ACADEMIC REGULATIONS
PROGRAM STRUCTURE
and
DETAILED SYLLABUS

Bachelor of Technology
(Mechanical Engineering)
(Effective for the students admitted from the Academic Year 2014-15)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

ACADEMIC REGULATIONS

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

For all Undergraduate Programmes (B. Tech)
GR15 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology - 2015 Regulations (GR15 Regulations) are given hereunder. These regulations govern all the Undergraduate Programmes offered by various departments of Engineering with effect from the students admitted to the programmes from 2015-16 academic year.

1. **Programme Offered:** The Undergraduate programme offered by the department is B.Tech, a four-year regular programme in that discipline.

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

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

4. **Programme Pattern:**
   a) A student is introduced to "Choice Based Credit System (CBCS)" for which he/she has to register for the courses at the beginning of each semester as per the procedure.
   b) Each Academic year of study is divided into two semesters.
   c) Minimum number of instruction days in each semester is 90.
   d) The total credits for the Programme is 200. Typically each semester has 25 credits.
   e) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
   f) A student has a choice of registering for credits from the courses offered in the programme ensuring the total credits in a semester are between 21 and 29.
   g) All the registered credits will be considered for the calculation of final CGPA.
   h) All courses are to be registered by a student in a semester as per the procedure at the beginning of the semester. All the courses are broadly classified as

S.no	Code	Area	% of credits in the Programme Min	Max
1	HS	Humanities and Social Sciences	5	10
2	BS	Basic Sciences	15	20
3	ES	Engineering Sciences	15	20
4	PC	Professional subjects – Core	30	40
5	PE	Professional Subjects – Elective	10	15
6	OE	Open Elective	05	10
7	PW	Project Work	10	15
8	MC	Mandatory Course*	02	02

*Credits/ Marks are not counted for grading / Pass percentage

5. **Award of B.Tech Degree:** A student will be declared eligible for the award of B. Tech Degree if he/she fulfills the following academic requirements:
   a) A student shall be declared eligible for the award of B.Tech degree, if he/she pursues the course of study and completes it successfully in not less than four academic years and not more than eight academic years.
   b) A student has to register for all the 200 credits and secure all credits.
   c) A student has to acquire a minimum of 5.00 SGPA in each semester for the award of B. Tech degree.
   d) A Student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the date of admission, shall forfeit his/her seat in B.Tech course.
   e) The Degree of B.Tech shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, to the students who are admitted to the programme and fulfill all the requirements for the award of the degree.

6. **Attendance Requirements**
   a) A student shall be eligible to appear for the semester-end examinations if he/she puts in a minimum of 75% of attendance in aggregate in all the courses concerned in the semester.
   b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted. A committee headed by Dean (Academic Affairs) shall be the deciding authority for granting the condonation.
   c) Students who have been granted condonation shall pay a fee as decided by the Academic Council.
   d) Shortage of Attendance more than 10%(attendance less than 65% in aggregate) shall in no case be condoned.
   e) Students whose shortage of attendance is not condoned in any semester are detained and are not eligible to take their end examinations of that semester. They may seek re-registration for that semester when offered next with the academic regulations of the batch into which he/she gets re-registered.

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

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

b) **Distribution and Weightage of marks**

S.no	Components	Internal	External	Total
1	Theory	30	70	100
2	Practical	25	50	75
3	Engineering Graphics	30	70	100
4	Industry OrientedMini Project	25	50	75
5	Comprehensive Viva	-	100	100
6	Seminar	-	100	100
7	Major Project	50	150	200

c) **Continuous Internal Evaluation and Semester End Examinations:**

The assessment of the student's performance in each course will be based on Continuous Internal Evaluation (CIE) and Semester-End Examination (SEE). The marks for each of the component of assessment are fixed as shown in the following Table.

Assessment Procedure :

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

2	Practical	25	Internal Exams & Continuous Evaluation	1) Lab Internal :10 marks 2) Record : 5 marks 3) Continuous Assessment : 5 marks 4) Attendance : 5 marks
		50	Semester-end examination	The semester-end examination is for a duration of 3 hours.

d) **Industry Oriented Mini Project:** The Mini Project is to be taken up with relevance to Industry and is evaluated for 75 marks. Out of 75 marks, 25 marks are for internal evaluation and 50 marks are for external evaluation. The supervisor continuously assesses the students for 15 marks (Attendance – 5 marks, Continuous Assessment – 5 marks, Report – 5 marks). At the end of the semester, Mini Project shall be displayed in the road show at the department level for the benefit of all students and staff and the same is to be evaluated by Mini Project Review Committee for 10 marks. The mini project report shall be presented before Project Review committee in the presence of External Examiner and the same is evaluated for 50 marks. Mini Project Review Committee consists of HOD, Mini Project Coordinator and Supervisor.

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

f) **Seminar:** For the seminar, the student shall collect information on a specialized topic and prepare a technical report and present the same to a Committee consisting of HOD and two senior faculty and the seminar coordinator of the department. The student shall be assessed for his/her understanding of the topic, its application and its relation with various courses studied during the programme of study for 100 marks.

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

h) **Engineering Graphics:**

- Two internal examinations, each is of 10 marks .The average of the two internal tests shall be considered for the award of marks.
- Submission of day to day work - 15 marks.
- Attendance - 5 marks.

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

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

10. **a) Supplementary Examinations:** A student who failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the college.
    b) Improvement Examinations: A student who failed to secure SGPA of at least 5.00 in a semester can reappear for the external examination of the required courses of the semester for an improvement in SGPA, with the approval from HOD and faculty advisor.
11. **Malpractices in Examinations:** Disciplinary action shall be taken in case of malpractices during Mid/ End-examinations as per the rules framed by the Academic Council.

12. **Academic Requirements:**
    a) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or laboratories if he / she secures not Less than 35% of marks in the Semester-end Examination and a minimum of 40% of the sum total of the Internal Evaluation and Semester-end examination taken together.
    b) A student shall be promoted to the next semester only when he/she satisfies the requirements of all the previous semesters.
    c) A student shall be promoted from I year to II year if and only if he/she secures 25 credits from all the I year regular and supplementary examinations.
    d) A student shall be promoted from II year to III year if and only if he/she secures 45 credits up to and including II year I Semester or 60 credits upto and including II year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.
    e) A student shall be promoted from III year to IV year if and only if he/she secures 75 credits upto and including III year I Semester or 90 credits upto and including III year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.
    f) **Grade Points:** A 10- point grading system with corresponding letter grades and percentage of marks, as given below, is followed

Letter Grade	Grade Point	Percentage of Marks
O (Outstanding)	10	Marks>=80 and Marks <= 100
A+ (Excellent)	9	Marks>=70 and Marks < 80
A (Very Good)	8	Marks>=60 and Marks < 70
B+ (Good)	7	Marks>=55 and Marks < 60
B (Above Average)	6	Marks>=50 and Marks < 55
C (Average)	5	Marks>=45 and Marks < 50
P (Pass)	4	Marks>=40 andMarks < 45
F (Fail)	0	Marks < 40
Ab (Absent)	0	

Earning of Credit:

A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range O-P. Letter grade 'F' in any Course implies failure of the student in that course and no credits earned.

Computation of SGPA and CGPA:

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i) $S_k$the SGPA of k^{th} semester(1 to 8)is the ratio of sum of the product of the number of credits and grade points to the total creditsof all courses registered by a student, i.e.,

$$\mathbf{SGPA\ (S_k) = \sum_{i=1}^{n} (Ci * Gi) / \sum_{i=1}^{n} Ci}$$

Where C_i is the number of credits of the i course and G_i is the grade point scored by the student in the i^{th} course and n is the number of courses registered in that semester.

ii) The CGPA is calculated in the same manner taking into account all the courses m, registered by a student over all the semesters of a programme, i.e.,upto and inclusive of S_k, where $k \geq 2$.

$$\mathbf{CGPA = \sum_{i=1}^{m} (Ci * Gi) / \sum_{i=1}^{m} Ci}$$

iii) The SGPA and CGPA shall be rounded off to 2 decimal points.

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

	Class Awarded	CGPA Secured
13.1	First Class With Distinction	CGPA ≥ 8.00 with no F or below grade/ detention anytime during the programme
13.2	First Class	CGPA ≥ 8.00 with rest of the clauses of 13.1 not satisfied
13.3	First Class	CGPA ≥ 6.50and CGPA < 8.00
13.4	Second Class	CGPA ≥ 5.50 and CGPA < 6.50
13.5	Pass Class	CGPA ≥ 5.00 and CGPA < 5.50

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

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

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

17. **General Rules**

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

Academic Regulations for B.Tech (Lateral Entry) under GR15

1. **All regulations as applicable for B.Tech Four year degree programme (Regular) will hold good for B.Tech (Lateral Entry Scheme) except for the following rules**
   a) Pursued programme of study for not less than three academic years and not more than six academic years.
   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 CGPA.
   c) Students who fail to fulfil all the academic requirements for the award of the degree within six academic years from the year of their admission, shall forfeit their seat in B.Tech programme.

2. **Academic Requirements**
   a) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or laboratories if he / she secures not less than 35% of marks in the Semester-end Examination and a minimum of 40% of the sum total of the Internal Evaluation and Semester-end examination taken together.
   b) A student shall be promoted to the next semester only when he/she satisfies the requirements of the previous semester.
   c) A student shall be promoted from II year to III year if and only if he/she secures 25 credits up to and including II year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.
   d) A student shall be promoted from III year to IV year if and only if he/she secures 45 credits up to and including III year I Semester or 60 credits up to and including III year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.

3. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B. Tech Degree by 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):

	Class Awarded	CGPA Secured
3.1	First Class With Distinction	CGPA ≥ 8 with no F or below grade/ detention anytime during the programme
3.2	First Class	CGPA ≥ 8 with rest of the clauses of 3.1 not satisfied
3.3	First Class	CGPA ≥ 6.50 and CGPA < 8
3.4	Second Class	CGPA ≥ 5.50 and CGPA < 6.50
3.5	Pass Class	CGPA ≥5.00 and CGPA < 5.50

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech (ME) PROGRAMME STRUCTURE

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

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Int.	Ext.	Marks
BS	GR15A1001	Linear Algebra and Single Variable Calculus	2	1	-	3	4	30	70	100
BS	GR15A1002	Advanced Calculus	2	1	-	3	4	30	70	100
BS	GR15A1008	Engineering Chemistry	2	1	-	3	4	30	70	100
ES	GR15A1012	Engineering Mechanics-STATICS	2	1	-	3	4	30	70	100
ES	GR15A1018	Basic Electrical Engineering	3	1	-	4	5	30	70	100
ES	GR15A1023	Engineering Graphics	1	-	2	3	5	30	70	100
HS	GR15A1024	Business Communication And soft skills	-	-	2	2	4	25	50	75
ES	GR15A1026	IT Workshop	-	-	2	2	4	25	50	75
BS	GR15A1030	Engineering Chemistry lab	-	-	2	2	4	25	50	75
		Total	**12**	**5**	**8**	**25**	**38**	**255**	**570**	**825**

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

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Int.	Ext.	Marks
BS	GR15A1003	Transform Calculus and Fourier Series	2	1	-	3	4	30	70	100
BS	GR15A1004	Numerical Methods	2	1	-	3	4	30	70	100
HS	GR15A1005	English	2	1	-	3	4	30	70	100
BS	GR15A1006	Physics for Engineers	2	1	-	3	4	30	70	100
ES	GR15A1011	Computer Programming and data structures	2	1	-	3	4	30	70	100
ES	GR15A1020	Engineering Mechanics -DYNAMICS	3	1	-	4	5	30	70	100
ES	GR15A1025	Engineering Workshop	-	-	2	2	4	25	50	75
ES	GR15A1028	Computer Programming and Data structures Lab	-	-	2	2	4	25	50	75
BS	GR15A1029	Engineering Physics Lab	-	-	2	2	4	25	50	75
		Total	**13**	**6**	**6**	**25**	**37**	**255**	**570**	**825**

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

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Int.	Ext.	Marks
BS	GR14A2011	Probability and Statistics	2	1	-	3	4	30	70	100
PC	GR14A2019	Kinematics of Machinery	3	1	-	4	5	30	70	100
PC	GR14A2020	Mechanics of Solids	3	1	-	4	5	30	70	100
PC	GR14A2021	Engineering Thermodynamics	3	1	-	4	5	30	70	100
PC	GR14A2022	Material Science & Metallurgy	3	1	-	4	5	30	70	100
PC	GR14A2023	Machine Drawing Lab	-	-	2	2	4	30	70	100
PC	GR14A2024	Material Science and Metallurgy Lab	-	-	2	2	4	25	50	75
PC	GR14A2025	Mechanics of Solids Lab	-	-	2	2	4	25	50	75
Total			**-**	**-**	**-**	**25**	**36**	**225**	**500**	**725**
MC	GR15A2002	Value Education and Ethics	-	-	2	2	4	30	70	100
MC	GR15A2106	Gender Sensitization Lab	-	-	2	2	4	25	50	75

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

Group	Sub-Code	Subject	L	T	P	Credits	Hours	Int.	Ext.	Marks
HS	GR14A2026	Electrical and Electronics Technology	2	1	-	3	4	30	70	100
PC	GR14A2027	Production Technology	3	1	-	4	5	30	70	100
PC	GR14A2028	Fluid Mechanics and Hydraulic Machinery	3	1	-	4	5	30	70	100
PC	GR14A2029	Internal Combustion Engines	3	1	-	4	5	30	70	100
PC	GR14A2030	Advanced Mechanics of Solids	3	1	-	4	5	30	70	100
PC	GR14A2031	Production Technology Lab	-	-	2	2	4	25	50	75
PC	GR14A2032	Electrical and Electronics Technology Lab	-	-	2	2	4	25	50	75
	GR14A2033	Fluid Mechanics and Hydraulic Machinery lab	-	-	2	2	4	25	50	75
Total			**-**	**-**	**-**	**25**	**36**	**725**	**225**	**500**
MC	GR14A2001	Environmental Science	-	-	2	2	4	30	70	100

SYLLABUS

I-Year

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

LINEAR ALGEBRA AND SINGLE VARIABLE CALCULUS

Course Code: GR15A1001 L:2 T:1 P:0 C:3

Prerequisites: Vector algebra, Matrix algebra and Pre-calculus

Course objectives: The objective of this course is to provide the student with

- Introduce the ideas of linearity and linear systems, which lie at the core level of many engineering concepts
- Explore the extensions of differential calculus, which form the stepping stones to a broader subject called " approximation theory"
- Learn the skill of seeing a mathematical equation in many commonly occurring natural phenomena and acquire preliminary skills to predict their behavior
- Provide an over view of mean value theorems and its applications
- Discuss the significant applications of higher order differential equations.

Course Outcomes: At the end of the course, the student will be able to

- Recognize the concepts of matrix rank to analyze linear algebraic systems
- Compute eigen values and vectors for engineering applications
- Illustrate the concepts of Mean Value Theorems to Describe the Medical Imaging and Industrial Automation.
- Differentiate various differential equations using elementary techniques (Exact or linear constant coefficient equations)
- Demonstrate model and solve linear dynamical systems
- Apply concepts of higher order differential equations to solve typical problems in Electrical circuits.
- Identify the physical phenomena of Simple harmonic motion by concepts of Differential equations.

Unit-I

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

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

Unit-II

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

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

Unit-III

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

Unit-IV

Linear differential equations of the first order and their applications: Formation of ODE-Methods to solve first order LDE (exact, reducible to exact, linear and Bernoulli equations). Applications - Growth and decay models - Newton's law of cooling - Applications to electrical circuits (LR and RC circuits) - Geometrical applications - Orthogonal trajectories.

Unit-V

Linear differential equations of the higher order and applications: Equations with constant coefficients-Particular integrals for functions of the type e^{ax}, x^n, sinax, cos ax, $e^{ax}.V(x)$ Exponential shift - Method of variation of parameters.
Applications - Deflection of beams, Simple harmonic motion (simple pendulum, spring-mass systems) and RLC circuits.

Teaching Methodologies

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

Text Books

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

References Books

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

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED CALCULUS

Course Code: GR15A1002 L:2 T:1 P:0 C:3

Prerequisites: Analytical 2-D and 3-D geometry, differential and integral calculus

Course Objectives: The objective of this course is to provide

- Introduce the techniques of tracing a curve using its geometrical properties
- Visualize multivariable functions in the context of function optimization
- Learn the skill of performing integration in 2-D and 3-D and apply them to estimate Characteristics of vector fields
- Introduce the concepts of vector differential calculus
- Demonstrate the Vector Integral Theorem with physical Interpretation.

Course Outcomes: At the end of the course, the student will be able to

- Identify the techniques of curve tracing and geometry to precisely estimate areas and volumes
- Solve problems on function optimization with and without constraints
- Demonstrate the knowledge of multiple integrals in solving problems in vector fields
- classify the concepts of differential calculus with physical Interpretation
- Categorize the verification and evaluation of Vector integral theorems geometrically.
- Explain the real significance of applications of multiple integrals.
- Classify the concepts of application of Integration.

Unit-I

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

Unit-II

Curve tracing principles and Applications of integration: Preliminary treatment of curve tracing Cartesian, polar and parametric curves -Applications of the definite integral to evaluate arc lengths, surface areas and volumes generated by revolution of plane area.

Unit-III

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

Unit-IV

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

Unit-V

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

Teaching Methodologies

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY

Course Code: GR15A1008 L:2 T:1 P:0 C:3

Prerequisites: Fundamentals in Engineering Chemistry Theory Course

Course Objectives: The objective of this course is to provide

- Explain the chemistry of water analysis essential for the functioning of certain core industries.
- Demonstrate how the chemistry of batteries and fuel cells provide energy vital for devices.
- Introduce a variety of engineering materials used in modern technology including
- Semiconductors, conducting polymers, liquid crystals, etc., to relate the molecular and crystal structure and properties to their engineering applications.
- Illustrate materials processing methods for industrial production of plastics, rubbers, silicon

Course Outcomes: At the end of the course, the student will be able to

- Analyse water for the industry required specifications.
- Understand the fundamental principles of electrochemistry for energy production and corrosion prevention.
- Know the origin of different types of engineering materials used in modern technology.
- Design new materials for novel applications.
- Develop the skills required for synthesis and analysis of materials.
- Relate the structure of materials to their properties and applications.
- Understand the processing of fossil fuels for the effective utilization of chemical energy
- Know the necessity of sustainable, environmentally-friendly energy sources like solar energy.

Unit-I

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

Unit-II

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

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

Unit-III

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

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

Unit-IV

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

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

Unit-V

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

Teaching Methodologies

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING GRAPHICS

Course Code: GR15A1023 L:1 T:0 P:2 C:3

Prerequisites: Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability.

