Academic Regulations

Programme Structure

&

Detailed Syllabus

Bachelor of Technology

(B. Tech)

(Four Year Regular Programme)
(Applicable for Batches admitted from 2017-18)

Department of Mechanical Engineering

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND

TECHNOLOGY Bachupally, Kukatpally, Hyderabad,

Telangana, India 500 090

Academic Regulations

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD
DEPARTMENT OF MECHANICAL ENGINEERING (B. Tech)
GR17 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology 2017 Regulations (GR17 Regulations) are given hereunder. These regulations govern the programmes offered by the Department of Mechanical Engineering with effect from the students admitted to the programmes in 2017-18 academic year.

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

2. **Medium of Instruction:** The medium of instruction (including examinations and reports) is English.
3. **Admissions:** Admission to the B. Tech in Mechanical Engineering Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the State Government/University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in the common entrance examination conducted by the Government/University or on the basis of any other order of merit approved by the Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. **Programme Pattern:**
   a) Each Academic year of study is divided into two semesters.
   b) Minimum number of instruction days in each semester is 90.
   c) **Student is introduced to "Choice Based Credit System (CBCS)"**
   d) 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).
   e) The total credits for the Programme is 192. Typically each semester has 24 credits.
   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 20 and 28.
   g) **All the registered credits will be considered for the calculation of final CGPA.**
   h) Each semester has - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE are followed.

i) **Subject / Course Classification** All subjects/ courses offered for the under graduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes mathematics, physics and chemistry subjects
2		ES - Engineering Sciences	Includes fundamental Engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to humanities, social sciences and management
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses (EℓC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6		OE – Open Electives	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
7	Core Courses	Project Work	B.Tech. project or UG project or UG major project
8		Industrial training/ Mini- project	Industrial training/ Internship/ UG Mini-project/ Mini-project
9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Minor courses	-	1 or 2 Credit courses (subset of HS)
11	Mandatory Courses (MC)	-	Mandatory courses 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) 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 192 credits and secure all credits.
   c) A student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the date of admission, shall forfeit his/her

seat in B. Tech course.

d) The Degree of B. Tech in Mechanical Engineering shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, for 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 for 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 Oriented Mini Project	25	50	75
5	Comprehensive Viva	-	100	100
6	Seminar	50	-	50
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 a duration of 2 hours. Average of the two mid exams shall be considered **i) Subjective - 15 marks** **ii) Objective - 5 marks** **2) Tutorials/Assignments - 5 marks** **3) Continuous Assessment – 5 marks**
		70	Semester-end examination	The semester-end examination is for a duration of 3 hours
2	Practical	25	Internal Exams & Continuous Evaluation	**i) Internal Exam-10 marks** **ii) Record - 5 marks** **iii) Continuous Assessment - 10 marks**
		50	Semester-end examination	The semester-end examination is for a duration of 3 hours

e) **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 (Continuous Assessment – 10 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 **50 marks.**

g) Major Project: The project work is evaluated for 200 marks. Out of 200, 50 marks shall be for internal evaluation and 150 marks for the external evaluation. The supervisor assesses the student for 25 marks (Continuous Assessment – 15 marks, Report – 10 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.
- Continuous Assessment - 5 marks.

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for re-counting of his/her answer book on payment of a prescribed fee.
9. **Re-evaluation of the End Examination Answer Books:** A student can request for re-evaluation of his/her answer book on payment of a prescribed fee.
10. **Supplementary Examinations:** A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the College.
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 and Promotion Rules:

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.

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	Regular course of study of first year second semester. (ii) Must have secured at least 24 credits out of 48 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	Regular course of study of second year second semester. (ii) Must have secured at least 58 credits out of 96 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 86 credits out of 144 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

13. 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 >= 90
A+ (Excellent)	9	Marks >= 80 and Marks < 90
A (Very Good)	8	Marks >= 70 and Marks < 80
B+ (Good)	7	Marks >= 60 and Marks < 70
B (Average)	6	Marks >= 50 and Marks < 60
C (Pass)	5	Marks >= 40 and Marks < 50
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-C. 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 credits of all courses registered by a student, i.e.,

$$SGPA\ (S_k) = \sum (C_i \cdot G_i) / \sum C_i$$

Where C_i is the number of credits of the i^{th} 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 student over all the semesters of a programme, i.e., upto and inclusive of S_k, where $k \geq 2$.

$$CGPA = \sum (C_i \cdot G_i) / \sum C_i$$

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

14. 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 based on CGPA secured from the 192 credits.

	Class Awarded	CGPA Secured
14.1	First Class With Distinction	CGPA 8.00 with no F or below grade/ detention anytime during the programme
14.2	First Class	CGPA 8.00 with rest of the clauses of 14.1 not satisfied
14.3	First Class	CGPA ≥ 6.50 and CGPA < 8.00
14.4	Second Class	CGPA ≥ 5.50 and CGPA < 6.50

14.5	**Pass Class**	**CGPA ≥ 5.00 and CGPA < 5.50**

15. **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.

16. **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.

17. **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.

18. **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 GR17

(Applicable for Batches Admitted from 2018-19)

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) A student should register for all 144 credits and secure all credits. The marks obtained in all 144 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 and Promotion Rules:**

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.

S. No.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester.	Regular course of study of second year first semester.
2	Second year second semester to third year first semester.	(i) Regular course of study of second year second semester. (ii) Must have secured at least 29 credits out of 48 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester.	Regular course of study of third year first semester.
4	Third year second semester to	(i) Regular course of study of third year

	fourth year first semester.	**second semester.** **(ii) Must have secured at least 58 credits out of 96 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.**
5	**Fourth year first semester to fourth year second semester.**	**Regular course of study of fourth year first semester.**

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 based on CGPA secured from the 144 credits.

	Class Awarded	**CGPA Secured**
3.1	**First Class With Distinction**	**CGPA 8.00 with no F or below grade/ detention anytime during the programme**
3.2	**First Class**	**CGPA 8.00 with rest of the clauses of 3.1 not satisfied**
3.3	**First Class**	**CGPA ≥ 6.50 and CGPA < 8.00**
3.4	**Second Class**	**CGPA ≥ 5.50 and CGPA < 6.50**
3.5	**Pass Class**	**CGPA ≥ 5.00 and CGPA < 5.50**

I BTECH I SEMESTER

Group	Subject code	Name of subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
BS	GR17A1001	Linear Algebra and Single Variable Calculus	2	1		3	4	100
BS	GR17A1002	Advanced Calculus	2	1		3	4	100
BS	GR17A1008	Engineering Chemistry	2	1		3	4	100
ES	GR17A1023	Engineering Graphics	1		2	3	5	100
ES	GR17A1018	Basic Electrical Engineering	2	1		3	4	100
ES	GR17A1012	Engineering Mechanics (Statics)	2	1		3	4	100
HS	GR17A1024	Business Communication and Soft Skills			2	2	4	75
ES	GR17A1026	IT Workshop			2	2	4	75
BS	GR17A1030	Engineering Chemistry lab			2	2	4	75
		TOTAL	**11**	**5**	**8**	**24**	**37**	**825**

I BTECH II SEMESTER

Group	Subject code	Name of subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
BS	GR17A1003	Transform Calculus and Fourier Series	2	1		3	4	100
BS	GR17A1004	Numerical Methods	2	1		3	4	100
BS	GR17A1007	Physics for Engineers	2	1		3	4	100
HS	GR17A1005	English	2	1		3	4	100
ES	GR17A1011	Computer Programming & Data structures	2	1		3	4	100
ES	GR17A1020	Engineering Mechanics (Dynamics)	2	1		3	4	100
ES	GR17A1025	Engineering Workshop			2	2	4	75
BS	GR17A1029	Engineering Physics lab			2	2	4	75
ES	GR17A1028	Computer Programming & Data Structures lab			2	2	4	75
		Total	**12**	**6**	**6**	**24**	**36**	**825**

