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.
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.

<table>
<thead>
<tr>
<th>Subject</th>
<th>End exams (External)</th>
<th>Internal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td>75</td>
<td>25</td>
<td>100</td>
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<tr>
<td>Practical</td>
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<td>25</td>
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<tr>
<td>Drawing</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>Industrial Mini Project</td>
<td>50</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>Comprehensive Viva</td>
<td>100</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Seminar</td>
<td>-</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Project</td>
<td>150</td>
<td>50</td>
<td>200</td>
</tr>
</tbody>
</table>

(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.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Minimum Credits</th>
<th>No. of Examinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I-I</td>
</tr>
<tr>
<td>II to III year</td>
<td>37</td>
<td>2</td>
</tr>
<tr>
<td>III to IV year</td>
<td>62</td>
<td>3</td>
</tr>
</tbody>
</table>

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):

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of Marks Secured</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST CLASS with DISTINCTION</td>
<td>Marks &gt; 70%</td>
</tr>
<tr>
<td>FIRST CLASS</td>
<td>60% ( \leq ) Marks &lt; 70%</td>
</tr>
<tr>
<td>SECOND CLASS</td>
<td>50% ( \leq ) Marks &lt; 60%</td>
</tr>
<tr>
<td>PASS CLASS</td>
<td>40% ( \leq ) Marks &lt; 50%</td>
</tr>
</tbody>
</table>

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)).

<table>
<thead>
<tr>
<th>Phase</th>
<th>Minimum Credits</th>
<th>No. of Examinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>II-1</td>
</tr>
<tr>
<td>III to IV year</td>
<td>37</td>
<td>2 Regular</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Supply</td>
</tr>
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</table>

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):

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>% of Marks Secured</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST CLASS with DISTINCTION</td>
<td>Marks ≥ 70%</td>
</tr>
<tr>
<td>FIRST CLASS</td>
<td>60% ≤ Marks &lt; 70%</td>
</tr>
<tr>
<td>SECOND CLASS</td>
<td>50% ≤ Marks &lt; 60%</td>
</tr>
<tr>
<td>PASS CLASS</td>
<td>40% ≤ Marks &lt; 50%</td>
</tr>
</tbody>
</table>
# Course Structure

## I B.Tech (ME) - I Semester

<table>
<thead>
<tr>
<th>Group</th>
<th>Subject code</th>
<th>Subject</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
<th>Marks</th>
<th>Int</th>
<th>Ext</th>
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<tr>
<td>BAS</td>
<td>GR11A1001</td>
<td>Mathematics-I</td>
<td>4</td>
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<td><strong>Total</strong></td>
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## I B.Tech (ME) - II Semester

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<th>L</th>
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<th>P</th>
<th>C</th>
<th>Marks</th>
<th>Int</th>
<th>Ext</th>
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<tr>
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<td>GR11A1021</td>
<td>Engineering Mechanics</td>
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### II B.Tech (ME) I Semester

<table>
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<th>Subject code</th>
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<th>L</th>
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<th>P</th>
<th>C</th>
<th>Marks</th>
<th>Int</th>
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<tr>
<td>BAS</td>
<td>GR11F5004</td>
<td>Probability and Statistics</td>
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<tr>
<td>DC</td>
<td>GR11A2028</td>
<td>Kinematics of Machinery</td>
<td>4</td>
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<td>DC</td>
<td>GR11A2029</td>
<td>Mechanics of Solids -I</td>
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<td>DC</td>
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<td>Thermodynamics</td>
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<td>DC</td>
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<td>Metallurgy and Material Science</td>
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<td>Metallurgy Lab</td>
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<tr>
<td>DC</td>
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<td>Machine Drawing Lab</td>
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<td>DC</td>
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<td>Mechanics of Solids Lab</td>
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### II B.Tech (ME) II Semester

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<th>Subject code</th>
<th>Subject</th>
<th>L</th>
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<th>P</th>
<th>C</th>
<th>Marks</th>
<th>Int</th>
<th>Ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>GR11A2038</td>
<td>Mechanics of solids II</td>
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<td>100</td>
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<td>75</td>
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</tr>
<tr>
<td>DC</td>
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<td>Fluid mechanics and Hydraulic Machinery</td>
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<td>DC</td>
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<td>Applied Thermodynamics-I</td>
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<td>100</td>
<td>25</td>
<td>75</td>
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<td>DC</td>
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<td>Production Technology</td>
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<td>100</td>
<td>25</td>
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<td>EAS</td>
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<td>EAS</td>
<td>GR11A2040</td>
<td>Electrical Technology Lab</td>
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<td>Production Technology Lab</td>
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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


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


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


Text Books:


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 \((-\pi, \pi)\): 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:**


**Reference Books:**

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


UNIT-II


UNIT-III

UNIT-IV


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.