Course Objectives: The objective of this course is to provide the student with

- To distinguish and differentiate the importance of engineering drawing.
- The course of study elevates the interpretation level of manuscripts into engineering drawing.
- Distinguish the basic principles and different steps involved in principle of planes of projections.
- By Interpreting the basic principles, can focus on cause to extend and relate the information of objects.
- Visualize the difference views of a given object through Orthographic and isometric projections

Course Outcomes: At the end of the course, the student will be able to

- Demonstrate different types of lines, the use of different types of pencils and drafter to represent
- Illustrate the basic drawing techniques, conic sections, cycloid curves, involutes and engineering
- Explain the basic concept of principle of planes of projections in front view and top view.
- Make use of orthographic projections of points, lines , planes and solids
- Analyze the structure which was hypostatically designed ex: development of surfaces, section of
- Explain the logic to convert pictorial vies to orthographic projections and orthographic projections to
- Evaluate conversions of isometric views to orthographic views helps in inventing new machinery.

Unit-I

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

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

Unit-II

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

Unit -III

PROJECTIONS OF PLANES: Planes parallel, perpendicular and inclined to one of the reference planes. Plane inclined to both the reference planes.

PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes.

Unit-IV

SECTIONS OF SOLIDS: Types of section planes, Section by a plane perpendicular to V.P., Section by a plane perpendicular to H.P.

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

Unit-V

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

TRANSFORMATION OF PROJECTIONS: Conversion of Isometric Views to Orthographic Views Conventions.

Teaching Methodology

Power point Presentations, Working models, white board & marker

Text Books

1. Engineering Drawing, N.D. Bhat / Charotar

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

BASIC ELECTRICAL ENGINEERING

Course Code: GR15A1018 L:3 T:1 P:0 C:4

Prerequisites: Fundamentals in Engineering Mathematics and Physics.

Course Objectives : BEE (Basic Electric Engineering) is common to first year branches of UG Engineering(except BT). At the end of the course the student is expected to

- Know the fundamentals of Electrical Engineering.
- Practical implementation of fundamental theory concepts.
- Solve problems in the fundamentals of electrical engineering.
- Understand the basic principles of general electrical machinery.
- Know the applications of electrical engineering in real time.
- Understand the common real time application of Electrical machinery.
- Learn basic house wiring.

Course Outcomes: At the end of the course, the student will be able to

- Strong basics of Electrical Engineering and practical implementation of Electrical fundamentals.
- Different applications of commonly used electric machinery.
- The methods for numerical solutions to fundamental electrical engineering.
- The basic principles involved in electrical engineering concepts.
- Practical methods of basic house wiring.
- The methods to solve AC circuits.
- Basics of electric machines used in industries.

Unit-I

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

Unit-II

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

Unit-III

AC Fundamentals-II: RMS and Average values, Form factor, Steady State Analysis of Series, Parallel and Series Parallel combinations of R, L,C with Sinusoidal excitation, Instantaneous

power, Average power, Real power, Reactive power and Apparent power, concept of Power factor, Frequency.

Unit-IV

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

Unit-V

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

(i) DC Motor,

(Ii) Single phase Transformer

(Iii) Single phase Induction motor

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING MECHANICS-STATICS

Course Code: GR15A1012 L:2 T:1 P:0 C:3

Prerequisites: A good working knowledge of calculus, vector algebra, General Physics is required.

Course Objectives: This is Engineering Applied Science-Dynamics Subject to Mechanical Branch of UG Engineering. At the end of the course student is expected to

- Explain basic principles describing the equilibrium of system of forces under static conditions
- Illustrate the concepts of friction and related problems
- Apply the concepts of centroid, moment of inertia, product of inertia and mass moment of inertia to practical problems
- Analyze trusses by using method of joints and method of section
- Demonstrate principles of virtual work to the static problems

Course Outcomes: At the end of the course, the students should be able to

- Solve forces and moments for planer system problems
- Evaluate basic equilibrium, friction problems
- Distinguish between Centroid and Centre of Gravity
- Differentiate between area moment of inertia and mass moment of inertia
- Evaluate trusses by method of joints and method of sections
- Analyze mass moment of Inertia and area moment of inertia
- Solve virtual work problems

Unit-I

Forces, Moments, Equilibrium: Introduction to Engineering Mechanics, Basic Concepts.
System of forces: Coplanar forces, concurrent forces, Resultant, Moment of forces and its application, Varignon's principle, Couples and resultant of force system.
Equilibrium of systems of forces: Free body diagrams, equations of equilibrium of coplanar systems, Lami's theorem, Graphical method for the equilibrium of coplanar forces, Converse of the law of triangle of forces, converse of the law of polygon of forces, conditions of equilibrium.

Unit-II

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

Unit-III

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

Unit-IV

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

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

Unit-V

Analysis of Trusses: Introduction, Classification of trusses, Assumptions made in the analysis of perfect truss, Methods of analysis of Trusses- Method of Joints and Method of Sections.
Principle of Virtual Work: Equilibrium of ideal systems, efficiency of simple machines, stable and unstable equilibriums.

Teaching Methodology

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

BUSINESS COMMUNICATION AND SOFT SKILLS

Course Code: GR15A1024 L:0 T:0 P:2 C:2

Prerequisites: Familiarity with basic language and communication skills.

Course objectives: The objective of this course is to provide the student with

- Recognize the role and importance of language and communication skills.
- Know the importance and application of phonology.
- Employ the acquired knowledge in classroom with reference to various social and professional spheres.
- Develop the sense of right usage of formal communication.
- Equip with the skills of listening, critical thinking and writing.
- Acquire the ability to work in teams.

Course outcomes: At the completion of this course the student will be able to

- Interpret the role and importance of various forms of communication skills.
- Utilize various media of verbal and non-verbal communication with reference to various professional contexts.
- Enabled to tote professional responsibilities in ananalytical manner.
- Accredit the activity of sequencing ideas in an efficacious style.
- Evaluate and use a neutral and correct form of English.
- Formulate behavior in various formal situations.
- Integrate business communication & soft skills to meet the requirement of corporate communication.

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

Describing a Person, Situation, Process and Object: Introduction to techniques of clear, brief and impersonal description to a listener or reader.

Unit-VI

Letter Writing: Manual and Emailing, types and formats, content and body of the letter. Email etiquette.

Unit-VII

Report Writing: Formats and types of reports

Unit-VIII

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

Reference Books

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

Software Used

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

IT WORKSHOP

Course Code: GR15A1026 L:0 T:0 P:2 C:2

Prerequisites

- Fundamentals of Computer and its parts.
- Identification of peripherals of computer.

Course Objectives

- To introduce the students to a PC, its basic peripherals and to install software's.
- To increase the ability of the students in effective usage of Internet using web browsers and tools.
- To enable the students in crafting professional word documents, excel spread sheets and power point presentation using Microsoft office tools.
- To provide basic knowledge about the networking devices – Routers and Switches .In addition it include, how to connect those devices using different cables.
- To enable the students to connect the devices by using different cables.
- To provide students about the basic knowledge of HTML and to create a static website.
- To provide the basic knowledge on DBMS concepts and store the data in database.

Course Outcomes: At the end of the course, the Student should have

- Ability to recognize different peripherals and install different system and application softwares.
- Ability to analyze and use of web browsers and related tools.
- Ability to create different documents, presentations and spreadsheet applications.
- Ability to recognize different network devices and their usage.
- Ability to recognize and use different cables.
- Ability to explore the internet for information extraction and other innovative applications.
- Ability to design a static webpage.
- Ability to design and develop database.

PC Hardware

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

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

Task 1

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

Task 2

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

Task 3

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

Task 4

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

Task 5

Network Hardware: Understand switches, routers, media types. static routing, dynamic routing (routing protocols), default routes; routing table and how it selects best route(s); routing table memory, network address translation (NAT).Introduction to Cisco Packet Tracer, design LAN using routers and switches.

Task 6

Network Protocols: Understand the Open Systems Interconnection (OSI) model, IPv4, IPv6, tunnelling, dual IP stack, subnet mask, gateway, ports, packets, reserved address ranges for local use (including local loopback IP) Understanding Cisco Router and Switches.

Task 7

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

Task 8

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

Task 9

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

Task 10

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

Task 11

Designing a Static web page: Understand how to create static web page using forms and tables.

Teaching Methodologies

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY LAB

Course Code: GR15A1030 L:0 T:0 P:2 C:2

Prerequisites: Fundamentals in Engineering Chemistry Laboratory

Course Objectives: The objective of this course is to provide

- Introduce practical applications of chemistry concepts to engineering problems.
- Know the laboratory practices implemented in a research and industrial chemistry laboratory.
- Explain the water analysis techniques for removing impurities.
- Demonstrate redox chemistry for analysing engineering materials like cement.
- Explain the measurement of physical properties like viscosity and surface tension of lubricants.

Course Outcomes: At the end of the course, the student will be able to

- Perform analysis of water to the required industrial standards.
- Apply the redox and acid-base titrations for analysing materials used in routine usage like cement, coal, acid in lead acid battery, etc.,
- Develop the skills required for assessing the quality of materials used in industries.
- Design novel ways of instrumental methods of analysis.
- Know the correlation between the measured property and the corresponding application.
- Understand scientific method of designing experiment and learn the skill necessary to perform it.
- Know how to innovate to design alternative energy sources utilizing chemistry for sustainable environment for future generations

List Of Experiments

1. Estimation of Total Hardness in sample water by complexometry
2. Estimation of percentage available chlorine in Bleaching Powder.
3. Estimation of Fe^{2+} by permanganometry.
4. Determination of strength of an acid by potentiometric titration method
5. Determination of strength of an acid by using conductometry.
6. Determination of Strength of an acid in Pb-Acid battery by titrimetric method
7. Determination of percentage of Iron in Cement sample by colorimetry..
8. Estimation of Calcium in port land cement.