II B Tech I Semester

Category	Subject code	Name of the subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
BS	GR17A2011	Probability and Statistics	2	1		3	4	100
PC	GR17A2019	Kinematics of Machinery	3	1		4	5	100
PC	GR17A2020	Mechanics of Solids	2	1		3	4	100
PC	GR17A2021	Engineering Thermodynamics	**3**	**1**		**4**	**5**	**100**
PC	GR17A2022	Material Science and Metallurgy	3	1		4	5	100
PC	GR17A2023	Machine Drawing Lab			**2**	**2**	**4**	**75**
PC	GR17A2024	Material Science and Metallurgy			2	2	4	75
PC	GR17A2025	Mechanics of Solids Lab			2	2	4	75
		TOTAL	13	5	6	**4**	**35**	**825**
MC	GR17A2002	Value Education and Ethics	2			2	4	100

II B Tech II Semester

Category	Subject code	Name of the subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
PC	GR17A2026	Electrical and Electronics Technology	2	1		3	4	100
PC	GR17A2027	Production Technology	3	1		4	5	100
PC	GR17A2028	Fluid Mechanics and Hydraulic	3	1		4	5	100
PC	GR17A2029	Internal Combustion Engines	**2**	**1**		**3**	**4**	**100**
PC	GR17A2030	Advanced Mechanics of Solids	3	1		4	5	100
PC	GR17A2031	Production Technology Lab			2	2	4	75
PC	GR17A2032	Electrical and Electronics Technology			2	2	4	75
PC	GR17A2033	Fluid Mechanics and Hydraulic			2	2	4	75
		TOTAL	13	5	6	**24**	**35**	**900**
MC	GR17A2001	Environmental Science	2			2	4	100
MC	GR17A2106	Gender Sensitization Lab			2	2	4	75

III BTECH **I SEMESTER**

Group	Sub-Code	Name of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
ES	GR17A2104	Managerial Economics and Financial Analysis	2	1		3	4	100
ES	GR17A3026	Machine Design	3	1		4	5	100
ES	GR17A3029	Machine Tools	3	1		4	5	100
Open Elective 1			**2**	**1**		**3**	**4**	**100**
Professional Elective 1			**3**	**1**		**4**	**5**	**100**
PE	GR17A3028	Dynamics of machinery						
PE	GR17A3038	Power Plant Engineering						
PE	GR17A3037	Mechatronics						
HS	GR17A3100	Advanced English communication Lab			2	2	4	75
ES	GR17A3030	Thermal Engineering Lab			2	2	4	75
ES	GR17A3031	Machine Tools Lab			2	2	4	75
Total			**13**	**5**	**6**	**24**	**35**	**725**

III BTECH **II SEMESTER**

Group	Sub-Code	Name of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
ES	GR17A3032	Design of Machine Members	2	1		3	4	100
ES	GR17A3033	Heat Transfer	3	1		4	5	100
ES	GR17A3035	Industrial Management	3	1		4	5	100
Open Elective 2			**2**	**1**		**3**	**4**	**100**
Professional Elective 2			**3**	**1**		**4**	**5**	**100**
PE	GR17A3034	Metrology and Surface Engineering						
PE	GR17A4043	Robotics						
PE	GR17A4042	Flexible Manufacturing Systems						
ES	GR17A3101	Industry Oriented Mini Project			2	2	4	75
ES	GR17A3039	Heat Transfer Lab			2	2	4	75
ES	GR17A3040	Metrology Lab			2	2	4	75
Total			**13**	**5**	**6**	**24**	**35**	**725**

IV BTECH **I SEMESTER**

Group	Sub-Code	Name of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
ES	GR17A4039	Basic Finite Element Methods	2	1		3	4	100
ES	GR17A4040	CAD/CAM	3	1		4	5	100
ES	GR17A4044	Instrumentation and control systems	3	1		4	5	100
Open Elective 3			**2**	**1**		**3**	**4**	**100**
Professional Elective 3			**3**	**1**		**4**	**5**	**100**
ES	GR17A4055	Mechanical Vibrations						
ES	GR17A4046	Renewable Sources of Energy						
ES	GR17A4047	Computational Fluid Dynamics						
ES	GR17A4048	CAD Lab			2	2	4	75
ES	GR17A4049	Instrumentation and Control Systems Lab			2	2	4	75
ES	GR17A4050	Production Drawing Practice			2	2	4	75
Total			**13**	**5**	**6**	**24**	**35**	**725**

IV BTECH **II SEMESTER**

Group	Sub-Code	Name Of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
ES	GR17A4051	Refrigeration and Air Conditioning	2	1		3	4	100
Professional Elective 4			**3**	**1**		**4**	**5**	**100**
ES	GR17A4052	Production Planning and Control						
ES	GR17A4053	Plant Layout and Material Handling						
ES	GR17A4054	Tribology						
Professional Elective 5			**2**	**1**		**3**	**4**	**100**
ES	GR17A4045	Un-conventional Machining Processes						
ES	GR17A4056	Nuclear Power Plant Engineering						
ES	GR17A4057	Optimization Techniques						
ES	GR17A4058	CAM and Simulation Lab			2	2	4	75
SPW	GR17A4142	Comprehensive Viva			1	1	2	50
SPW	GR17A4143	Seminar			1	1	2	100
SPW	GR17A4144	Major Project			10	10	14	200
Total			7	3	**14**	**24**	**35**	**725**

Open Elective 1		Course Title	Department Offering
OE - I	GR17A3151	Water Resources Engineering	CE
	GR17A3152	Solar & Wind Energy Systems	EEE
	GR17A3153	Applied Thermodynamics	ME
	GR17A3154	Principles of E- Commerce	CSE
	GR17A3155	Data mining and Applications	IT
	GR17A3156	Computer Architecture and Organization	ECE
Open Elective 2		**Course Title**	**Department Offering**
OE - II	GR17A3161	Transportation Engineering	CE
	GR17A3162	Sensors & Transducers	EEE
	GR17A3163	Automobile Engineering	ME
	GR17A3164	Human Computer Interaction	CSE
	GR17A3165	Essentials of Big Data Analytics	IT
	GR17A3166	Principles of Operating Systems	ECE
Open Elective 3		**Course Title**	**Department Offering**
OE - III	GR17A4161	Green Building Technology	CE
	GR17A4162	Soft Computing Techniques	EEE
	GR17A4163	Operations Research	ME
	GR17A4164	Mobile Computing and Applications	CSE
	GR17A4165	Business Intelligence	IT
	GR17A4166	Principles Of Satellite Communications	ECE

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Managerial Economics and Financial Analysis

Course Code: GR17A2104	**LTPC**
III B. Tech I Semester	**2 1 03**

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit IV

Introduction to Financial Accounting & Financial Analysis: Accounting Concepts and Conventions - Double-Entry Book Keeping. **Accounting Cycle:** Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). **Financial Analysis:** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital structure Ratios and Profitability ratios. Du Pont Chart.

TEXT BOOKS

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

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MACHINE DESIGN

Course Code: GR17A3026	**L T P C**
III B. Tech I Semester	**3 104**

UNIT I

INTRODUCTION: General considerations in design, Engineering Materials and their properties –Selection of Materials –Manufacturing consideration in design. Tolerances and fits-preferred numbers.

Stresses in Machine Members: Simple stresses – Combined stresses -factor of safety- Principal stresses– Various theories of failure.

UNIT II

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

UNIT III

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

UNIT IV

Keys, Cotters and Knuckle Joints:

Design of Keys-stresses in keys- Cotter joints: Spigot and Socket, Sleeve and Cotter joint, Gib and Cotter joint-Knuckle joint.

UNIT V

Shafts: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined axial, bending and torsional loads – Shaft sizes – BIS codes.

Shaft Couplings: Rigid couplings– Muff, Split Muff and Flange couplings. Flexible couplings-Bushed pin type coupling–Universal coupling-Oldham's coupling.

TEXT BOOKS:

1. Design of Machine Elements Design, V. B. Bandari -TMH Publishers
2. Machine Design – R.S.Khrumi& J K Gupta
3. Machine Design – Pandya and Shah.

1. Machine Design / Schaum Series.
2. Machine Design by Shigley, MH Publishers

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MACHINE TOOLS

Course Code: GR17A3029	**L T P C**
III B. Tech I Semester	**3 1 0 4**

UNIT I

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

UNIT II

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

UNIT III

Shaping, slotting and planning machines – Principles of working – Principal parts – specification classification, operations performed. Kinematic scheme of the shaping slotting and planning machines- machining time calculations.

Drilling and Boring Machines – Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines – Jig Boring machine - Deep hole drilling machine.

