing Skills,

Telephone Skills,

Time Management

Team Building,

Decision making

English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

6. Books Recommended:

1. **Effective Technical Communication**, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing Company Ltd.
2. **A Course in English communication** by Madhavi Apte, Prentice-Hall of India, 2007.
3. **Communication Skills** by Leena Sen, Prentice-Hall of India, 2005.

4. **Academic Writing- A Practical guide for students** by Stephen Bailey, Rontledge Falmer, London & New York, 2004.

5. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai

6. **Body Language- Your Success Mantra** by Dr. Shalini Verma, S. Chand, 2006.

7. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice**, New Age International (P) Ltd., Publishers, New Delhi.

8. Books on **TOEFL/GRE/GMAT/CAT** by Barron's/cup

9. **IELTS series with CDs** by Cambridge University Press.

10. **Technical Report Writing Today** by Daniel G. Riordan & Steven E. Pauley, Biztantra Publishers, 2005.

11. **Basic Communication Skills for Technology** by Andra J. Rutherford, 2nd Edition, Pearson Education, 2007.

12. **Communication Skills for Engineers** by Sunita Mishra & C. Muralikrishna, Pearson Education, 2007.

13. **Objective English** by Edgar Thorpe & Showick Thorpe, 2nd edition, Pearson Education, 2007.

14. **Cambridge Preparation for the TOEFL** Test by Jolene Gear & Robert Gear, 4th Edition.

15. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

Advanced Communication Skills Lab Practicals:

1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.

2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) I Semester

MACHINE TOOLS LAB

1. Introduction of general purpose machines -Lathe, Drilling machine, Milling machine, Shaper, Planing machine, slotting machine, Cylindrical Grinder, surface grinder and tool and cutter grinder.
2. Step Turning And Taper Turning On Lathe Machine
3. Thread cutting and knurling on -lathe machine.
4. Drilling and Tapping
5. Shaping and Planing
6. Slotting
7. Milling
8. Cylindrical Surface Grinding
9. Grinding of Tool angles.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) I Semester

THERMAL ENGINEERING LAB

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

III B.Tech (ME) II Semester

METROLOGY AND SURFACE ENGINEERING

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 ad 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: Taylor's 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.

Surface Roughness Measurement: Differences between surface roughness and surface Waviness-Numerical assessment of surface finish – CLA,R, R.M.S Values – Rz values, Rz value, 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-IV

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

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.

UNIT -V

Surface Engineering: Surface texture and properties, surface cleaning techniques, surface integrity, wear and its measurement, lubricant and its selection for reducing wear, principles of corrosion and remedial measures, laser applications for surface modification

Surface Treatments: Mechanical surface treatments and coatings, case hardening and surface coatings, thermal sprayings, vapor deposition, Ion implantation, diffusion coatings, electroplating, electroforming, ceramic, and organic and diamond coating

TEXT BOOKS:

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

REFERENCES:

1. BIS standards-919 on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson
3. Handbook 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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) II Semester

HEAT TRANSFER

Note: HT Data Book Permitted

Unit - I

Introduction: Modes and mechanisms of heat transfer – Basic laws of heat transfer –General discussion about applications of heat transfer.

Conduction Heat Transfer: Fourier rate equation – 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: Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius of insulation

One Dimensional Steady State Conduction Heat Transfer: Variable Thermal conductivity – systems with heat sources or Heat generation. Extended surface (fins) Heat Transfer – Long Fin, Fin with insulated tip and Short Fin, Application to error measurement of Temperature.

One Dimensional Transient Conduction Heat Transfer: Systems with negligible internal resistance – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems- Concept of Functional Body.

Unit - III

Convective Heat Transfer: Classification of systems based on causation of flow, condition of flow, configuration of flow and medium of flow , application for developing semi – empirical non- dimensional correlation for convection heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

Forced convection: External Flows: Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer -Flat plates and Cylinders.

Internal Flows: Concepts about Hydrodynamic and Thermal Entry Lengths – Division of internal flow based on this –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: 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 a 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 - Problems using LMTD and NTU methods.

Unit - V

Radiation Heat Transfer: Emission characteristics and laws of black-body radiation – Irradiation – total and monochromatic quantities – laws of Planck, Wien, Kirchoff, Lambert, Stefan and Boltzmann– heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between grey bodies – radiation shields – electrical analogy for radiation networks.