9. Determination of Viscosity of the given unknown liquid by Oswald's viscometer.
10. Determination of surface tention of the given unknown liquid by stalagmometer.
11. Preparation of Thiokol rubber.
12. Determination of percentage Moisture content in a coal sample.

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

TRANSFORM CALCULUS AND FOURIER SERIES

Course Code: GR15A1003 L:2 T:1 P:0 C:3

Prerequisites: Differential and integral calculus, multiple integrals and linear differential equations

Course Objectives: The objective of this course is to provide the student with

- Introduce improper integrals and specially to Beta and Gamma Functions
- Introduce the idea of domain transformation for easy problem solving
- Learn the skill of decomposing a periodic and non-periodic function in to fundamental Components using Fourier series and Fourier transform
- Introduce PDE and acquire the skill of finding analytical solutions of such equations
- Identify the real time problem and formulate the mathematical model.

Course Outcomes: At the end of the course, the student will be able to

- Calculate definite integral values using Beta and Gamma Functions
- Develop the skill of evaluating Laplace and inverse Laplace transform to solve linear systems under initial and boundary conditions
- Illustrate the concepts of Laplace Transform to find the solutions of physical problems such as Electrical circuits.
- Interpret the Fourier series and Fourier transform in the context of signals and systems.
- Solve difference equations by Z-Transform.
- Formulate Partial differential equations by eliminating arbitrary functions and arbitrary constants.
- Determine the solution of Boundary value problems (PDE) by Fourier Transform Method.

Unit-I

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

Unit-II

Laplace Transform: Definition and existence of the Laplace Transform-Elementary functions-Properties of the Laplace transform-Convolution integral - Convolution theorem-Heaviside's unit step-function-Dirac delta function. The inverse Laplace transform-Properties-Method of partial fractions- Heaviside's inversion formula-Inversion by convolution theorem. Application of the Laplace transform to solve initial value problems and boundary value problems in ODE. Solution of a system of linear differential equations-Solution of problems in electrical circuits by Laplace transforms method.

Unit-III

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

Unit-IV

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

Unit-V

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

Teaching Methodologies

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

NUMERICAL METHODS

Course Code: GR15A1004 L:2 T:1 P:0 C:3

Prerequisites: Elementary calculus, Partial differentiation, Geometry and ordinary differential equations.

Course Objectives: The objective of this course is to provide the student with

- Explain the distinction between analytical and approximate solutions arising in mathematics
- Acquire skills that equip us to approximate a hidden function using data
- Learn methods that provides solutions to problems hitherto unsolvable due to their complex Nature.
- Create ability to model, solve and interpreted the Engg Problem.
- Introduce the various applications of interpolation in Science and Engg.

Course Outcomes: At the end of the course, the student will be able to

- Develop the skill of determining approximate solutions to problems having no analytical Solutions in different contexts
- Solve problems related to cubic spline fitting and approximation of functions using B-splines and least squares
- Develop the skill of finding approximate solutions to problems arising in linear differential Equations
- Identify how the numerical methods play a vital role in many areas in engineering for example Dynamics, elasticity, heat transfer, electromagnetic theory and quantum mechanics.
- Interpret the mathematical results in physical or other terms to see what it practically means and implies.
- Explain the concept of interpolation is useful in predicting future out comes base on the present knowledge.
- Solve the model by selecting and applying a suitable mathematical method.

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

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

Teaching Methodologies

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PHYSICS FOR ENGINEERS

Course Code: GR15A1006 L:2 T:1 P:0 C:3

Prerequisites: Fundamentals in Physics and Mathematics.

Course Objectives: The objective of this course is to provide the student with

- Describe the various bonds between the atoms, crystal structures and their packing factors.
- Recognize the basic concepts of Acoustics, Acoustic quieting and ultrasonic applications.
- Discuss the origin of Electrical and Magnetic properties of various materials.
- Interpret the properties of laser light and how it is used for communication in optical fiber networks.
- Explain the latest developments of Nano-technology.

Course Outcomes: At the end of the course, the student will be able to

- Identify and describe various bonds between the atoms and properties of various materials.
- Recognize and design a building based on acoustical requirements.
- Find the advancements in material testing by using non destructive testing techniques.
- Classify various magnetic and dielectric materials and its utilization in various fields.
- Analyze why Laser light is more powerful than normal light and its applications in various fields.
- Demonstrate the application of optical fibers in communication.
- Extend the knowledge of characterization techniques to know the composition of Nano material.

Unit-I

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

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

Unit-II

Acoustics & Acoustic Quieting: Basic Requirement of Acoustically Good Hall, Reverberation and Time of Reverberation, Sabine's Formula for Reverberation Time(Qualitative Treatment),

Measurement of Absorption Coefficient of a Material, Factors Affecting the Architectural Acoustics and their Remedies. Acoustic Quieting: Aspects of Acoustic Quieting, Methods of Quieting, Mufflers, Sound-proofing.

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

Unit-III

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

Unit-IV

Lasers: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Einstein's Coefficients and Relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers. Fiber Optics: Structure and Principle of Optical Fiber, Acceptance Angle , Numerical Aperture, Types of Optical Fibers (SMSI,MMSI,MMGI), Attenuation in Optical Fibers, Application of Optical Fibers, Optical fiber Communication Link with block diagram.

Unit-V

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

Teaching Methodologies

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH

Course Code: GR15A1005 L:2 T:1 P:0 C:3

Prerequisites: Familiarity with basic language and communication skills.

Course objectives: The objective of this course is to provide the student with

- Identify the importance to acquire Basic Language Skills in English.
- Relate the vocabulary, Grammar and Structures in English.
- Practice to analyze and express their ideas in the new context.
- Demonstrate the learnt public speaking skills in an enthusiastic manner.
- Integrate oral and written communication skills.

Course outcomes: At the end of the course, the student will be able to

- Read and comprehend a wide range of text and know the importance of lifelong learning.
- Improve English language proficiency with an emphasis on LSRW skills.
- Interpret academic subjects with better understanding.
- Express ideas fluently and appropriately in terms of various social and professional areas.
- Revamp English language skills to meet the corporate needs.
- Present themselves in various formal, social and professional situations.
- Improve literary sense through wide range of selections from various genres.

Unit-I

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

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

Unit-II

Grammar & Vocabulary Development: Articles: Types of Articles and their usages; Tense and Aspect; Subject and Verb Agreement; Prepositions
Vocabulary Development: Synonyms and Antonyms; One-word substitutes; prefixes and suffixes; words often confused; idioms and phrases.
Speaking & Writing skills: Information transfer: verbal to graphical presentation and from graphical presentation to verbal. Public Speaking: Body Language, Presentation Skills and its Features.

Tutorial-3: Worksheet on the usage of Tenses, Articles and Prepositions

Tutorial-4: Exercises on vocabulary

Tutorial-5: Interpretation of data from different formats

Unit-III

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

Tutorial-5: Story Analysis

Tutorial-6: Present a person who bears risk taking ability to solve the problems of people/society

Tutorial-7: Describe a strange event that occurred in your life

Unit-IV

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

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

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

Unit-V

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

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

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER PROGRAMMING AND DATA STRUCTURES

Course Code: GR15A1011 L:2 T:1 P:0 C:3

Prerequisites: Knowledge of mathematics required

Course Objectives: The objective of this course is to provide the student with

- To explain basic computer system concepts.
- To design algorithms and draw flowcharts in a language independent manner.
- To use the concepts of C-programming language such as variables, operators, branching, looping, functions, arrays, pointers, structures and files.
- To examine the functions available in C-library.
- To convert recursive function to non-recursive function and vice versa
- To manipulate files.
- To experiment searching, sorting techniques and basic operations of stacks and queues

Course Outcomes: At the end of the course, the student will be able to

- Describe the basic computer system concepts.
- Design algorithm, draw flowchart and write the program for a given scenario.
- Use the concepts of C-programming language and functions available in C-library to develop the programs.
- Examine the static memory allocation and dynamic memory allocation.
- Experiment recursive and non-recursive functions
- Create and update files.
- Analyze the searching, sorting techniques and basic operations of stacks and queues.

Unit-I

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

Unit-II

Decision Making Statements: if, if-else, if-else-if, nested if, switch
Iterative Statements: while, do- while, for
Unconditional Statements: break, continue, go to.

Arrays: Introduction, One-dimensional Arrays, Declaring and Initializing Arrays, Multidimensional Arrays.
Strings: Introduction to Strings, String Handling Functions, Array of Strings.

Unit-III

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

Unit-IV

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

Unit-V

Sorting: Bubble sort, Merge sort, Insertion sort, Selection Sort, Quick Sort. **Searching:** Linear Search, Binary Search.
Introduction to Data Structures: Stack Operations using Arrays: Push and Pop,
Queue Operations using Arrays: Insert, Delete

Teaching Methodologies: White board and marker, power point presentation

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING MECHANICS-DYNAMICS

Course Code: GR15A1020 L:3 T:1 P:0 C:4

Prerequisites: A good working knowledge of calculus, vector algebra, General Physics & Engineering Mechanics-statics is required.