UNIT IV

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

UNIT V

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

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

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

Typical examples of jigs and fixtures.

TEXT BOOKS:

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

REFERENCES:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DYNAMICS OF MACHINERY
(Professional Elective-I)

Course Code: GR17A3028 **L T P C**
III B. Tech I Semester **3 1 0 4**

Unit I

Gyroscopes: : Introduction, Precessional angular motion, Gyroscopic couple, effect of gyroscopic couple on an aeroplane, effect of gyroscopic couple on a naval ship during steering, gyroscopic couple on a naval ship during pitching, Gyroscopic couple on a naval ship during rolling, stability of a four wheel drive moving in a curved path, stability of a two wheel vehicle taking a turn.

Unit II

Static Force Analysis: Introduction, Static Equilibrium, Equilibrium of Two-force and Three-force members, Member with Two force

Dynamic force Analysis: Introduction, D'Alemberts principle, Equivalent Offset inertia force, Dynamic analysis of Four bar and Single slider mechanisms, Piston effort, Turning moment on crank shaft, Inertia of connecting rod, Inertia forces in reciprocating Engines.

Unit III

Governors: Introduction, types of governors, Watt governor, Porter governor, Proell governor, Hartnell governor, Wilson-Hartnell governor, Spring controlled gravity governor, Inertia governors, Sensitiveness of governor, Hunting, Isochronism, Stability, effort of governor, Power of governor, Controlling force.

Brakes and Dynamometers: Types of brakes: Simple block brake, band and block brake-internal expanding shoe brake-effect of braking of a vehicle. Dynamometers – absorption and transmission types. General description and methods of operation.

Unit IV

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

UNIT V

Vibrations: Free Vibration of mass attached to vertical spring – Transverse loads – vibrations of beams with concentrated and distributed loads. Dunkerly's method – Raleigh's method. Whirling of shafts – critical speed – torsional vibrations – one, two and three rotor systems.

TEXT BOOKS

1. Theory of Machines / S.S Ratan/ Mc. GrawHill Publ.
2. Theoryofmachines/Khurmi/S.Chand.

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
POWER PLANT ENGINEERING
(Professional Elective-I)

Course Code: GR17A3038	**LTPC**
III B. Tech I Semester	**3 1 04**

UNIT I

Introduction To The Sources Of Energy – Resources and Development of Power in India.
Steam Power Plant: Plant Layout, Working of different Circuits, Fuel and handling equipments. Types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems.
Combustion Process: Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

UNIT II

Internal Combustion Engine Plant: Diesel Power Plant: Introduction – IC Engines, types, construction– Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system – super charging.

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

UNIT III

Hydro Electric Power Plant: Water power – Hydrological cycle / flow measurement – drainage area characteristics – Hydrographs – storage and Pondage – classification of dams and spill ways.

Hydro Projects and Plant: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

Nuclear Power Station: Nuclear fuel- Types of reactions- fertile and breeding materials – Nuclear reactor, reactor operation.

Reactors: Essential components of Nuclear reactor, Types of reactors- Pressurized water reactor, boiling water reactor, sodium-graphite reactor, fast Breeder Reactor, Homogeneous Reactor, Gas cooled Reactor. Effects of Nuclear Radiation- Radioactive waste disposal system.

UNIT IV

Power From Non-Conventional Sources: Utilization of Solar Collectors- Principle of Working.

Wind Energy – types – HAWT, VAWT -Tidal Energy: Types of tidal power plants.

Direct Energy Conversion: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT V

Power Plant Economics: Definition of Connected load, Demand, Maximum demand, Demand factor, Load factor, Diversity factor, Utilization factor, Plant capacity factor, Plant use factor. Loads, load curves, load duration curve. Principles of power plant design. Cost analysis-Capital cost, operating costs, etc., Related exercises.

Environmental Considerations: Effluents from Thermal and Nuclear power plants. Impact on environment- pollutants and pollution standards – Methods of Pollution control.

TEXT BOOKS:

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

REFERENCES:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MECHATRONICS
(Professional Elective-I)

Course Code: GR17A3037 **LTPC**
III B. Tech I Semester **3 1 04**

Unit I

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

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

Unit II

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

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

Unit III

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

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

Unit IV

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

Unit V

Programmable motion controllers : Introduction - System Transfer Function – Laplace

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

TEXT BOOKS:

1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.

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

REFERENCES:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Thermal Engineering Lab

Course Code: GR17A3030 **LTPC**

III B. Tech I Semester **0 02 2**

Task 1	Disassembly/Assembly of 4 stroke single cylinder diesel and petrol engine
Task 2	Valve timing diagram for 4 stroke single cylinder diesel and petrol engine
Task 3	Performance test on 4 stroke single cylinder diesel engine with Electrical loading
Task 4	Performance test on 4 stroke single cylinder diesel engine with Mechanical loading
Task 5	Heat balance test on 4 stroke single cylinder diesel engine with Electrical loading
Task 6	Heat balance test on 4 stroke single cylinder diesel engine with Mechanical loading
Task 7	Performance test on 4 stroke single cylinder Petrol engine with Electrical loading
Task 8	Performance test on 4 stroke multi cylinder Petrol engine with eddy dynamometer loading
Task 9	Performance on two stage reciprocating compressor
Task 10	Study of Babcock and Wilcox boiler
Task 11	Performance test on variable compression ratio single cylinder 4 stroke petrol engine with Electrical loading.
Task 12	Find out COP of a given refrigeration test rig

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MACHINE TOOLS LAB

Course Code: GR17A3031 **LTPC**
III B. Tech I Semester **00 22**

Task 1. Preparation of Work specimen for lathe, drilling, shaping, slotting and milling

Task 2. Plane &Step Turning operation on lathe Machine

Task 3. Taper Turning on Lathe Machine

Task 4. Thread cutting operation on-lathe machine.

Task 5. Knurling operation on-lathe machine.

Task 6. Drilling operation and boring operation on lathe machine

Task 7. Drilling and counter boring operation on lathe machine

Task 8. Drilling and internal thread cutting using Tapping

Task 9. Edge preparation using Shaping m a chi ne

Task 10. Key way cutting operation in Slotting machine

Task 11. Face milling operation using Milling machine

Task 12. Grinding of tool angles using Cylindrical /Surface Grinding Machine

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

WATER RESOURCES ENGINEERING

(Open Elective-1)

Course Code: GR17A3151 **LTPC**
III Year. I Semester **2103**

UNIT I

Introduction to Engineering Hydrology and its applications: Hydrologic Cycle, types and forms of precipitation, rainfall measurement, types of Rain gauges, computation of average rainfall over a basin, processing of rainfall data-adjustment of record-Rainfall Double Mass Curve. Runoff-Factors affecting Runoff over a Catchment- Empirical and Rational Formulae.

Abstraction from rainfall: Evaporation, factors effecting evaporation, Measurement of evaporation- Evapotranspiration- Penman and Blaney & Criddle Methods -Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices'.

UNIT II

Distribution of Runoff: Hydrograph Analysis Flood Hydrograph – Effective Rainfall - Base Flow- Base Flow Separation - Direct Runoff Hydrograph– Unit Hydrograph, definition and limitations of application of Unit hydrograph, Derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa S- hydrograph, Synthetic Unit Hydrograph.

UNIT III

Ground water Occurrence: Types of aquifers, aquifer parameters,' porosity' Specific yield, permeability, transmissivity and storage coefficient, Darcy's law, radial flow to wells in confined and unconfined aquifers, Types of wells, Well Construction - Well Development.

UNIT IV

Necessity and importance of irrigation: Advantages and ill-effects of irrigation, Types of irrigation, Methods of application of irrigation water, Indian Agriculture soils, Methods of improving soil fertility-Crop rotation, preparation land for irrigation, Standards of quality for irrigation water.

Soil-water-plant relationship: Vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and delta, factors Affecting duty- design discharge for a water course. The depth and frequency of Irrigation, Irrigation efficiencies-Water Logging.

UNIT V

Classification of canals: Design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, IS standards for canal design canal lining.

Design discharge over a catchment: computation of design discharge–rational formula, SCS curve number method, flood frequency analysis introductory part only. Stream gauging-measurement and estimation of stream flow.