TEXT BOOKS:

1. Heat Transfer / HOLMAN/TMH
2. Heat Transfer – P.K.Nag/ TMH
3. Fundamentals of Engg. Heat and Mass Transfer / R.C.SACHDEVA / New Age International
4. Heat and Mass Transfer – D.S.Kumar / S.K.Kataria & Sons

REFERENCE BOOKS:

1. Heat Transfer – Ghoshdastidar – Oxford University Press – II Edition
2. Heat and Mass Transfer –Cengel- McGraw Hill.
3. Heat and Mass Transfer – R.K. Rajput – S.Chand & Company Ltd.
4. Essential Heat Transfer - Christopher A Long / Pearson Education
5 Heat and Mass Transfer-Kondandaraman
6. Fundamentals of Heat Transfer & Mass Transfer- Incropera & Dewitt / John Wiley Pub.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) II Semester

INDUSTRIAL MANAGEMENT

Unit - I

Concepts of Management and Organization: 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, Maslow's Hierarchy of Human Needs.

Designing of Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of organization structures: Line organization, Line and staff organization, Matrix organization, Virtual Organization, Cellular Organization, Inverted pyramid structure, and their merits & demerits.

Unit - II

Operations Management:

Plant Layout: Definition, Objectives, types of production, types of plant layout – Product wise Plant layout travel chart.

Work study: Definition, objectives, method study - definition, objectives, steps involved- various types of associated charts- Work measurement- definition, time study, steps involved-equipment, different methods of performance rating-allowances, standard time calculation. Work Sampling – definition, steps involved, and standard time calculations.

Inspection: Inspection and quality control, types of inspections - Statistical Quality Control-techniques- control charts. Introduction to TQM-Quality Circles, ISO 9000 series procedures.

Unit - III

Materials Management: Objectives, Inventory – functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory Control Systems, EOQ. Stores Management and Stores Records. Purchase management, duties of purchase of manager and Supply chain management.

Marketing: Functions of marketing, Marketing strategies, Marketing vs Selling, Marketing mix, product life cycle and Channels of distribution

Unit - IV

Project Management:

(A)PERT/CPM: Project management and Networks, Program Evaluation Review

Techniques (PERT)- Critical Path Method (CPM)-critical path calculation-crashing and Project Crashing methods, Optimization of Project duration and Project cost ,Project calculations within the given time and Simple industrial Networks exercises

(B)Human Resources Management: Introduction to Human Resource 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.

Unit - V

(A) Strategic Management: Mission, Goals, Objectives, Policy, Stratege, Programes, Corporate planning processes, Environmental scanning, and SWOT analysis.

(B) Contemporary Management Practices: Basic concepts of just-in-time(jit) system, six sigma, capability maturity model (CMM), Enterprise resources planning (ERP),Business process outsources(BPO), Bench marking, Deming's contributions to quality and Kaizen,Poka-yoke.

TEXT BOOKS:

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

REFERENCES:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) II Semester

DESIGN OF MACHINE MEMBERS-II

Note: Design Data Book Permitted

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

Unit - III

Mechanical Springs: Stresses and deflections of helical springs – Extension - compression springs – Springs for fatigue loading – natural frequency of helical springs – Energy storage capacity – helical torsion springs – Co-axial springs, leaf springs.

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, Square ACME , Buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.

TEXT BOOKS:

1. Machine Design, V.Bandari Tmh Publishers
2. Machine Design, S MD Jalaludin, Anuradha Publishers
3. Machine Design, Kannaiah/ Scietech.

REFERENCES:

1. Design Data hand Book, S MD Jalaludin, Anuradha Publishers
2. Machine Design / R.N. Norton
3. Data Books : (I) P.S.G. College of Technology (ii) Mahadevan
4. Mech. Engg. Design / JE Shigley
5. Machine Design – R.S. Khurmi & J.S.Gupta / S.Chand Pub.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) II Semester

AUTOMOBILE ENGINEERING
(Open Elective)

Unit - I

Introduction: Components of four wheeler automobile – chassis and body – power unit –power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonisation, Nitriding of crank shaft.

Fuel System:

S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump – filters– carburettor – types – air filters – petrol injection.

C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump,nozzle, spray formation, injection timing, testing of fuel pumps.