Course Objectives: The objective of this course is to provide

- Basic principles describing the motion of particles and rigid bodies under accelerating conditions.
- Principles of dynamic behavior to practical problems
- Concept of D'Alembert's principles and related problems
- Concepts of impulse and momentum of particles and rigid bodies
- Concepts of vibrations to the problems associated with dynamic behaviour

Course Outcomes: At the end of the course, the student will be able to

- Define kinematics of a particle, rectilinear and curvilinear motion,kinetics of particles
- Apply Newton laws, work and energy method for kinematics of a rigid body in plane motion-
- Evaluate rotational motion about a fixed axis of rigid bodies.
- Evaluate kinetics of a rigid body in plane motion.
- Solve various cases of impulse momentum basic problems.
- Evaluate moving bodies using DAlembert's principle
- Analyze various cases for vibration in mechanical components

Unit-I

KINEMATICS OF PARTICLES- RECTILINEAR MOTION: Introduction- Rectilinear motion of a particle, displacement, velocity and acceleration. Rectilinear motion along X-axis, Determination of motion of particle using methods of differentiation and integration.

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

KINEMATICS OF PARTICLES-CURVILINEAR MOTION: Introduction, curvilinear motion of a particle, rectangular components of velocity, acceleration components of particle-tangential & normal acceleration components, radial & transverse components of acceleration. Projectile motion, Projectile on Inclined Plane.

Unit-II

KINETICS OF PARTICLES: Introduction-Definitions of Matter, body, particle, mass, weight, inertia, momentum. Newton's law of motion. Relation Between force & mass. Motion of a particle in

rectangular coordinates. Motion of Lift. Motion of body on an inclined plane. Motion of connected Bodies.D'Alembert's Principle and applications.

WORK ENERGY METHOD: Law of conservation of Energy, Application of Work Energy Method to particle motion and connected system.

Unit-III

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

Unit-IV

KINEMATICS OF RIGID BODIES: Types of Rigid body motions- Motion of translation, Motion of Rotation, & General Plane Motion. Rotational motion about a fixed axis- Angular displacement, Angular Velocity, Angular acceleration. Equations of circular motion-Rotational motion with constant Angular Acceleration & angular Velocity. Relation between linear & angular acceleration.

KINETICS OF RIGID BODIES: Definitions-Force & Translation, Moment of couple & rotation, Torque & rotation. Newton's Law of Rotation. Relation between torque & Moment of inertia. Motion of bodies tied to a string and passing over a pulley.

Unit-V

MECHANICAL VIBRATIONS: Introduction-simple harmonic motion, Definitions. Equations of Simple Harmonic Motion, Motion of a body attached to a spring, Springs in series and in parallel, Horizontal Motion of a block attached to a spring. Simple pendulum, Seconds pendulum, Gain & loss of oscillations due to change in gravity (g) & length (l) of a simple pendulum, Compound pendulum and Torsional pendulum.

Teaching Methodology

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING WORKSHOP

Course Code: GR15A1025 L:0 T:0 P:2 C:2

Prerequisites

Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability

Course Objectives: The Objective of this course is to provide the student

- Introduction to general machining skills in the students
- Develop a skill in dignity of labour,precision,safety at work place,team working and development of right attitude
- To provide the students with hands on experience on different trades of engineering like Carpentry,Tinsmithy,Welding and Housewiring
- Production of simple models
- To perform different practical techniques

Course Outcomes: At the end of the course, students will be able to

- Design and model different prototypes in the Carpentry trade such as Cross lap joint, Dove tail joint
- Create various types in the trade of Fitting such as Straight fit,V-fit
- Construct various basic prototypes in the trade of tin smithy such as rectangular tray and open scoop etc.
- Analyze to make in the trade of Tin Smithy such as Rectangular tray and Open Cylinder
- Apply various House Wiring techniques such as Connecting one lamp with one switch,
- Develop various basic house wiring techniques such as two lamps with one switch, Connecting a Fluorescent tube, Series Wiring, Go down wiring
- Demonstrate to develop various basic prototypes in the trade of Welding such as Lap joint, Lap Tee joint, Butt joint and Corner joint

Unit-I

Carpentry Shop – 1:

1.1. Introduction to various types of wood such as Teak, Mango, Sheesham, etc. (Demonstration and their identification).

1.2. Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed. Job I Marking, sawing, planning and chiselling & their practice

1.3. Introduction to various types of wooden joints, their relative advantages and uses. Job II Preparation of half lap joint Job III Preparation of Mortise and Tenon Joint

1.4. Safety precautions in carpentry shop.

Unit-II

Fitting Shop – 2:

2.1. Introduction to fitting shop tools, common materials used in fitting shop.

2.2. Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.

Job I Marking of job, use of marking tools and measuring instruments.

Job II Filing a dimensioned rectangular or square piece of an accuracy of + 0.5 mm

Job III Filing practice (production of flat surfaces). Checking by straight edge.

Job IV Making a cutout from a square piece of MS Flat using hand hacksaw such as T-fit and V-fit

2.3.Care and maintenance of measuring tools like callipers, steel rule, try square.

Unit-III

House wiring – 3:

3.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, PVC Conduits.

3.2 Study of electrical safety measures and demonstration about use of protective devices such as fuses, and relays including earthing.

JobI Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.

JobII Preparation of a house wiring circuit on wooden board using fuse, switches, socket, holder, ceiling rose etc. in PVC conduit and PVC casing and capping wiring system.

Job III Two lamps in series and parallel connection with one way switch

JobIV Two lamps in series and one lamp in parallel connection with one way switch.

Job V Stair case lamp connection with two way switch.

Unit-IV

Tin- smithy – 4:

4.1 Introduction to tin -smithy shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material and specifications.

4.2 Introduction and demonstration of hand tools used in tin -smithy shop.

4.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g. M.S. sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.

corrugated sheet, aluminium sheets etc.

corrugated sheet, aluminium sheets etc.

4.4. Preparation of a rectangle tray and open scoop/ funnel.

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING PHYSICS LAB

Course Code: GR15A1029 L:0 T:0 P:2 C:2

Prerequisites: Fundamentals of Physics and Mathematics.

Course objectives: The objective of this course is to provide the student with

- Record and tabulate physical quantities like resistance, capacitance, a.c voltage and frequency by using digital multimeter and CRO.
- Classify the behavior and characteristics of dielectric and magnetic materials for its optimum utilization.
- Apply the theoretical concepts of optical fibers in practical applications.
- Analyze the behavior of semiconductors in various aspects.
- Revise the basic properties of light like interference, diffraction through hands on experience.

Course outcomes: At the end of the course, the student will be able to

- Identify the usage of CRO, digital multi meter to record various physical quantities.
- Distinguish the characteristics and behavior of dielectric materials in a practical manner.
- Calculate losses in optical fiber and interpret them to the optical communication systems.
- Quantify the type of semiconductor and measurement of energy gap in a semiconductor.
- Investigate the properties of light like interference and diffraction through experimentation.
- Examine the behavior of magnetic materials with the help of graph.
- Analyze the characteristics of light emitting diodes for their optimum utilization.

List of Experiments

` 1. Determine the energy gap of a given semiconductor.
2. Calculate the energy loss in a given Ferro magnetic material by plotting B-H curve.
3. Calculate the Numerical Aperture of a given optical fiber.
4. Determine the Dielectric constant and Curie temperature of PZT material.
5. Calculate the Acceptance angle of a given optical fiber.
6. Draw V-I & L-I Characteristics of LASER diode.
7. Determine the bending losses in a given optical fibers.

8. Determine the Air-gap losses in a given optical fibers.
9. Determine the Hall Coefficient in Ge semiconductor by using Hall Experimental setup.
10. Determine the carrier concentration, mobility of charge carrier in Ge semiconductor.
11. Measure Ac voltage and frequency through CRO.
12. Measure Resistance and Capacitance by using digital multimeter.
13. Diffraction Grating.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER PROGRAMMING AND DATA STRUCTURES LAB

Course Code: GR15A1028 L:0 T:0 P:2 C:2

Prerequisite: Basic operations of computer

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

- To use the fundamentals of C programming language and analyze the given problem.
- To develop the proficiency in writing programs in procedure oriented language.
- To apply the concepts of searching and sorting algorithms for solving real time problems.
- To examine the functions available in C-library.
- To manipulate files.
- To device stack and queue operations.
- To write a program in recursive and non-recursive manner

Course Outcomes: At the end of the course, the expected outcome from the students

- Use the programming concepts and c-library functions for writing the programs.
- Write a program to a given problem.
- Analyze and debug the given program.
- Create and update files
- Differentiate static and dynamic memory allocation.
- Apply searching and sorting techniques for real time scenario.
- Experiment the basic operations of stacks and queues.

Task- I

a) The heights of three students are 165, 148, 154 cm. respectively. Write a c program to sort the heights of the students in descending order.

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

c) The program should request the user to input two numbers and display one of the following as per the desire of user.
   (a) sum of numbers
   (b) difference of numbers
   (c) product of the numbers
   (d) division of the numbers.

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

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

Task-II

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

Task-III

a) Write a C program to calculate the following Sum: Sum=1-x2/2!+x4/4!-x6/6!+x8/8!-x10/10!
b) For a certain electrical circuit with an induction (L) and Resistance (R) , the damped natural frequency is given by f=√(1/LC – R2/ 4C2). Write a C program to calculate the frequency for different values of C starting from 0.01 to 0.1.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Task-I V

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

Task-V

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

Task-VI

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

Task-VII

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

Task-VIII

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

Task-IX

a) Write a c program which accepts employee details like (outer structure : name, employid, salary and (inner structure : area, street number, houseno)).Display the employee names and id belonging to a particular area.
b) Write a C program that uses functions to perform the following operations:
   i) Addition of two complex numbers
   ii) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Task-X

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

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

Task-XI

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

Task-XII

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

Task-XIII

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

Task-XIV

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

Text Books

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

Reference Books

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

SYLLABUS

II-Year

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROBABILITY AND STATISTICS

Course Code: GR15A2011 L:2 T:1 P:0 C:3

Prerequisites: Fundamentals in Basic Mathematics.