TEXT BOOKS

1. A text book of hydrology by P. Jaya Rami Reddy, laxmi publications pvt limited
2. Irrigation and water power engineering- B.C. Punmia, PandeB. B.Lal, Ashok kumarjain, Arun kumarjain- Laxmi publications 16th edition

REFERENCES

l. Elementary hydrology by V.P. Singh PHI publications
2. Irrigation and Water- Resources &Water Power by P'N 'Modi' StandardBook House.
3. Irrigation Water Management by D'K' Majundar' Printice Hall ofIndra.
4. Irrigation and Hydraulic structures by S'K'Grag'
5. Applied Hydrology by VenTe Chow' David R' Maidmentlarry W'MaysTataMC. GrawHill'
6. Introduction to Hydrology by Warren Viessman' Jr' Garyl' Lewis'
7. Handbook of Hydrology by David R. Maidment (Editour-in-chief)-McGrow - Hill

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOLAR AND WIND ENERGY SYSTEMS
(Open Elective- I)

Course Code: GR17A3152 **LTPC**
III Year I Sem **2103**

UNIT I

Solar Energy Basics: The sun as a source of energy, The Earth Sun, Earth Radiation Spectrums, Extra-terrestrial and Terrestrial Radiations, Spectral Energy Distribution of Solar Radiation, Depletion of Solar Radiation, Solar Radiation Data, Measurement of Solar Radiation, Solar Time(Local Apparent Time), Solar Radiation Geometry, Solar Day Length, Empirical Equations for Estimating Solar Radiation Availability on Horizontal Surface For Cloudy skies, Hourly Global, Diffuse and Beam Radiation on Horizontal Surface Under Cloudless Skies, Solar Radiation on Inclined Plane Surface

UNIT II

Solar Thermal Systems: Solar Collectors, Solar Water Heater, Solar Passive Space-Heating and Cooling Systems, Solar Ustrial Heating Systems, Solar Refrigeration and Air-Conditioning Systems, Solar Cookers, Solar Furnaces, Solar Green House, Solar Dryer, Solar Distillation(or Desalination of Water), Solar Thermo-Mechanical Systems.

UNIT III

Solar Photovoltaic Systems: Solar Cell Fundamentals, Solar Cell Characteristics, Solar Cell Classification, Solar Cell, Module, Panel and Array Construction, Maximizing The Solar PV Output and Load Matching, Maximizing Power point tracker(MPPT),Balance of System Components, Solar PV Systems, Solar PV Applications

UNIT IV

Wind Energy: Origin of Winds, Nature of Winds, Wind Turbine Siting, Major Applications of Wind Power, Basics of Fluid Mechanics, Wind Turbine Aerodynamics.

UNIT V

Wind Energy Conversion Systems: Wind Energy Conversion Systems (WECS), Wind-Diesel Hybrid System, Effects of Wind Speed and Grid Condition (System Integration), Wind Energy Storage, Environmental Aspects.

TEXT BOOKS

- B.H.Khan, “Non- Conventional Energy Resources”, 2nd edition, Tata McGraw-Hill, New Delhi

REFERENCES

1. SP Sukhatme, Solar Energy - Principles of thermal collection and storage, 2nd edition, Tata McGraw-Hill, New Delhi

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

APPLIED THERMODYNAMICS

(Open Elective-I)

Course Code: GR17A3153 **LTPC**

III B. Tech I Semester **2103**

UNIT I

Steam Power Cycles: Carnot cycle, Rankine cycle, Modified Rankine - Schematic layouts, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration &Reheating. Binary vapour cycle

Combustion: Fuels and combustion, basic chemistry, combustion equations, stochiometric air fuel ratio, volumetric and mass basis conversion, Flue gas analysis by Orsat apparatus.

UNIT II

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

UNIT III

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

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

UNIT IV

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

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

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

UNIT V

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

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

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

TEXT BOOKS:

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

REFERENCES:

1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot

2. Gas Turbines and Propulsive Systems – P.Khajuria&S.P.Dubey - /Dhanpatrai

3. Gas Turbines / Cohen, Rogers and SaravanaMuttoo / Addison Wesley – Longman

4. Thermal Engineering-M.L.Marthur& Mehta/Jain bros

5. Gas Turbines – V.Ganesan /TMH

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF E-COMMERCE
(Open Elective- I)

Course Code: GR17A3154	**L**	**T**	**P**	**C**
III Year I Semester	**2**	**1**	**0**	**3**

UNIT I

INTRODUCTION TO E-COMMERCE

E-commerce, Difference between E-commerce and E-business, Purpose of E-Commerce, Eight Unique Features of E-commerce Technology, Web 2:0, Types of E-commerce, Growth of the Internet and the Web, Origins and Growth of E-commerce, Understanding E-commerce.

UNIT II

E-COMMERCE BUSINESS MODELS AND CONCEPTS

E-commerce Business Models, Business-to-Consumer (B2C) Business Models, Business-to-Business (B2B) Business Models, Business Models in Emerging E-commerce Areas.

UNIT III

BUILDING AN E-COM WEB SITE

Building an E-commerce Web Site, Choosing Software, Choosing the Hardware, E-commerce Site Tools.

UNIT IV

ONLINE SECURITY AND PAYMENT SYSTEMS

Security Threats in the E-commerce Environment, Technology Solutions, payment systems, E-commerce Payment System, Electronic Billing Presentment and Payment.

UNIT V

ONLINE CONTENT AND MEDIA

Online Content, Online Publishing Industry, Online Entertainment Industry.

TEXT BOOKS:

1. Kenneth C. Laudon Carol GuercioTraver, “E-commerce: business, technology, society”, Fifth edition, Pearson Prentice Hall, 2009. (Unit-1:Chapter -1, Unit-II: Chapter-2, Unit-III: Chapter-4, Unit-IV: Chapter-5, Unit-V:Chapter-10)

REFERENCES

1. Dave Chaffey, "E-Business and E-Commerce Management: Strategy, Implementation and Practice", Fifth edition, Pearson Education, 2013.
2. K.K. Bajaj, Debjani Nag, "E-Commerce: The Cutting Edge of Business", Second edition, McGraw Hill Education (India) Private Limited, 2005.
3. David Whiteley ,“E-Commerce: Strategy, Technologies And Applications”, McGraw Hill Education (India) Private Limited, 2001.
4. SteffanoKorper, "The E-Commerce Book: Building the E-Empire", Morgan Kaufmann, 2000.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA MINING AND APPLICATIONS

(Open Elective – I)

Course Code: GR17A3155 **LTPC**

III Year I Semester **2103**

UNIT I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT II

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint- Based Association Mining

UNIT III

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor.

Cluster Analysis Introduction :Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Outlier Analysis - Distance-Based Outlier Detection, Density-Based Local Outlier Detection

UNIT IV

Mining World Wide Web: Mining web page layout structure, Identification of authoritative web pages using web link structures, Automatic Classification of Web Documents, Web Usage Mining.

Spatial Mining: Mining spatial association and colocation patterns, spatial clustering methods, spatial classification and spatial trend analysis.

UNIT V

Text Mining: Text Data analysis and Information retrieval, Dimensionality reduction for text, text mining approaches.

Applications and trends in Data Mining : Data Mining for Financial Data Analysis, , Data Mining

for Telecommunication Industry, Data Mining for Intrusion Detection, Various themes on Data Mining, Social impacts of data mining

TEXT BOOKS

1. Data Mining – Concepts and Techniques - Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, Second Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.
3. Data Mining – Introductory and advanced topics – Margaret H. Dunham &S.Sridhar, Pearson Education.

REFERENCES

1. Data Mining Techniques – Arun K. Pujari, Second Edition, Universities Press.
2. Data Warehousing in the Real World, Sam Anahory and Dennis Murray, Pearson Edn Asia.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTER ARCHITECTURE AND ORGANIZATION
(OPEN ELECTIVE-I)

Course Code: GR17A3156 **LTPC**
III Year I Semester **2103**

UNIT I

Introduction

Computing and Computers, Evolution of Computers, VLSI Era, System Design;
Register Level, Processor Level, CPU Organization, Data Representation, Fixed Point Num bers, Floating Point Numbers, Instruction Formats, Instruction Types, addressing modes.