Text Books:


Reference Books

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


(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

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

Reference Books
2. Engineering Drawing- Johle, Tata Macgraw Hill.
UNIT-I


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

**Reference Books**
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.
7. Complexometry: Estimation of copper by using standard EDTA solution.
IT WORKSHOP

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.
6. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft).
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.


(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


4. **A Foundation English Course for undergraduates** (Practice exercises on skills) Paul Gunashekar Shyamala Kumar Das Sachil Mahadevan, Oxford University 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

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


UNIT- II


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

Text Books:

Reference Books:
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


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.


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:**


**Reference Books:**

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


UNIT- III


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

**UNIT-IV**


**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:**


**Reference Books:**

2. Engineering Physics: R K Gaur & S L Gupta, Dhanpat Rai & Sons
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 situations develop 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
GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

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


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.


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

Reference Books
2. C & Data structures - P. Padmanabham, B.S. Publications.
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:
   \[ \text{Sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10! \]

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
   \[ S = ut + \frac{1}{2}at^2 \]
   where ‘u’ and ‘a’ are the initial velocity (m/sec.) and acceleration (m/sec^2). 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+x²+x³+…………+xⁿ

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 - XI:

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.
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.
11. Air gap losses in optical fiber
12. Characteristics of LASER diode
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:
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:**

2. Fundamentals of Stochastic process-B.R. Bhat

**REFERENCE BOOKS:**

2. Probability, Statistics and Queuing Theory with computer applications- Arnold O.Allen


**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.
KINEMATICS OF MACHINERY

UNIT – I

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


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

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.


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.


TEXTBOOKS:


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
GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

II B.Tech (ME)        I Semester

MECHANICS OF SOLIDS-I

UNIT – I


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


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:**

4. Solid Mechanics, by Popov

**REFERENCES:**

4. Strength of Materials by S.Timshenko
THERMODYNAMICS

UNIT – I


UNIT – II


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.

UNIT – IV


UNIT - V

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


TEXT BOOKS :

1. Engineering Thermodynamics / PK Nag /TMH, III Edition

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


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.

**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
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.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.
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:

REFERENCES:
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
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:

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


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 – manometric 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.

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.Subramanya / TMH private limited
GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
II B.Tech (ME)  II Semester

APPLIED THERMODYNAMICS - I

UNIT – I


UNIT – II


UNIT – III


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


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
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
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.


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


TEXT BOOKS:
2. Manufacturing Technology / P.N. Rao/TMH

REFERENCES:
1. Production Technology / R.K. Jain
4. Welding Process / Paramar /
5. Production Technology /Sarma P C /
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 delastar transformations.

UNIT-II


Principle of operation of alternators – regulation by synchronous impedance method

UNIT-III


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:
ELECTRICAL TECHNOLOGY LAB

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


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
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:
   3. Bending and other operations

IV. PROCESSING OF PLASTICS:
   1. Injection Moulding
   2. Blow Moulding
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.
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.
### III B.Tech (ME)

#### I Semester

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Elective 4

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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, 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.


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


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:


REFERENCES:

3. Suma Damodaran, Managerial Economics, Oxford University Press.
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


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:


REFERENCES:
1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. Theory of Machines / Shigley / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
MACHINE TOOLS

Unit - I


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

Unit - II


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.


Unit - IV


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:**


**REFERENCES:**

2. Workshop Technology – B.S.Raghu Vamshi – Vol II
DESIGN OF MACHINE MEMBERS-I

Unit - I


Unit - II


Unit - III


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 cirkips, Gaskets and seals (stationary & rotary).


TEXT BOOKS:


REFERENCES:

1. Design of Machine Elements / V.M. Faires
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


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.


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.


**TEXT BOOKS** :

2. Gas Turbines – V.Ganesan /TMH

**REFERENCES** :

1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot
3. Gas Turbines / Cohen, Rogers and Saravana Muttoo / Addison Wesley – Longman
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.


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:

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


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

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


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.
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.
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
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.
METROLOGY AND SURFACE ENGINEERING

UNIT – I


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.