Course Objectives: The objective of this course is to provide

- State the fundamentals of Probability and Statistics.
- Describe the properties of random variables and distributions.
- Apply the tests of hypothesis.
- Distinguish between explanatory and response variables and analyse multi variable data using correlation and regression.
- Evaluate random processes.

Course Outcomes: At the end of the course, the student will be able to

- Estimate the chance of occurrence of various uncertain events in different random experiments with strong basics of probability.
- Evaluate random processes which occur in engineering applications governed by the Binomial, Poisson, Exponential, Normal and Uniform distributions.
- Apply various sampling techniques.
- Forecast the models using Regression Analysis.
- Estimate the system performance measures in different queueing processes.
- Apply Inferential Statistics to make predictions or judgments about the population from which the sample data is drawn.
- Develop models for Stochastic Processes.

Unit-I

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

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

Unit-II

Distributions: Binomial, Poisson, Uniform, Normal and Exponential distributions (Definition, Real life examples, Statements of their Mean, Mode and Variance and Problems). Fitting of Binomial and Poisson distributions.

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

Unit-III

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

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

Unit-IV

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

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

Unit-V

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

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

Teaching Methodologies

1. Chalk &Talk
2. Ppts

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

KINEMATICS OF MACHINERY

Course Code: GR14A2019 L:3 T:1 P:0 C:4

Prerequisites: Engineering Mathematics

Course Objectives: The objective of this course is to provide the student with

- To impart knowledge on various types of Mechanisms and synthesis.
- To impart skills to analyze the position, velocity and acceleration of mechanisms and explain the concepts of instantaneous centers.
- To familiarize higher pairs like cams and gears and explain their working principles.
- To introduce the concept of gears, gear terminology, tooth profiles and gear trains.
- To understand the theory of belts, chains, ropes.

Course Outcomes: At the end of the course, the student will be able to

- List out the common mechanisms, working principles and its applications which is used in machines.
- Interpret mobility for different mechanisma and enumerate rigid links, types of links and types of joints in the mechanisms.
- Explain Straight line motion mechanisms and its applications generally used in various machines.
- Utilize analytical, mathematical and graphical aspects of kinematics of Machines for effective design.
- Define Cam terminology, classifications of cam and follower, cam profiles, Introduction about cam design and its applications.
- Explain Gear mechanism classification and gear train analysis, gear standardization and law of gearing.
- Design and fabrication of gear box design followed by the specification and standards.
- Asses various concepts of mechanisms like straight line motion mechanisms, Steering gear mechanisms and working principles of power transmission elements (Gears, gear trains, Cams, Belt and Chain drives) and design related problems effectively.
- Build up critical thinking and problem solving capacity of various mechanical engineering problems related to kinematics of machines.

Unit-I

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

Machines: Classification of machines – kinematic chain – inversion of mechanism – inversions of quadric cycle chain, single and double slider crank chains.
Straight Line Motion Mechanisms: Exact, approximate and intermediate types – Peaucellier, Hart and Scott Russell – Grasshopper – Watt -T.Chebicheff and Robert Mechanisms - Pantograph.

Unit-II

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

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

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

Unit-III

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

Unit-IV

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

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

Unit-V

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

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

Belt, Rope and Chain Drives: Introduction, Belt and rope drives, selection of belt drive- types of

belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

Teaching Methodology

White Board and Marker, PPTs, Models

Text Books

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

References Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MECHANICS OF SOLIDS

Course Code: GR14A2020 L:3 T:1 P:0 C:4

Prerequisites: Knowledge in Engineering Mechanics (statics)

Course Objectives: The objective of this course is to provide the student with

- To impart knowledge on the properties of materials.
- To introduce the strength and failure criteria of the materials.
- To impart the knowledge on calculating stresses in the materials subjected to external loads.
- To impart the knowledge on calculating deformations and strains in the materials subjected to external loads.
- To impart the knowledge on dealing with combined normal and shear loads.

Course Outcomes: At the end of the course, the student will be able to

- Recognize the importance of properties of materials for deciding the design criteria.
- Estimate the stresses and strains in structural members and machine elements subjected to external loads.
- Estimate the stresses and strains due to combined normal and shear loads.
- Sketch the shear force and bending moment diagrams for the beams carrying transverse loads.
- Ascertain physical behaviour of materials subjected to external loads.
- Recommend the materials and physical dimensions according to maximum stresses and strains.
- Interpret the results and design data.

Unit-I

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

Unit-II

Shear Force and Bending Moment Diagrams: Shear forces and bending moments of beams due to concentrated loads, uniformly distributed loads, uniformly varying loads and couples; Shear Force and Bending Moment diagrams for cantilevers, simply supported beams, and their

construction- Maximum bending moment & point of contra flexure. Relation between shear force, bending moment and load intensity.

Unit-III

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

Unit-IV

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

Unit-V

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

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

Teaching Methodology

Power point Presentations, Working models, white board & marker

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING THERMODYNAMICS

Course Code: GR14A2021 L:3 T:1 P:0 C:4

Prerequisites: Basic Knowledge in Physics, Differentiation, Integration, Fundamental units and dimensions.

Course Objectives: The objective of this course is to provide the student with

- Describe about thermodynamic systems and boundaries.
- study the basic laws of thermodynamics including conservations of mass and energy
- Explain various forms of energy.
- Identify various types of properties (e.g.extensive and intensive) for thermodynamics systems
- List tables ,equations and charts in evaluation of thermodynamic properties

Course Outcomes: At the end of the course, the student will be able to

- State and Apply basic laws of thermodynamics to various flow and non-flowProcesses.
- Calculate the change in Entropy, Heat transfer and Work done in Thermodynamic processes.
- Differentiate between various energy conversion devices like heat engine, heat pump and Refrigerator.
- Deduce the efficiencies of various Power cycles
- Obtain the various thermodynamic properties from steam tables and Psychrometric charts
- Asses the various Refrigeration cycles based on Coefficient Of Performance(C.O.P)
- Convert mass basis analysis to volume basis analysis in gas mixtures and vice versa.

Unit-I

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

Zeroth Law, First Law of Thermodynamics and Steady Flow Energy Equation:

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

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

Teaching Methodology

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MATERIAL SCIENCE AND METALLURGY

Course Code: GR14A2022 L:3 T:1 P:0 C:4

Prerequisites: Basic knowledge from Engineering Physics and chemistry

Course Objectives: The objective of this course is to provide the student with

- Introduce the students about the fundamental science and engineering principles relevant to materials.
- Have a firm understanding on various equilibrium diagrams.
- Expose the students with different types of ferrous/non ferrous metals.
- Provide knowledge on various heat treatment operations.
- Get familiarized with composite materials and its types.

Course Outcomes: At the end of the course, the student will be able to

- Relate crystal structures and relationship between different materials.
- Relate the equilibrium transformation diagrams for various metals.
- Utilize appropriate techniques in treating a metal with proper heat treatment operations.
- Have knowledge on different types of ferrous and nonferrous metals.
- Manufacture different products with composite materials.
- Recommend a suitable material with its properties for a specified application.
- Evaluate the behavior of material when it is subjected to heat treatment process.

Unit-I

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

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

Unit-II

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

Unit-III

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

Unit-IV

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

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

Unit-V

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

Composite materials: Classification of composites, various methods of manufacture of composites, particle–reinforced materials, fibre-reinforced materials, metalceramicmixtures, metal–matrix composites and Carbon–Carbon composites.

Teaching Methodology

Power point Presentations, Working models, white board & marker

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MACHINE DRAWING LAB

Course Code: GR14A2023 L:0 T:0 P:2 C:2

Prerequisites: Knowledge in Engineering Graphics.

Course Objectives: The objective of this course is to provide the student with

- Students can relate various part drawings and assembly drawings
- This subject can enhance imaginary skills, which in turn is useful in developing complex views of machine components.
- Explain the various symbols used in drawing.
- Illustrate the principles and requirements of production drawings.
- Justify Assemble and disassemble of various machine components

Course Outcomes: At the end of the course, the student will be able to

- Apply the knowledge of machine drawing as a system of Communication in which ideas are expressed clearly and all information fully conveyed.
- To design a system, component or process to meet desired needs within, realistic constraints such as manufacturability ,economic ,environmental, safety & sustainability etc.., to represent a part drawing and assembly drawings.
- To identify, formulates, analyzes and solves Engineering Problems in Optimum time.
- Recognize to use modern engineering tools, software and equipment to analyze different drawings for Design & manufacturing.
- To use the techniques, skills and modern engineering tools necessary for engineering practice with the concept of virtual work.
- Recognition of the need for, and an ability to engage in self education and life-long learning.

Unit-I

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

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

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

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

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

Teaching Methodology

Power point Presentations, Working models, white board & marker

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MATERIAL SCIENCE AND METALLURGY LAB

Course Code: GR14A2024 L:0 T:0 P:2 C:2

Course Objectives: The objective of this course is to provide the student with

- Provide knowledge on microstructure of different materials.
- Acquire skills on properties of materials at higher elevated temperatures.
- Refine grain size by various heat treatment processes.
- Impart the required material for products based on micro structure.
- Know the differences between ferrous and non ferrous metals with their properties.

Course Outcomes: At the end of the course, the student will be able to

- Relate properties to microstructure.
- Choose suitable metals and alloys for industrial applications.
- Find out the hardness of various treated and untreated metals.
- Tell the chemical composition of various ferrous and non ferrous metals.
- Select a suitable heat treatment process for a material.
- Evaluate the behavior of materials after it is heat treated.
- Create moulds from various materials and determining all mechanical properties.