UNIT II

Data Path Design

Fixed Point Arithmetic, Addition, Subtraction, Multiplication and Division, Combinational and SequentialALUs, Carry look ahead adder, Robertson algorithm, booth's algorithm, non-restoring division algorithm,Floating Point Arithmetic, Coprocessor, Pipeline Processing, Pipelin e design, Modified booth's Algorithm

UNIT III

Control Design

Hardwired Control, Microprogrammed Control, Multiplier Control Unit, CPU Control Unit, Pipe line Control Instruction Pipelines, Pipeline Performance, Superscalar Processing, Nano Programming.

UNIT IV

Memory Organization

Random Access Memories, Serial Access Memories, RAM Interfaces, Magnetic Surface Re cording,Optical Memories, multilevel memories, Cache & Virtual Memory, Memory Allocation, Associative Memory.

UNIT V

System Organization

Communication methods, Buses, Bus Control, Bus Interfacing, Bus arbitration, IO and system control, IOinterface circuits, Handshaking, DMA and interrupts, vectored interrupts, PCI interr upts, pipelineinterrupts, IOP organization, operation systems, multiprocessors, fault tolera-- nce, RISC and CISC processors, Superscalar and vector processor.

TEXT BOOKS:

1. John P.Hayes, 'Computer architecture and Organisation', TMH Third edition, 1998.
2. V. Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", V edition, McGraw-Hill Inc, 1996.

REFERENCES:

1. Morris Mano, "Computer System Architecture", Prentice-Hall of India, 2000.
2. Paraami, "Computer Architecture", BEH R002, Oxford Press.
3. P.Pal Chaudhuri, "Computer organization and design", 2nd Ed., Prentice Hall of India, 2007.
4. G.Kane & J.Heinrich, "MIPS RISC Architecture", Englewood cliffs, New Jersey, Prentice Hall, 1992.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DESIGN OF MACHINE MEMBERS

Course code: GR17A3032	**L TPC**
III B. Tech II Semester	**2 1 0 3**

Unit I

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

Unit II

Engine parts: Pistons, Forces acting on piston–Construction, Design and Proportions of piston, Cylinder and Cylinder liners.

Unit III

Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends.

Crank and Crank shafts: Crank pin, Crankshaft - strength and proportions of over hung and center cranks.

Unit IV

Gears: Spur gears-Helical gears-Causes of gear tooth failure-Lewis equation-Dynamic load factor-compressive strength-Design analysis of gears-Estimation of centre distance, module and face width, Check for dynamic and wear considerations.

Unit V

Design of power screws: Design of screw-Stresses in power screws, Design of screw jack, design of nut, compound screw, differential screw –possible failures.
Mechanical Springs: Stresses and deflections of helical springs–Extension- compression springs – Springs for fatigue loading – natural frequency of helical springs–Energy storage capacity– helical torsion springs–Co-axial springs, leaf springs.

TEXT BOOKS:

1. Design of Machine Elements Design, V. B. Bandari -TMH Publishers
2. Machine Design – R.S.Khrumi& J K Gupta
3. Machine Design – Pandya and Shah.

REFERENCES:

1. Machine Design / Schaum Series.
2. Machine Design by Shigley, MH Publishers

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HEAT TRANSFER

Course code: GR17A3033 **LTPC**
III B. Tech II Semester **3 104**

UNIT I
INTRODUCTION AND CONDUCTION HEAT TRANSFER

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

General heat conduction equation in Cartesian, cylindrical and spherical coordinates – Simplification and forms of the field equation – Steady, unsteady and periodic heat transfer – Initial and boundary conditions.

UNIT II
ONE DIMENSIONAL STEADY STATE CONDUCTION HEAT TRANSFER

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

ONE DIMENSIONAL TRANSIENT CONDUCTIVE HEAT TRANSFER

One dimensional transient conduction heat transfer in systems with negligible internal resistance. Significance of Biot and Fourier numbers.

Chart solutions of transient conduction systems – Sensitivity of thermometer – Significance of time constant -- Concept of Functional Body.

UNIT III
CONVECTIVE HEAT TRANSFER

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

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

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

UNIT IV
HEAT TRANSFER WITH PHASE CHANGE AND HEAT EXCHANGERS

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

Condensation – film wise and drop wise condensation – Nusselt's theory of condensation on vertical plate – Film condensation on vertical and horizontal cylinders using empirical correlations. Heat Exchangers: Classification of heat exchangers – Overall heat transfer coefficient and fouling

factor – Concepts of LMTD and NTU methods – Effectiveness of heat exchangers.

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

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

REFERENCE BOOKS:

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

Data Book: Heat and Mass Transfer – Kodandaraman

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INDUSTRIAL MANAGEMENT

Course code: GR17A3035	**LT PC**
III B. Tech II Semester	**3 1 04**

UNIT I

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

Designing Organizational Structures: Basic concepts related to Organisation, Departmentation and Decentralisation, Types of Organisation Structures-Line organization, Line and staff organization, functional organization, Matrixorganization, Virtual Organisation, Cellular Organisation, inverted pyramid structure and their merits, demerits.

UNIT **II**

Operations Management: Plant location, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant, Plant Layout- objectives, types of production, types of plant layout.

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

UNIT III

Materials Management: Objectives, Inventory – functions, types, associated costs, inventory classification techniques-EOQ, EPQ, Selective inventory control - ABC and VED analysis. Inventory Control Systems, Continuous & periodical review systems. **Stores Management:** Objectives, Stores Records.
Purchase Management: Objectives, duties of purchase manager, supply chain management. **Marketing Management:** Marketing, functions of marketing, marketing strategies, marketing vs selling, marketing mix, product life cycle and channels of distribution.

UNIT IV

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

Project Management: PERT &CPM, network modelling-probabilistic model, various types of activity times estimation- programme evaluation and review techniques- Critical Path Method-probability of completing the project, deterministic model, critical path calculation-crashing of networks.

UNIT V

Human Resource Management: Functions of HRM, Job Evaluation, types of evaluation methods, Job description, Merit Rating-methods, difference with job evaluation, wage incentives-wage incentive schemes.
Financial Management: Objectives and functions.

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

TEXT BOOKS

1. Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004.

2. Industrial Engineering and Management O.P. Khanna DhanpatRai.

REFERENCES

1. Stoner, Freeman, Gilbert, *Management*, 6th Ed, Pearson Education, New Delhi, 2005.

2. Panner Selvam, Production and Operations Management, PHI, 2004.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
METROLOGY AND SURFACE ENGINEERING
(Professional Elective-II)

Course code: GR17A3034	**LTPC**
III B. Tech II Semester	**3 10 4**

UNIT I

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

UNIT II

Linear Measurement: Length standard, line and end standard, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.
Measurement of Angles and Tapers: Different methods – Bevel protractor – angle slip gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.
Limit Gauges: Taylor's principle – Design of Go and No Go gauges, plug ring, snap, gap, taper, profile and position gauges.

UNIT III

Optical Measuring Instruments: Tool maker's microscope and its uses – collimators, optical projector – optical flats and their uses, interferometer.
Flat Surface Measurement: Measurement of flat surfaces – instruments used – straight edges – surface plates – optical flat and auto collimator.

UNIT IV
Surface Roughness Measurement: Differences between surface roughness and surface waviness-Numerical assessment of surface finish – CLA, R.M.S Values – Rz values, Methods of measurement of surface finish- profilograph, Talysurf, ISI symbols for indication of surface finish. **Measurement Through Comparators:** Comparators – Mechanical, Electrical and Electronic Comparators, pneumatic comparators and their uses in mass production.

UNIT V
Screw Thread Measurement: Element of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch, profile thread gauges.
Machine Tool Alignment Tests: Requirements of Machine Tool Alignment Tests, Alignment tests on lathe, milling, drilling machine tools.. Preparation of acceptance charts.
Gear Measurement: Gear measuring instruments, Gear tooth profile measurement. Measurement of diameter, pitch pressure angle and tooth thickness.
Coordinate Measuring Machines: Types of CMM, Role of CMM, and Applications of CMM.

TEXT BOOKS

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

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ROBOTICS
(Professional Elective-II)

Course Code: GR17A4043 **L T P C**
III B. Tech II Semester **3 1 0 4**

UNIT I

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

UNIT II

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

UNIT III

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

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

UNIT IV

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

Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages.