Unit - II

Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat,evaporating cooling – pressure sealed cooling – ntifreeze solutions.

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

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 - III

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

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.

Unit - IV

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 System: **Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.**

Breaking 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 Sing.
2. Automobile Engineering / William Crouse

REFERENCES:

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. LTD.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) II Semester

MECHATRONICS
(Open Elective)

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: 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

III B.Tech (ME) II Semester

COMPUTATIONAL FLUID DYNAMICS
(Open Elective)

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, iterative schemes of Matrix Inversion, Direct Methods for Matrix inversion, Direct Methods for banded matrices.

Unit - II

Finite Difference Applications in Heat conduction and Convention: Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, 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 fluid flow modeling, conservative property, the upwind scheme. Review of Equations Governing Fluid Flow and Heat Transfer: Introduction, conservation of mass, Newton's second law of motion, expanded forms of Navier-stokes equations, conservation of energy principle, special forms of the Navier-stokes equations.

Unit - IV

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

Unit - V

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

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 / Mc Graw Hill.

REFERENCES:

1. Computational Fluid Flow and Heat Transfer/ Niyogi, Pearson Publications

2. Fundamentals of Computational Fluid Dynamics – Tapan K. Sengupta / Universities Press.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) II Semester

METROLOGY LAB

1. Measurement of lengths, heights, diameters by vernier calipers micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, Vernier calipers and checking the chordal addendum and chordal height of spur gear.
4. Machine tool “alignment of test on the 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, etc.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by Two wire/ Three wire method or Tool makers microscope.
10. Surface roughness measurement by Taly Surf.
11. Surface Wear Resistances Test using Electro Spark Coating Device.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

III B.Tech (ME) II Semester

HEAT TRANSFER LAB

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

IV B.Tech (ME) I Semester

OPERATIONS RESEARCH

Unit - I

Development – Definition– Characteristics and Phases – Types of models – operation Research models – applications.

Linear Programming: Linear Programming Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

Unit - II

Transportation Problem: Formulation – Optimal solution, unbalanced transportation problem –Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.

Sequencing: Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.

Unit - III

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

Theory of game: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games - graphical method.

Unit - IV

Waiting lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

Unit - V

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

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

TEXT BOOKS:

1. Operations Research / S.D.Sharma-Kedarnath
2. Operations Research / Prem kumar Gupta , Dr. D.S. Hira

REFERENCES:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

FINITE ELEMENT METHODS

Unit - I

Introduction to Finite Element Method for solving field problems. Stress and Equilibrium. Strain – Displacement relations. Stress – strain relations.

One Dimensional problems: Finite element modeling coordinates and shape functions. Potential Energy approach : Assembly of Global stiffness matrix and load vector. Finite element quations, Treatment of boundary conditions, Quadratic shape functions.

Unit - II

Analysis of Trusses and Frames: Element of stiffness matrix for a truss member.Analysisof plane truss with number of unknowns not exceeding to each node.Analysis of frames with two translations and a rotational degree of freedom at each node.

Analysis of Beams: Element stiffness matrix for two node, two degrees of freedom per node beam element.

Unit - III

Finite element modeling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions.

Finite element modeling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements.

Two dimensional four noded isoparametric elements and numerical integration.

Unit - IV

Steady state heat transfer analysis: one dimensional analysis of a fin and two dimensional analysis of thin plate. Analysis of a uniform shaft subjected to torsion.

Dynamic Analysis: Formulation of finite element model, element matrices, evaluation of Eigen values and Eigen vectors for a stepped bar and a beam.

Unit - V

Finite element – formulation of 3D problems in stress analysis, convergence requirements, mesh generation, techniques such as semi automatic and fully automatic mesh generation techniques. Use of software such as ANSYS, CAEFEM,NISA NASTRAN etc. Comparison of commercially available packages.

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
3. The Finite Element Method for Engineers – Kenneth H.Huebner,Donald L. Dewhirst, Douglas E.Smith and Ted G. Byrom / John Wiley & sons (ASIA) Pte Ltd.
4. Finite Element Analysis/ C.S.Krishna Murthy

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

CAD / CAM

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.

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 – II

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

Drafting and Modeling systems: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.

UNIT – III

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 – IV

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, computer aided testing, integration of CAQC with CAD/CAM.