List of Experiments

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

Teaching Methodology: Experimental Test rigs & Microscopes

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MECHANICS OF SOLIDS LAB

Course Code: GR14A2025 L:0 T:0 P:2 C:2

Prerequisites: Fundamentals of Mechanics of solids

Course Objectives: The objective of this course is to provide the student with

- To discuss the basic mechanical principles underlying modern approaches for design of various types of structural members.
- To study the behavior of material under various kinds of static loadings-Transverse loading, axial loading, Torsional and Bending loading.
- .In finding out the slope and deflection of various types of beams.
- In finding out the mechanical and material properties by experiments.
- To build the necessary theoretical background for further structural analysis.

Course Outcomes: At the end of the course, the student will be able to

- To conduct experiments, analyze and interpret experimental data to know the behavior of material.
- To evaluate the behavior of ferrous and non-ferrous metals subjecting to Transverse loading, axial loading, Torsional and Bending loading by means of experiments.
- .To determine the hardness and impact energy for different materials.
- To determine and to understand the compressive strength of concrete cubes and blocks.
- The students will be able to find and analyze the stiffness of open coiled springs.
- To determine the behavior of deflection of beams through deformation and to evaluate the modulus of elasticity of the given material.
- The students will be able to determine and analyze the torsional rigidity of different ferrous materials.

List of Experiments

1. To determine the resistance of a material to indentation using Brinnel's Hardness Test
2. To determine the resistance of a material to indentation using Rockwell's Hardness Test
3. To determine the resistance of a material to indentation using Vicker's Hardness Test
4. To determine the rigidity modulus of a spring using Compression Test
5. To determine the strength of material in tension using Tension Test
6. To determine the strength of material under compression using Compression Test
7. To determine the young's modulus of the given structural material using Cantilever Beam
8. To determine the young's modulus of the given structural material using Simply Supported Beam

9. To determine the young's modulus of the given structural material using Maxwell's Reciprocal Theorem
10. To determine the young's modulus of the given structural material using Continuous Beam
11. To determine the tensional strength and stiffness of a material using Torsion Test
12. To determine the ultimate shear strength of the given structural material using Direct Shear Test.

Teaching Methodology: Experimental Test rigs

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

VALUE EDUCATION AND ETHICS

Course Code: GR15A2002 L:2 T:0 P:0 C:0

Prerequisites: General awareness on Moral Science

Course Objectives: The objective of this course is to provide

- Define and classify values, ethics
- Explain about self analysis, importance of values
- Organise constructive thinking and team work to create mutual happiness and prosperity
- Elaborate on ethics and professional ethics using case studies.
- Importance of continuous learning, choosing right work and career.

Course Outcomes: At the end of the course, the student will be able to

- Choose the right value system by self analysis and right understanding
- Make use of positive thinking, dignity of labour for building harmony and peace in self, family and society
- Analysing the importance of personality on effective behavior
- Identify and solve ethical dilemmas by finding value based and sustainable solutions in professional life.
- Find sustainable technological solutions for saving environment
- Compile value and ethical systems for continuous happiness and prosperity
- Take part in effective team work bringing out win-win solutions for complex problems

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

GENDER SENSITIZATION

Course Code: GR15A2106 L:0 T:0 P:3 C:2

Course Objectives

- To develop students sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes: At the end of the course, the student will be able to

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I

UNDERSTANDING GENDER: Gender: Why should we study it? (Towards a world of Equals: Unit – 1) Socialization: Making women, making men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities. Just Relationships: Being Together and Equals (Towards a World of Equals: Unit – 12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Further Reading: Rosa Parks – The Brave Heart.

Unit-II

GENDER AND BIOLOGY: Missing Women: Sex Selection and its Consequences (Towards a World of Equals: Unit – 4) Declining Sex Ratio. Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit – 10) Two or Many? Struggles with Discrimination.Additional Reading: Our Bodies, Our Health (Towards a World of Equals: Unit – 13)

Unit-III

GENDER AND LABOUR: Housework: the Invisible Labour(Towards a World of Equals: Unit – 3) "My Mother doesn`t Work". "Share the Load". Women`s Work: Its Politics and Economics (Towards a World of Equals: Unit – 7) Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

Unit-IV

ISSUES OF VIOLENCE: Sexual Harassment: Say No! (Towards a World of Equals: Unit – 6) Sexual Harassment, not Eve – teasing – Coping with Everyday Harassment – Further Reading: "Chupulu" Domestic Violence: Speaking Out (Towards a World of Equals: Unit – 8) Is Home a Safe Place? – When Women Unite [Film]. Rebuilding Lives. Further Reading. New Forums for justice. Thinking about Sexual Violence (Towards a World of Equals: Unit – 11) Blaming the Victim – "! Fought for my Life ……" – Further Reading. The Caste Face of Violence.

Unit-V

GENDER STUDIES: Knowledge: Through the Lens of Gender (Towards a World of Equals: Unit – 5) Point of View. Gender and the Structure of Knowledge. Further Reading. Unacknowledged Women Artists of Telangana.Whose History? Questions for Historians and Others (Towards a World of Equals: Unit – 9) Reclaiming a Past. Writing other Histories. Fur**,** her Reading. Missing Pages from Telangana History.

Text Books

1. Towards a World of Equals: A Bilingual Textbook on Gender" Telugu Akademi, Hyderabad Written by A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu.

Reference Books

1. Sen, Amartya. "More than Once Million Women are Missing". New York Review of Books 37.20 (20 December 1990). Print. `We Were Making History……' Life Stories of Women in the Telangana People`s Struggle. New Delhi : Kali for Women, 1989.
2. TriptiLahiri. "By the Numbers: Where India Women Work." Women`s Studies Journal (14 November 2012) Available online at: http://blogs. Wsj.com/India real time/2012/11/14/by – the –numbers – where- Indian- women-works
3. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada http://harpercollints.co.in/BookDetail.asp?Book Code=3732

4. Vimala “Vantilu (The Kitchen)”. Omen Writing in India: 600BC to the Present, Volume II The 20th Century. Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 599-601.
5. Shatrughna, Veena et al. Women`s Work and its Impact on Child Health and Nutrition, Hyderabad, National Institute of Nutrition, India Council of Medcial Research 1993. B.Tech (ANE) R-15 Malla Reddy College of Engineering and Technology (MRCET) 113
6. Stress Shakti Sanghatana. “We Were Making History….’Life Stories of Women in the Telangana People`s Struggle. New Delhi:Kali of Women, 1989.
7. Menon, Nivedita. Seeing Like a Feminist. New Delhi. Zubaan-Penguin Books, 2012.
8. Jayaprabha, A. “Chupulu (Stares)”. Women Writing in India: 600BC to the Present. Volume II: The 20th Century Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 596-597.
9. Javeed, Shayam and AnupamManuhaar. “Women and Wage Discrimination in India: A Critical Analysis”. International Journal of Humanilities and Social Science Invention 2, 4(2013).
10. Gautam, Liela and Gita Ramaswamy. “A ‘Conversation’ between a Daughter and Mother”. Broadsheel on Contemporany Politics. Special Issue on Sexuality and Harassment: Gender Politics on Campus Today. Ed.Madhumeeta Sinha and Asma Rasheed. Hydrabad: Anveshi research Center for Women`s Studies, 2014.
11. Abdulali Sohaila. “ I Fought For My Life…and Won.” Available online at: http://www.thealternative. In/lifestyle/i-fought-for-my lifeand-won-sohaila-abdulal/
12. Jeganathan Pradeep, Partha Chatterjee (Ed). “Community, Gender and Violence Subaltern Studies XI”. Permanent Block and Ravi Dayal Publishers, New Delhi, 2000
13. K. Kapadia. The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India. London: Zed Books, 2002.
14. S. Benhabib. Situating the self: Gender, Community, and Postmodernism in Contemporary Ethics, London: Routledge, 1992.
15. Virginia Woolf A Room of One`s Oxford: Black Swan. 1992.
16. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a Human Face

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL AND ELECTRONICS TECHNOLOGY

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

Course Objectives

- To demonstrate how circuits are designed.
- To provide clear explanation of DC & AC machines.
- To explain the operation of Transformer and its EMF equation and its Loses.
- To provide clear explanation of working principles of electronic devices.
- To explain the operation of BJT.
- To provide clear explanation of Rectifiers.
- To show how each device is used in appropriate circuits.

Course Outcomes

- Ability to compare the performance of devices in various applications.
- Ability to know the working principles of DC & AC machines.
- Ability to know the operation of Transformer.
- Ability to get knowledge on Semiconductor Devices.
- Ability to know different types of Rectifiers.
- Ability to get knowledge on Filters and Diodes.
- Ability to analyze the working operation of each device in a circuit

Unit-I

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

Unit-II

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

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

Unit-III

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

Unit-IV

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

Unit-V

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

Teaching Methodologies

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRODUCTION TECHNOLOGY

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

Prerequisites: Basic knowledge in engineering workshop practices

Course Objectives: The objective of this course is to provide the student with

- Inculcate the principle, thermal and metallurgical aspects during solidification of metal and alloys.
- Impart knowledge about principles/methods of casting with detail design of gating/riser system needed for casting
- Impart knowledge about defects in cast objects and requirements for achieving sound casting.
- Impart knowledge about process during welding and weldability aspects of different common engineering materials.
- Introduction to various plastic parts manufacturing methods used.