UNIT V

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

Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading-Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS

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

REFERENCES

1. Robotics / Fu K S/ McGraw Hill.
2. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
3. Robotic Engineering / Richard D. Klafter, Prentice Hall
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.

5. Introduction to Robotics / John J Craig / Pearson Edu.
6. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
FLEXIBLE MANUFACTURING SYSTEM
(Professional Elective-II)

Course Code: GR17A4042 **LTPC**
III B. Tech II Semester **3 1 04**

Unit I

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

UNIT II

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

UNIT III

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

UNIT IV

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

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

UNIT V

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

TEXT BOOKS

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

REFERENCE BOOKS

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HEAT TRANSFER LAB

Subject code: GR17A3039	**LTPC**
III B.Tech II Semester	**00 22**

Task 1. Determination of overall thermal conductivity of composite slab

Task 2. Comparison of heat transfer through different lagged pipes

Task 3. Determination of thermal conductivity of a concentric sphere

Task 4. To determine thermal conductivity of metal rod

Task 5. Determine the temperature distribution and effectiveness of given pin fin, in natural and forced flow conditions

Task 6. Find out the natural heat transfer coefficient in vertical and horizontal position

Task 7. Calculate the convective heat transfer coefficient in forced convection

Task 8. To determine the rate of heat transfer and overall heat transfer coefficient in parallel and counter flow heat exchanger

Task 9. To determine the Emissivity of radiating surface

Task 10. To determine the Stefan's Boltzman's constant

Task 11. To study boiling heat transfer phenomenon across a given wire and determine the critical heat flux

Task 12. To find out the axial heat flux in heat pipe using water as working fluid

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

METROLOGY LAB

Course code: GR17A3040 **LTPC**

III B. Tech II Semester **0 022**

Task 1 Measurement of lengths, heights, diameters by vernier calipers micrometers etc.

Task 2 Measurement of internal and external diameters using internal and external micrometres

Task 3 Measurement of bores by internal micrometers and dial bore indicators.

Task 4 Use of gear teeth, Vernier calipers and checking the chordal addendum and chordal height of spur gear.

Task 5 Machine tool "alignment of test on the lathe.

Task 6 Machine tool alignment test on milling machine.

Task 7 Tool maker's microscope and its application

Task 8 Angle and taper measurements by using Bevel protractor, Sine bars,

Task 9 Use of spirit level in finding the flatness of surface plate.

Task 10 External thread measurement by u s i n g t hree wire method or Tool makers' microscope.

Task 11 Surface roughness measurement by surface roughness tester.

Task 12 Measurement of screw thread by using profile projector

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

TRANSPORTATION ENGINEERING

(Open Elective-II)

Course Code: GR17A3161 **LTPC**
III Year II Semester **2103**

UNIT I

Highway development and planning: Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT II

Highway geometric design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distances- Stopping sight Distance, Overtaking Sight Distance, intermediate Sight Distance and Head light sight distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT III

Traffic engineering: Traffic flow parameters-Volume, Speed, Density and headway- Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation-Parking Studies, Parking types and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.

Traffic regulation and management: Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Design of Traffic Signals – Webster Method –IRC Method.

UNIT IV

Intersection design: Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections- Channelization: Objectives –Traffic Islands and Design criteria-Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria-Advantages and Disadvantages of Rotary Intersection.

UNIT V

Introduction to railway and airport engineering: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – Crossings and Turn outs.

Factors affecting Selection of site for Airport – Aircraft Characteristics- Geometric Design of Runway- Computation of Runway length – Correction for runway length – Orientation of Runway – Wind Rose Diagram – Runway Lighting system.

TEXT BOOKS

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 9th edition (2011).

2. Railway Engineering – A text book of Transportation Engineering – S.P.Chandola – S.Chand& Co. Ltd. – (2001).

3. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.

4. Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.

REFERENCES

1. Highway Engineering – S.P.Bindra ,DhanpatRai& Sons. – 4th Edition (1981)

2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 8th Edition – 2011.

3. Railway Engineering – S.C.Rangwala –Charotar Publishers.

4. Air Transportation Planning & design – S.K.Khanna – Nem Chnd and Bros.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SENSORS AND TRANSDUCERS

(Open Elective – II)

Course Code: GR17A3162 **LTPC**

III Year II Sem **2103**

UNIT I

Introduction: Sensors / Transducers, principles, classification, parameters, characterizations

UNIT II

Introduction to mechanical & Electro Mechanical Sensors: Resistive Potentiometer, Inductive sensors, Capacitive Sensors, Ultrasonic Sensors

UNIT III

Basics of Thermal and Magnetic Sensors: Gas thermometric sensors, Thermal expansion type thermometric sensors, acoustic temperature sensors, dielectric constant and refractive index thermo sensors. Sensors and principles: Yoke coil sensor, coaxial type sensor, Force and displacement sensor

UNIT IV

SMART Sensors: Introduction, Primary sensors, Excitation, Amplification, Filters, Converters, Compensation, Information coding / processing, Data Communication, The Automation

UNIT V

Sensors their Applications: Flow - rate sensors, Pressure Sensors, Temperature Sensors, Torque & Position Sensors, Home Appliance Sensors - Distance Sensing Medical Diagnostic sensors, Sensors for Environmental Monitoring

TEXT BOOKS

1. Sensors & Transducers By D. Patranabis , PHI Publications

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
AUTOMOBILE ENGINEERING
(Open Elective-II)

Course code: GR17A3163 **LTPC**
III B. Tech II Semester **2103**

UNIT I

INTRODUCTION, ENGINE AND LUBRICATION SYSTEM

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

Emissions : Emission from Automobiles – Pollution standards National and international – Pollution Control – Techniques – Energy alternatives – Photovoltaic, hydrogen, Biomass, alcohols, LPG and CNG.

UNIT II

FUEL SYSTEM AND COOLING SYSTEM

Fuel System in S.I. Engine : Fuel supply systems, Mechanical and electrical fuel pump – filters– carburetor – types – air filters – petrol injection-Multi point fuel injection(MPFI).

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

Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling, Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporative cooling – pressure sealed cooling – anti freeze solutions.

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UNIT III

IGNITION SYSTEM AND ELECTRICAL SYSTEM

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

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

UNIT IV

TRANSMISSION AND STEERING SYSTEM

Transmission System: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, constant mesh, synchro mesh gear boxes, epicyclic gear box, over drive, torque converter. Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.

Steering System: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

UNIT V

SUSPENSION AND BRAKING SYSTEM

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

Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel Cylinder, tandem master cylinder, Requirement of brake fluid, Pneumatic and vacuum brakes.

TEXT BOOKS

4. Automobile Engineering -R B Gupta
5. Automotive Mechanics – William Crouse
6. Automobile Engineering Vol. 1 & Vol. 2 / Kripal Singh

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

HUMAN COMPUTER INTERFACE

(Open Elective-II)

Course Code: GR17A3164 **LTPC**

III Year II Semester **2103**

UNIT I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT III

Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow.

UNIT IV

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls, Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors, Software tools – Specification methods, interface – Building Tools.

UNIT V

Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.

2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia.

REFERENCES

1. Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.

2. Interaction Design PRECE, ROGERS, SHARPS. Wiley Dreamtech,

3. User Interface Design, Soren Lauesen Pearson Education

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ESSENTIALS OF BIG DATA ANALYTICS

(Open Elective – II)

Course Code: GR17A3165 **L T PC**

III Year II Semester **2 1 0 3**

UNIT I

INTRODUCTION TO BIG DATA AND HADOOP: Introduction to Big Data Platform – Big Data definition, Challenges of Conventional Systems: Enterprise/structured data, Social/unstructured Data, Unstructured data needs for Analytics, Analytics vs Reporting, Data Analytic Tools, History of Hadoop, Components of Hadoop, Analyzing the Data with Hadoop, Different Echo systems of Hadoop, IBM Big Data Platform Strategy and Introduction to Infosphere Big Insights.

UNIT II

HDFS (Hadoop Distributed File System): Significance of HDFS in Hadoop, Design of HDFS, HDFS Architecture overview, 5 daemons of Hadoop: Name Node, Data Node, Secondary Node, Job Tracker and Task Tracker, their functionality, Data Storage in HDFS: Introduction about Blocks, Data replication, Accessing HDFS: CLI (Command Line Interface) and admin commands, How to store various types of data in HDFS using CLI-command.