UNIT – V

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 BOOKS:

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

REFERENCES:

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 / Farid Amirouche / Pearson
4. CAD/CAM: Concepts and Applications/Alavala/ PHI
5. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

ROBOTICS
(ELECTIVE – I)

Unit - I

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

Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

Unit - II

Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.

Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

Unit - III

Differential transformation and manipulators, Jacobians – problems.Dynamics: Lagrange – Euler and Newton – Euler formations – Problems.

Unit - IV

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 Feedback components: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

INSTRUMENTATION AND CONTROL SYSTEMS (ELECTIVE – I)

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.

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 - II

Measurement of Speed: Mechanical Tachometers – Electrical tachometers – Stroboscope, Noncontact type of tachometer

Measurement of Pressure: Units – classification – different principles used. Manometers, Piston, Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement – Thermal conductivity gauges – ionization pressure gauges, Mcleod pressure gauge.

Unit - III

Measurement of Level: Direct method – Indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – Bubler level indicators.

Measurement of Flow: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot – wire anemometer,Laser Doppler Anemometer (LDA).

Unit - IV

Measurement of Acceleration and Vibration: Different simple instruments – Principles of Seismic instruments – Vibrometer and accelerometer using this principle.

Measurement of Force, Torque and Power: Elastic force meters, load cells, Torsion meters, Dynamometers.

Stress Strain Measurements: Various types of stress and strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, Strain gauge Rosettes.

Measurement of Humidity: Moisture content of gases, sling psychrometer, Absorption psychrometer, Dew point meter.

Unit - V

Elements of Control Systems: Introduction, Importance – Classification – Open and closed systems 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 Manik and Dhanesh/ 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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

MECHANICAL VIBRATIONS
(ELECTIVE – I)

UNIT - I

Single Degree of Freedom Systems - I: Undamped and damped free vibrations; forced vibrations coulomb damping; Response to excitation; rotating unbalance and support excitation; vibration isolation and Transmissibility.

Single Degree of Freedom Systems - II: Response to Non periodic Excitations; unit impulse, unit step and unit Ramp functions; response to arbitrary excitations, the convolution Integral; shock spectrum; system response by the Laplace Transformation method.

UNIT – II

Vibration Measuring Instruments: Vibrometers, velocity meters & accelerometers

Two Degrees-of-Freedom Systems: Principal modes - Undamped and damped free vibrations; forced vibrations; Undamped vibration absorbers.

UNIT – III

Multi Degrees-of-Freedom Systems: Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; free and forced vibration by Modal analysis; Method of matrix inversion; torsional vibrations of multi – rotor systems and geared systems; Discrete- Time systems.

Numerical Methods: Raleigh's stodola's, Matrix iteration, Rayleigh- Ritz Method and Holzer methods.

UNIT – IV

Continuous System: free vibration of strings – longitudinal oscillations of bars – traverse vibrations of beams – torsional vibrations of shafts.

UNIT – V

Critical Speeds of Shafts: Critical speeds without and with damping, secondary critical speeds.

TEXT BOOKS:

1. G.K. Groover, "Mechanical Vibrations", 4th ed., NEM Chand & Brothers, 2009.
2. L.Meirovitch, "Fundamentals of Vibrations", 1st ed., Tata McGraw Hill, 2009.

REFERENCE BOOKS:

1. S.GrahamKelly, “Schaum’s Outlines, Theory & Problems of Mechanical Vibrations”, 3rd ed., Tata McGraw Hill, 2007.
2. W.T. Thomson and M.D. Dehlen, “Theory of Vibrations with Applications”, 5th ed., Pearson Education, 2007.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

UNCONVENTIONAL MACHINING PROCESSES
(ELECTIVE – II)

UNIT – I

INTRODUCTION: Need for non-traditional machining methods-Classification of modern machining processes – considerations in process selection. Materials. Applications.

UNIT - II

MECHANICAL PROCESSES: Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development. Abrasive jet machining, Water jet machining and abrasive water jet machine: Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations. Magnetic abrasive finishing, Abrasive flow finishing

UNIT - III

THERMO ELECTRIC PROCESSES: General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

UNIT - IV

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

UNIT – V

ELECTRO CHEMICAL & CHEMICAL PROCESSES: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, Surface finish and accuracy economic aspects of ECM – Simple problems for estimation of metal removal rate, Electro stream drilling, Shaped tube electrolytic machining.Fundamentals of chemical machining, Chemical machining principle, maskants, etchants, advantages and applications of chemical machining.