Course Outcomes: At the end of the course, the student will be able to

- Interpret contemporary developments in the field of manufacturing processes
- Impart knowledge on role and value of production and identify basic production processes.
- Introduction to methods of joining that shows a comprehensive understanding of tools, materials, equipment, and processes.
- Demonstrate awareness of the competition that surrounds the development of inventions and the control of welding processes
- Apply critical thinking skills for development and evaluating ideas for manufacturing processes.
- Identify and use the materials, tools, machines, and techniques used in various forming processes.
- Demonstrate various ways of producing plastic products and its equipment details.

Unit-I

Metal Casting Processes: Sand casting – Sand moulds - Type of patterns – Pattern materials – Pattern allowances – Types of Moulding sand – Properties – Core making – Methods of Sand testing – Moulding machines – Types of moulding machines - Melting furnaces –Special casting processes – Shell, investment casting – Ceramic mould – Lost Wax process – Pressure die casting – Centrifugal casting – CO_2 process– Sand Casting defects – Inspection methods

Unit-II

Joining Processes Fusion welding processes – Types of Gas welding – Equipments used – Flame characteristics – Filler and Flux materials - Arc welding equipments - Electrodes –Coating and

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

Unit-III

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

Unit-IV

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

Unit-V

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

Teaching Methodology

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

FLUID MECHANICS AND HYDRAULIC MACHINERY

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

Prerequisites: Engineering Mathematics, Fundamentals of Thermodynamics

Course Objectives: The objective of this course is to provide the student with

- Evaluate control volume analysis to develop basic equations and to solve problems.
- Describe and use differential equations to determine pressure and velocity variations in internal and external flows.
- Examine the concept of viscosity and where viscosity is important in real flows.
- Analyze the equations in combination with experimental data to determine losses in flow systems.
- Compare dimensional analysis to design physical or numerical experiments and to apply dynamic similarity.

Course Outcomes: At the end of the course, the student will be able to

- Apply knowledge of mathematics, science and engineering.
- Use the governing equations of fluid flow and applying them to simple flow problems.
- Explain the mathematical formulation of various flow problems.
- Analyze the boundary layer concept to the fluid flow problems.
- Apply the concept of fluid and models of fluids for flow problems.
- Explain the stream function and potential function to fluid flow problems.
- Apply the basic principles to derive the equation for viscous flow, including laminar flow & turbulent flow.

Unit-1

Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapour pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.
Fluid Kinematics: Stream line, path line and streak lines and stream tube, classification of flows- steady & unsteady, uniform, non uniform, laminar, turbulent, rotational and irrotational flows- equation of continuity for three dimensional flows.

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

Hydraulic Turbines: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube theory- functions and efficiency. Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

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

Teaching Methodology

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

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

INTERNAL COMBUSTION ENGINES

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

Prerequisites: Basic knowledge of Thermodynamics, Basic power cycles and Basic knowledge of fluid mechanics.

Course Objectives: The objective of this course is to provide the student with

- Understanding the concept of working principles of various components involved in internal combustion engines.
- Improving the analytical skills in finding the engineering solutions and redesign the system to improve the performance of IC engines by modifying the variable valve timings to improve fuel economy and control of emissions in global, environmental and social contexts.
- Understanding the components and working principles of rotary and reciprocating compressors.
- Become familiar with applications of different types of compressors.
- Evaluating the factors which influence the performance of the compressors in steam power plants, gas turbines and jet propulsions etc. for better engineering practice.

Course Outcomes: At the end of the course, the student will be able to

- Describe and assess benefits of improvements to thermodynamic systems
- Describe and apply basic thermodynamic principles and laws of physics to analysing and predicting performance of idealised forms of thermodynamic systems
- To improve the analytical skills in finding the engineering solutions and redesign the system to improve the fuel efficiency of the engine in global, environmental and social contexts.
- To adopt the resources available at optimum level in order to achieve the better efficiency in the performance of different types of Air compressors duly reducing the operational losses.
- To develop an idea of utilization of resources duly reducing the emission levels for achieving echo-friendly environment.
- To have knowledge to redesign the different components of air compressors depending upon the type of applications for global economic and environmental context within realistic constraints like health, safety and sustainability.
- To impart the knowledge of many different aspects of engineering, including mechanical engineering, combustion, electrical and electronic systems and fuel technology.
- Relate idealised thermodynamic system models to corresponding real systems

Unit-I

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

Unit-II

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

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

Unit-III

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

Unit-IV

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

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

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

Unit-V

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

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

Teaching Methodology

Power point Presentations, Working models, white board & marker

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED MECHANICS OF SOLIDS

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

Prerequisites: Basic mechanics of solids, Engineering Mechanics

Course Objectives: The objective of this course is to provide the student with

- calculate the support reactions and reacting moments in fixed and continuous beams
- analyse various columns and struts according to their crushing strength
- compute the stresses due to bending in curved beams and stresses in rotating elements
- construct shear force and bending moment diagrams for fixed and continuous beams
- choose suitable cylindrical shells subjected to internal fluid pressure

Course Outcomes: At the end of the course, the student will be able to

- Calculate the stresses in non -uniform structural beams
- Estimate the safe pressure that can be carried by thin and thick pressure shells pressure vessels
- Select suitable column or a struts for particular application
- Compute the stresses in indeterminate structural members
- Distinguish bucking stresses from axial compressive stresses
- interpret and identify suitable material for corresponding stresses
- Anlayze structures and calculate the stresses under combined loading.

Unit-I

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

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

Unit-II

Fixed Beams: Fixing moments and Reactions for a fixed beam of uniform section, Effect of sinking support, slope and deflection. Construction of shear force and bending moment diagrams.

Unit-III

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

Unit-IV

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

Unit-V

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

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

Teaching Methodology

Power point Presentations, Working models, white board & marker

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRODUCTION TECHNOLOGY LAB

Course Code: GR14A2031 L:0 T:0 P:2 C:2

Prerequisites: Fundamentals of Production of Technology

Course Objectives: The objective of this course is to provide the student with

- Impart knowledge on various production processes in manufacturing a product.
- Expose the students with various welding processes.
- Provide knowledge and practical experience on various plastic molding machines.
- Acquire skills on pattern preparation & casting process.
- Provide practical exposure with various sheet metal operations.

Course Outcomes: At the end of the course, the student will be able to

- Produce quality of products from casting process.
- Execute a layout of shop floor for different applications.
- Apply creativity in making various products using sheet metal operations.
- Find, analyze and solve technical problem when manufacturing a component.
- Prepare products from various plastic molding processes.
- Work with all machineries and prepare errorless products.
- Recognize the importance of safety devices and equipments to be weared before doing an operation.

List of Experiments

I. CASTING

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

II. WELDING

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

III. MECHANICAL PRESS WORKING

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

IV. PROCESSING OF PLASTICS

1. Injection Moulding
2. Blow Moulding

Teaching Methodology

Welding Equipment, Plastic Moulding Equipment, Casting Equipment

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL TECHNOLOGY LAB

Course Code: GR14A2032 L:0 T:0 P:2 C:2

Course Objectives

- To prepare the students to have knowledge of Theorems.
- To prepare the students to have knowledge of Transformers.
- To prepare the students to have knowledge of Induction Motors.
- To prepare the students to have knowledge of DC motor.
- To prepare the students to have knowledge of Alternator.

Course Outcomes

- Ability to understand the concept of Kirchoff's Law.
- Ability to understand the concept of theorems.
- Able to conduct open and short circuit test on transformers.
- Ability to conduct experiment on Alternator to find the characteristics.
- Ability to conduct experiment on Induction motor.
- Ability to perform test on DC motors.
- Ability to find the magnetization characteristics of D.C. Shunt generator

Contents

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

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Code: GR14A2033 L:0 T:0 P:2 C:2

Prerequisites: Fundamentals of Fluid Mechanics and Hydraulic Machinery

Course Objectives: The objective of this course is to provide the student with

- Provide practical skill in verification of principles of fluid flow
- Impart knowledge in measuring pressure ,discharge and velocity of fluid
- Differentiate the major and minor head losses in pipes
- Gain knowledge about the performance testing of turbines and pumps.
- Calculate the head loss in a Hydraulic Machine.

Course Outcomes: At the end of the course, the student will be able to

- Asses the friction factor using major and minor losses in pipes
- Examine the coefficient of discharge of venturimeter and orifice meter
- Prove the Bernoulli's equation.
- Recommend the type of pump for a particular application
- Calculate the efficiencies of various turbines
- Determine the coefficient of impact of various jets using various vanes
- Determine the overall efficiencies of various pumps

List of Experiments

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

11. Determine the overall efficiency of Reciprocating pump at Constant Speed and Constant Head
12. Determine the Turbine Speed and Flow rate by using Turbine Flow meter

Teaching Methodology

Experimental Test Rigs, Turbines and Pumps

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENVIRONMENTAL SCIENCE

Course Code: GR15A2001 L:2 T:0 P:0 C:0

Prerequisites: Basic knowledge on basic sciences and natural resources

Course Objectives

- To understand about the importance and scope of Environment.
- To identify, analyze and solve the problems in Environment.
- To participate in team oriented activities aiding constructive thinking and recognize the value of continuing education.

Course Outcomes: At the end of the course, the Student will be able to

- Importance of environment, its purpose, design and perspectives
- Environmental issues related to the exploitation of natural resources and development of the mankind
- Role of professionals in protecting the environment from degradation
- The solutions for environmental problems created by local, national and global developmental activities.
- Critically evaluate literature on environmental problems;
- Develop relevant research questions for environmental investigation
- Use methods and tools of environmental research, including statistical analysis, GIS, and other techniques;

Unit-I

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

Unit–II

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

Unit-III

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

Unit-IV

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

Unit-V

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

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

Teaching Methodology

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

Text Books

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

Reference Books

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