UNIT III

Map Reduce Map Reduce Architecture, Map Reduce Programming Model, Map Reduce Java API, Anatomy of Map Reduce Job run, Failures, Job Scheduling, Sort & Shuffle phase, Task Execution. Map Reduce Program using IBM BigInsights. Adaptive Map Reduce.

Introduction to Oozie: Overview of Managing job Execution. Apache Pig: Introduction to Apache Pig, Map Reduce Vs Apache Pig, SQL Vs Apache Pig, Pig Datatypes, Modes Of Execution in Pig.

UNIT IV

Data Stores on Hadoop Hive: Introduction, architecture, Integration with Hadoop, Hive Tables: Managed Tables, External Tables, Hive Query Language (Hive QL) Hbase: Introduction to HBase, Architecture, HBaseVs RDBMS, HBaseUseCasesHmaster. Introduction to Zookeeper.

UNIT V

BM APPLICATIONS ON HADOOP

Big SQL: Introduction to Big SQL, Datatypes, Big SQL Statistics.

Big Sheets: Introduction, Processing and Accessing BigSheets, Big SQL Integration.

TEXT BOOKS

1. Tom White “Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.

REFERENCES

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”,McGraw-Hill/Osborne Media (2013), Oracle press.
4. AnandRajaraman and Jefrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.

6. Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007
7. Pete Warden, “Big Data Glossary”, O’Reily, 2011.
8. Michael Mineli, Michele Chambers, AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
9. ArvindSathi, “Big Data Analytics: Disruptive Technologies for Changing the Game”, MC Press, 2012
10. Paul Zikopoulos, Dirk De Roos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corigan, "Harness the Power of Big Data The IBM Big Data Platform", Tata McGraw Hill Publications, 2012.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PRINCIPLES OF OPERATING SYSTEMS
(Open Elective-II)

Course Code: GR17A3166 **LTPC**
III Year II Semester **2103**

UNIT I

Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, operating systems structures and systems calls, Evaluation of Operating Systems.

UNIT II

Process Management – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

UNIT III

Concurrency: Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors and Synchronization examples

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation

UNIT IV

Virtual Memory Management: virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

Principles of deadlock – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock,

UNIT V

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management

Mass-storage structure overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, Introduction to Storage Area Networks (SAN), Introduction to Network Attached Storage.

TEXT BOOKS

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.

2. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

REFERENCES

1. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
2. Operating Systems A concept - based Approach, 2nd Edition, D. M. Dhamdhere, TMH.
3. Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
4. Operating Systems, A. S. Godbole, 2nd Edition, TMH
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, S, Haldar and A. A. Arvind, Pearson Education.
7. Operating Systems, R. Elmasri, A. G. Carrick and D. Levine, Mc Graw Hill.
8. Operating Systems in depth, T. W. Doeppner, Wiley.

IV Year Syllabus

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

BASIC FINITE ELEMENT METHODS

Course Code: GR17A4039 **LTPC**
IV B. Tech I Semester **21 03**

UNIT I

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

UNIT II

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

UNIT III

Finite element modelling of two dimensional stress analysis with constant strain traingles and treatment of boundary conditions-quadrilateral element and numerical integration

UNIT IV

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

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

UNIT V

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

TEXT BOOKS

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

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CAD/CAM

Course Code: GR17A4040	**LTPC**
IV B. Tech I Semester	**3 104**

UNIT I

CAD Fundamentals: Computers in Industrial Manufacturing, Product cycle, Implementation of CAD in Design, CAD Hardware, Basic structure of CPU,Memory types, input and output devices-graphic terminals, plotters. CAD software -Definition of system software and application software. Raster scan graphics coordinate system, CAD database structure.

UNIT II

Geometric Modelling: Transformation of geometry, 2D and 3D transformations, wire frame modelling, wire frame entities-concept of parametric and non-parametric representation of curves, continuity of curves, Cubic spline, Bezier curve, B- spline and NURBS Representation.

UNIT III

Surface Modelling: Parametric Representation of Analytical surfaces, synthetic surfaces- plane surface, Ruled surface, surface of revolution, Tabulated cylinder, blending surface-coons patch, Bi-Cubic, Bezier and B-Spline surfaces, clipping, and hidden surface removal

Solid Modelling: Analytical and synthetic entities, Boundary Representation (B-Rep), Constructive solid Geometry representation (CSG-Rep), Sweep Representation.

UNIT IV

Numerical control (NC): Basic components of NC System**,** NC procedure, NC machine tools, NC Machining centres-types, CNC Part Programming- fundamentals, Manual part-programming -Computer Aided Part Programming (APT).

Group Technology: Part families, part classification and coding system, production flow analysis, Machine cell design, Advantages and limitations.

Computer Aided Process Planning (CAPP)-Retrieval type process planning, Generative type Process Planning, CAPP benefits.

UNIT V

Computer Aided Quality Control (CAQC): Terminology in quality control, the role of computers in Quality Control, contact and noncontact inspection methods, computer aidedinspection and testing, integration of CAQC with CAD/CAM.

Computer Integrated Manufacturing systems (CIM): Types of Manufacturing systems, Machine tools and related equipment, Material handling systems, Flexible manufacturing systems (FMS) equipment, layouts, benefits, computer control systems, human labour in the manufacturing systems, Benefits of CIM

TEXT BOOKS

1. CAD / CAM A Zimmers&P. Groover/PE/PHI

2. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH

3. CAD/CAM: Principles and Applications by P.N. Rao/TMH

REFERENCES

1. Automation, Production systems & Computer integrated Manufacturing/ Groover/P.E

2. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age

3. Principles of Computer Aided Design and Manufacturing / FaridAmirouche / Pearson

4. CAD/CAM: Concepts and Applications/Alavala/ PHI

5. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INSTUMENTATION AND CONTROL SYSTEMS

Course Code: GR17A4044 **LTPC**
IV B. Tech I Semester **31 04**

UNIT I

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

UNIT II

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

Measurement of Temperature: Classification – Ranges – Various Principles of measurement– Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers – Temperature Indicators.

UNIT III

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

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

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

UNIT IV

Measurement Of Speed: Mechanical Tachometers – Electrical tachometers – Stroboscope, Non contact type of tachometer

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

UNIT V

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

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

Measurement Of Force, Torque And Power- Elastic force meters, load cells, Torsion meters, Dynamometers.

Elements Of Control Systems: Introduction, Importance – Classification – Open and closed

systems Servomechanisms–Examples with block diagrams–Temperature, speed & position control systems.

TEXT BOOKS

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

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MECHANICAL VIBRATIONS

(Professional Elective-III)

Course Code: GR17A4055	**LTPC**
IV B. Tech II Semester	**3 104**

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

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

Unit V

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

TEXT BOOKS

1. Mechanical Vibrations by G.K. Groover.
2. Mechanical Viabrations byV.Ram Murthy.

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

RENEWABLE ENERGY RESOURCES
(Professional Elective-III)

Course Code: GR17A4046 **LTPC**
IV B. Tech I Semester **3 104**

UNIT I

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

UNIT II

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

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

UNIT III

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

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT V

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

DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. hermo-electric generators, seebeck, peltier and joul Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHDEngine, power generation systems, electron gas dynamic

conversion, economic aspects. Fuel cells,principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXTBOOKS

1. Renewable energy resources/Tiwariand Ghosal/Narosa.
2. Non-Conventional EnergySources/G.D.Rai

REFERENCES

1 RenewableEnergySources/Twidell&Weir

2 SolarEnergy/Sukhame

3 SplarPowerEngineering/B.SMagalFrankKreith&J.FKreith.

4 PrinciplesofSolarEnergy/FrankKrieth&JohnF.Kreider.

5 Non-ConventionalEnergy/AshokVDesai/WileyEastern.

6 Non-ConventionalEnergySystems/KMittal/Wheeler

7 RenewableEnergyTechnologies/Ramesh&Kumar/Narosa

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTATIONAL FLUID DYNAMICS
(Professional Elective-III)

Course Code: GR17A4047 **LTPC**
IV B. Tech I Semester **3 104**

UNIT I

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

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

UNIT II

Finite Difference Applications: Heat conduction and Convection – steady state heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

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

UNIT III

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

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

UNIT IV

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

UNIT V

Finite Volume Method for correction problems: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, Upwind interpolation, Linear interpolation and QUICK scheme, pressure velocity coupling, staggered, SIMPLE & SIMPLER schemes. FVM for diffusion problems,FVM for 10 steady state diffusion problems, FVM for 2D diffusion problems.