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

REFERENCES:
1. BIS standards-919 on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson
4. Surface Engineering with Lasers/ Dehosson J.T.
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.


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


Unit - III


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**


**TEXT BOOKS:**

1. Heat Transfer / HOLMAN/TMH

**REFERENCE BOOKS:**

4. Essential Heat Transfer - Christopher A Long / Pearson Education
5. Heat and Mass Transfer-Kondandaraman
GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
III B.Tech (ME) II Semester

INDUSTRIAL MANAGEMENT

Unit - I


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


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


Unit - V

(A) Strategic Management: Mission, Goals, Objectives, Policy, Strategy, Programmes, 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:
2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai.

REFERENCES:
III B.Tech (ME)  II Semester

DESIGN OF MACHINE MEMBERS-II

Note: Design Data Book Permitted

Unit - I


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


Unit - IV


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:

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


**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 – antifreeze 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.


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.


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:

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.


Unit - II


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.


Unit - IV

Unit - V


TEXT BOOKS:

2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

REFERENCES:

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.


Unit - II


Unit - III


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

REFERENCES:

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.
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.
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
7. Heat transfer in natural convection
8. Parallel and counter flow heat exchanger.
10. Stefan Boltzman Apparatus.
GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME) I Semester

OPERATIONS RESEARCH

Unit - I


**Unit - II**


**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.

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

REFERENCES:
2. Operations Research / A.M.Natarajan, P.Balasubramani, A. T a m i l a r a s i / Pearson Education.
3. Introduction to O.R / Taha/ PHI
4. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman
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


Unit - II
Analysis of Trusses and Frames: Element of stiffness matrix for a truss member. Analysis of 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.


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.
TEXTBOOKS:
1. Introduction to Finite Elements in Engineering / Chandraputla, Ashok and Belegundu / Prentice – Hall.

REFERENCES:
2. Finite Element Methods/ Alavala/TMH
4. Finite Element Analysis/ C.S.Krishna Murthy
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


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 Amrouche / Pearson
4. CAD/CAM: Concepts and Applications/Alavala/ PHI
Unit - I


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


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 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:

4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Introduction to Robotics / John J Craig / Pearson Edu.
INSTRUMENTATION AND CONTROL SYSTEMS
(ELECTIVE – I)

Unit - I

Measurement of Displacement: Theory and construction of various transducers to measure displacement – Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.


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


Unit - III


Unit - IV


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

Unit - V


TEXT BOOKS:

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.
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


UNIT – V

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

TEXT BOOKS:


REFERENCE BOOKS:


UNCONVENTIONAL MACHINING PROCESSES (ELECTIVE – II)

UNIT – I


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


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

TEXT BOOKS:
1. Advanced machining processes by VK Jain/ Allied publishers.

REFERENCES:
1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.
5. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
8. Production Control / Moore.
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, petroff’s 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


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
UNIT – I

**Introduction:** Types and strategies of automation, pneumitic 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:**

2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.
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 quantitative 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


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.

TEXTBOOKS:

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

2. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
5. Production Control / Moore.
GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV B.Tech (ME)                    II Semester

DATABASE MANAGEMENT SYSTEMS

UNIT – I


UNIT – II


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.


UNIT – IV

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


TEXT BOOKS:


REFERENCES:


2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education

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


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
PRODUCTION DRAWING PRACTICE LAB


**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

**TEXTBOOKS:**

2. Machine Drawing with Auto CAD- Pohit and Ghosh, PE

**REFERENCE:**

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:


UNIT – III


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

UNIT IV

POWER FROM NON-CONVENTIONAL SOURCES: Utilization of Solar-

**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

**REFERENCES:**
2. Power plant Engineering/ Ramalingam/ Scietech Publishers
5. An Introduction to Power Plant Technology / G.D. Rai.
RELIABILITY ENGINEERING
(ELECTIVE – III)

UNIT – I


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.


UNIT – III


UNIT – IV


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
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


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

UNIT-III


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 joule 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
7. Renewable Energy Technologies /Ramesh & Kumar /Narosa
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
REFRIGERATION AND AIR CONDITIONING
(ELECTIVE IV)

UNIT – I


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


UNIT II


Condensers – classification – Working Principles
Evaporators – classification – Working Principles
Expansion devices – Types – Working Principles


UNIT III


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.

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
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.
6. Quality Control and inspection.

Software Packages:

Use of Gibbs CAM, Master CAM etc.