TEXT BOOKS:

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

REFERENCES:

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 & Rakesh Sarin.
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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

TRIBOLOGY
(ELECTIVE – III)

UNIT - I

Study of Various Parameters: Viscosity, flow of fluids, viscosity and its variation -absolute and kinematic viscosity, temperature variation, viscosity index determination of viscosity, different viscometers used.

Hydrostatic Lubrication: Hydrostatic step bearing, application to pivoted pad thrust bearing and other applications, hydrostatic lifts, hydrostatic squeeze films and its application to journal bearing.

UNIT - II

Hydrodynamic Theory of Lubrication: Various theories of lubrication, petroffs equation, Reynolds equation in two dimensions -Effects of side leakage - Reynolds equation in three dimensions, Friction in sliding bearing, hydro dynamic theory applied to journal bearing, minimum oil film thickness, oil whip and whirl anti - friction bearing.

Friction and Power Losses In Journal Bearings: Calibration of friction loss friction in concentric bearings, bearing modulus, Sommerfield number, heat balance, practical consideration of journal bearing design considerations.

UNIT - III

Air Lubricated Bearing: Advantages and disadvantages application to Hydrodynamic journal bearings, hydrodynamic thrust bearings. Hydrostatic thrust bearings. Hydrostatic bearing Analysis including compressibility effect.

Study of current concepts of boundary friction and dry friction.

UNIT - IV

Types of Bearing Oil Pads: Hydrostatic bearing wick oiled bearings, oil rings, pressure feed bearing, partial bearings -externally pressurized bearings.

UNIT - V

Bearing Materials: General requirements of bearing materials, types of bearing materials.

TEXT BOOKS:

1. Fundamentals of Tribology, Basu, SenGupta and Ahuja/PHI
2. Tribology in Industry**:** Sushil Kumar Srivatsava, S. Chand &Co.

REFERENCES:

1. Tribology – B.C. Majumdar

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

AUTOMATION IN MANUFACTURING
(ELECTIVE – IV)

UNIT – I

Introduction: Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools. Mechanical feeding and too changing and machine tool control transfer the automaton.

Automated Flow Lines: Methods or work part transport transfer Mechanical buffer storage control function, design and fabrication consideration.

UNIT – II

Analysis Of Automated Flow Lines: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

Assembly System and Line Balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – III

Automated Material Handling: Types of equipment, functions, analysis and design of material handling systems conveyor systems, automated guided vehicle systems.

Automated Storage Systems: Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – IV

Adaptive Control Systems: Introduction, adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force, Temperatures, vibration and acoustic emission.

UNIT – V

Business Process Re-Engineering: Introduction to BPE logistics, ERP, Software configuration of BPE, concurrent Engineering, Techniques of Rapid Proto typing.

TEXT BOOKS:

1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./PE/PHI

REFERENCES:

1. Computer control of Manufacturing Systems by Yoram Coreom.
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) II Semester

PRODUCTION PLANNING AND CONTROL

UNIT – I

Introduction: Definition – Objectives of production Planning and Control – Functions of production planning and control – Elements of production control – Types of production – Organization of production planning and control department – Internal organization of department.

Forecasting: Importance of forecasting – Types of forecasting, their uses – General principles of forecasting – Forecasting techniques – qualitative methods and quantitive methods.

UNIT – II

Inventory management – Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P–Systems and Q-Systems

Introduction to MRP & ERP, LOB (Line of Balance), JIT inventory, and Japanese concepts.

UNIT – III

Routing – Definition – Routing procedure –Route sheets – Bill of material – Factors affecting routing procedure. Schedule –definition – Difference with loading

Scheduling Policies – Techniques, Standard scheduling methods,

UNIT – IV

Line Balancing, Aggregate planning, Chase planning, Expediting, controlling aspects.

UNIT – V

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

TEXT BOOKS:

1. Elements of Production Planning and Control / Samuel Eilon.
2. Modern Production/ operation managements / Baffa & Rakesh Sarin

REFERENCES:

1. Operations Management – S.N. Chary.
2. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
3. Reliability Engineering & Quality Engineering by Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Galgotia Publications, Pvt., Limited.
4. Production Control A Quantitative Approach / John E. Biegel.
5. Production Control / Moore.
6. Operations Management / Joseph Monks.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) II Semester

DATABASE MANAGEMENT SYSTEMS

UNIT – I

Data base System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor. History of Data base Systems.Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

UNIT – II

Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT – III

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT – IV

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols –

Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage- Advance Recovery systems- Remote Backup systems.

UNIT – V

Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition

2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

REFERENCES:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education

3. Introduction to Database Systems, C.J.Date Pearson Education

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

INSTRUMENTATION & CONTROL LAB

1. Calibration of Pressure Gauges
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple 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 a rotameter for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of McLeod gauge for low pressure.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

COMPUTER AIDED DESIGN LAB

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, shell 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. 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.

Software Packages:

Use of Auto CAD,CATIA, Pro-E, I-DEAS, ANSYS

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

PRODUCTION DRAWING PRACTICE LAB

Conventional representation of Materials – conventional representation of parts – screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits – methods of indicating notes on drawings.

Limits and Fits: Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.

Form and Positional Tolerances: Introduction and indication of the tolerances of from and position on drawings, deformation of runout and total runout and their indication.

Surface roughness and its indication: Definitions – finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components.

Heat treatment and surface treatment symbols used on drawings.

Detailed and Part drawings: Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

Part drawing using computer aided drafting by CAD software

TEXT BOOKS:

1. Production and Drawing – K.L. Narayana & P. Kannaiah/ New Age
2. Machine Drawing with Auto CAD- Pohit and Ghosh, PE

REFERENCE:

1. Geometric dimensioning and Tolerancing- James D. Meadows/ B.S Publications
2. Engineering Metrology, R.K. Jain, Khanna Publications

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) II Semester

POWER PLANT ENGINEERING

(ELECTIVE - III)

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.

STEAM POWER PLANT:

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 comparison.

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.

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

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

UNIT – V

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS : Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, 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 BOOKS:

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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) II Semester

RELIABILITY ENGINEERING
(ELECTIVE – III)

UNIT – I

Basics Concepts of reliability: Introduction, Reliability and quality**,** Failures and failure modes, Causes of failures and reliability, Maintainability and availability, History of reliability, reliability literature.

Reliability mathematics: Introduction, Random Experiment, probability, random variables, Distribution functions, discrete distribution, Continuous distribution, Numerical Characteristics of random variables, Laplace transforms.

UNIT – II

Component reliability and hazard models: Introduction, Component reliability from test data, Mean time to failure, Time- dependant hazard models, Stress Dependent hazard models, Derivation of reliability function using markov, treatment of field data.

System reliability models: Introduction – Systems with component with in series – system with parallel components – k – out - of – m systems – Non series parallel systems – Systems with – mixed – mode failures – Fault – tree technique

UNIT – III

Maintainability and availability concepts: Introduction – maintainability function – Availability function – frequency failures – Two unit parallel systems with repair - k – out - of – m systems – Preventive maintenance.

Reliability improvement: Introduction – Improvement components – redundancy – Element redundancy – Unit redundancy – Stand by redundancy – optimization – Reliability – cost trade – off.

UNIT – IV

Economics of reliability engineering: Economic issues – manufacture's cost – customer's cost – Reliability achievement cost – models – reliability utility cost models – Depreciation cost models – Availability - cost – model of parallel systems.

UNIT – V

Reliability management: Reliability programming – Management policies and decision – Reliability management by objectives – Reliability group – Reliability data: Acquisition and analysis – managing people for reliability

TEXT BOOKS:

1. Reliability Engineering – balaguruswamy – TMHill
2. Reliability Engineering – L.S.Srinath

REFERENCE BOOKS:

1. Reliability Engineering – Patrick DTO – Wiley Conor – India
2. Reliability Engineering and life testing – Naikan - PHI

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) II Semester

RENEWABLE ENERGY RESOURCES
(ELECTIVE - IV)

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.

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

UNIT-II

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.

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

UNIT-III

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-IV

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

UNIT-V

DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC.

Thermo-electric generators, seebeck, peltier and joul Thomson effects, Figure of merit, 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.

TEXT BOOKS:

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

REFERENCES:

1. Renewable Energy Sources /Twidell & Weir
2. Solar Energy /Sukhame
3. Splar Power Engineering / B.S Magal Frank Kreith & J.F Kreith.
4. Principles of Solar Energy / Frank Krieth & John F Kreider.
5. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
6. Non-Conventional Energy Systems / K Mittal /Wheeler
7. Renewable Energy Technologies /Ramesh & Kumar /Narosa

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) II Semester

PLANT LAYOUT AND MATERIAL HANDLING (ELECTIVE IV)

UNIT – I

Introduction: Classification of layout, Advantages and limitations of different layouts, layout design procedures, overview of the plant layout

Process Layout & Product Layout: Selection, specification, implementation and follow up, comparison of product and process layout

UNIT – II

Heuristics for plant layout – ALDEP, CORELAP, CRAFT

Group Layout, 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 for material handling to plant layout

Basic Material Handling Systems: Selection, material handling method – path, equipment, function oriented systems

UNIT – IV

Methods to minimize cost of material handling – Maintenance of material handling Equipments, Safety in handling

UNIT – V

Ergonomics of material handling equipment, Design, Miscellaneous equipments

TEXT BOOKS:

1. Operations Management / PB Mahapatra /PHI
2. Aspects of Material Handling /Dr.KC Arora & Shinde, Lakshmi Publications

REFERENCE BOOKS:

1. Facility Layout & Location an Analytical approach /RL Francis/LF Mc Linnis Jr,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

IV B.Tech (ME) II Semester

REFRIGERATION AND AIR CONDITIONING
(ELECTIVE IV)

UNIT – I

Introduction to Refrigeration: Necessity and applications – Unit of refrigeration and C.O.P. – Mechanical Refrigeration – Types of Ideal cycles of refrigeration.

Air Refrigeration: Bell Coleman cycle and Brayton Cycle, Open and Dense air systems – Actual air refrigeration system problems – Refrigeration needs of Air craft's.

Vapour Compression Refrigeration: working principle and essential components of the plant – simple Vapour compression refrigeration cycle – COP – Representation of cycle on T-S and p-h charts – effect of sub cooling and super heating – cycle analysis – Actual cycle Influence of various parameters on system performance – Use of p-h charts – numerical Problems.

UNIT II

System Components: Compressors – General classification – comparison – Advantages and Disadvantages.

Condensers – classification – Working Principles

Evaporators – classification – Working Principles

Expansion devices – Types – Working Principles

Refrigerants – Desirable properties – classification refrigerants used – Nomenclature – Ozone Depletion – Global Warming.

Vapor Absorption System: Calculation of max COP – description and working of NH3 – water system and Li Br –water (Two shell & Four shell) System. Principle of operation Three Fluid absorption system, salient features.

UNIT III

Steam Jet Refrigeration System – Working Principle and Basic Components.

Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube or Hilsch tube.

Introduction to Air Conditioning: Psychometric Properties & Processes – Characterization of Sensible and latent heat loads –– Need for Ventilation, Consideration of Infiltration – Load concepts of RSHF, GSHF- Problems, Concept of ESHF and ADP.

UNIT IV

Requirements of human comfort and concept of effective temperature- Comfort chart –Comfort Air

Conditioning – Requirements of Industrial air conditioning, Air conditioning Load Calculations.

UNIT – V

Air Conditioning systems - Classification of equipment, cooling, heating humidification and dehumidification,filters, grills and registers fans and blowers.

Heat Pump – Heat sources – different heat pump circuits.

TEXT BOOKS:

1. Refrigeration and Air Conditioning / CP Arora / TMH.
2. A Course in Refrigeration and Air conditioning / SC Arora & Domkundwar / Dhanpatrai

REFERENCES:

1. Refrigeration and Air Conditioning / Manohar Prasad / New Age.
2. Principles of Refrigeration - Dossat / Pearson Education.
3. Refrigeration and Air Conditioning-P.L.Bellaney
4. Basic Refrigeration and Air-Conditioning – Ananthanarayanan / TMH
5. Refrigeration and Air Conditioning – R.S. Khurmi & J.K Gupta – S.Chand – Eurasia Publishing House (P) Ltd.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) II Semester

CAM AND MANUFACTURING SIMULATION LAB

1. Development of process sheets for various components based on tooling Machines.
2. Development of manufacturing and tool management systems.
3. Study of various post processors used in NC Machines.
4. Development of NC code for free form and sculptured surfaces using CAM packages.
5. Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package. Through RS 232.
6. Quality Control and inspection.

Software Packages:

Use of Gibbs CAM, Master CAM etc.