TEXT BOOK

1. Numerical heat transfer and fluid flow / Suhas V. Patankar- Butter-worth Publishers
2. Computational fluid dynamics - Basics with applications - John. D. Anderson / Mc Graw Hill.
3 Computational fluid dynamics/ T. J.C'hung/ Cambridge University press,2002.
4. Introduction to Computational fluid dynamics, Finite Voume Method H.Versteeg,Malala Sekra

5. Computational fluid dynamics for Engineers Vol.1,2 & 3 Klaus A. Hoffmann and Steve T. Chiang
6 Computational Methods for Fluid Dynamics 3rd Edition Joel H. Ferziger & Milovan Peric

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Computer Aided Design Lab

Course code: GR17A4048 **LTPC**

IV B. Tech I Semester **0 02 2**

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

Task -1: Sketching

2. Part Modeling: Generation of various 3D Models through Extrusion, revolve, shell, sweep. Creation of various features. Study of parent child relation. Feature and Boolean based modeling. Surface modelling.

Task -2: Part modeling and Drawing

Task 3: Part modeling and drawings of Foot-Step Bearing

Task 4: Part modeling and drawings of Pipe Vice

Task 5: Part modeling and drawings of Plumber Block

3. Assembly Modeling:

Task 6: Assembly and drawings of Foot-Step Bearing

Task 7: Assembly and drawings of Pipe Vice

Task 8: Assembly and drawings of Plumber Block

4. Structural Analysis:

Determination of deflection and stresses in Trusses and Beams.

Task 9: Simulation of Truss structure subjected to concentrated force

Task 10: Simulation of Beam subjected to concentrated force

Determination of deflections, Principle and Von-Mises Stresses using Plane stress, Plane strain and axisymmetric conditions.

Task 11: Simulation of Steel Bracket subjected to pressure load using Plane stress conditions

Task 12: Simulation of a round bar with varying diameter subjected to pressure load using axisymmetric condition.

Estimation of Natural Frequencies and Mode Shapes Harmonic response of 2D beam. Determination of stresses in 3D and shell structures.

Task 13: Modal analysis of a Cantilever Beam.

Thermal Analysis:

Steady state heat transfer analysis

Task 14: Simulation of a thin plate exposed to temperature and heat flux.

Task 15: Thermal analysis of Composite Slab

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INSTRUMENTATION AND CONTROL SYSTEMS LAB

Course code: GR17A4049	**LTPC**
IV B. Tech I Semester	**0 02 2**

Task 1. Calibration of Pressure Gauges

Task 2. Calibration of thermistor for temperature measurement.

Task 3. Study and calibration of LVDT transducer for displacement measurement.

Task 4. Calibration of strain gauge for strain measurement.

Task 5. Calibration of thermocouple for temperature measurement.

Task 6. Calibration of capacitive transducer for angular displacement.

Task 7. Study and calibration of stroboscope for the measurement of speed.

Task 8. Calibration of resistance temperature detector for temperature measurement.

Task 9. Study and calibration of a rotameter for flow measurement.

Task 10. Study and calibration of vibrometer for the measurement of vibration amplitude at various loads.

Task 11. Study and calibration of McLeod gauge for low pressure measurement

Task 12. Study and calibration of load cell

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PRODUCTION DRAWING PRACTICE

Course Code: GR17A4050	**LTPC**
IV B. Tech I Semester	**0 0 2 2**

UNIT I

Conventional representation: Materials, screw, riveted and welded joints.Springs, gears. electrical, hydraulic and pneumatic circuits.

UNIT II

Limits and Fits: International Grades of Tolerances and their estimation, fundamental deviations for Hole based and Shaft based systems. Designation of limits/fits. Types of Fits. Interchangeability and selective assembly. Selection of fits and calculation of limits.

UNIT III

Form and Position tolerance: Geometrical form and position tolerances,Surface treatments, surface roughness symbols on mechanical components.

UNIT IV

Part drawings: Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc. Part Drawing Assemblies-Stuffing Box, Connecting rod, Protected Flange coupling, Universal coupling, Foot step bearing, Eccentric, Steam engine cross head, Square tool post, Plummer block, Lathe tail stock.

UNIT V

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

TEXT BOOKS

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

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREEN BUILDING TECHNOLOGY

(Open Elective-III)

Course Code: GR17A4161	**LTP C**
IV Year I Semester	**2 1 0 3**

UNIT 1

Concept of Green Buildings:

Green building Definition, Features, Necessity, Initiatives, Green buildings in India, Green building Assessment- Green Building Rating Systems (BREEAM,USGBC,LEED,IGBC,TERI-GRIHA, GREEN STAR),Criteria for rating, Energy efficient criteria ,environmental benefits economic benefits, health and social benefits , Major energy efficiency areas for building, Contribution of buildings towards Global Warming. Life cycle cost of buildings, Codes and Certification Programs

UNIT II

Sources of Energy:

Renewable and Non-renewable sources of energy ; Coal, Petroleum, Nuclear, Wind, Solar, Hydro, Geothermal sources; potential of these sources, hazards, pollution; Global scenario with reference to demand and supply in India, Global efforts to reduce carbon emissions, Performance testing (new and existing): Building modeling , Energy analysis, Commissioning, Metering, Monitoring. **Carbon emission**: Forecasting, Control of carbon emission, Air quality and its monitoring carbon foot print; Environmental issues, Minimizing carbon emission, Energy retrofits and Green Remodels.

UNIT III

Green Building Materials: Sustainably managed Materials, Depleting natural resources of building materials; renewable and recyclable resources; energy efficient materials; Embodied Energy of Materials , Green cement, Biodegradable materials, Smart materials, Manufactured Materials, Volatile Organic Compounds (VOC's), Natural Non-Petroleum Based Materials, Recycled materials, Renewable and Indigenous Building Materials, Engineering evaluation of these materials.

Green Building Planning Methods, Energy Conservation Measures in Buildings, Waste &Water management and Recycling in Sustainable Facilities, Heating, Ventilation and Air Conditioning, Passive Solar & Daylight, Plumbing and its Effect on Energy Consumption

UNIT IV

Design of Green Buildings; Sustainable sites, Impact of building on environment, Life cycle assessment, Principles of sustainable development in Building Design ,Design on Bioclimatic **and Specifications:** Environment friendly and cost effective Building Technologies, Integrated Life cycle design of Materials and Structures, Green Strategies for Building Systems, Alternative Construction and solar passive architecture, Considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort, cost efficiency in building design, Advanced Green building technologies and innovations.

UNIT V

Construction of Green Buildings: Energy efficient construction, Practices for thermal efficiency and natural lighting. Eco- friendly water proofing; ECB codes building rating, Maintenance of green buildings, Cost and Performance Comparisons and Benchmarking, Green Project Management Methods and Best Practices, Cost/benefit analysis of green buildings,Life-cycle analysis of green buildings, Case studies of rated buildings (new and existing)

TEXT BOOKS:

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkatta Rama Reddy & K S Nanjunda Rao – New Age International Publishers
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPON Press
3. Non-conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers
4. Green Buildings (McGraw hill publication): by Gevorkian
5. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design
6. Understanding Green Building Guidelines: For Students and Young Professionals, Traci Rose Rider , W. W. Norton & Company Publisher.
7. Understanding Green Building Materials,Traci Rose Rider, W. W. Norton & Company Publisher.

REFERENCES

1. IGBC reference guide
2. Free abridged versions of LEED reference guides
3. ECBC latest version
4. US GBC's Reference Material:

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOFT COMPUTING TECHNIQUES

(Open Elective-III)

Course Code: GR17A4162 **LTPC**

IV Year I Sem **2103**

UNIT I

Neural Networks-I(Introduction & Architecture) Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetero-associative memory.

UNIT II

Neural Networks-II (Back propagation networks) Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient; back propagation algorithm, factors affecting back propagation training, applications.

UNIT III

Fuzzy Logic-I (Introduction) Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

UNIT IV

Fuzzy Logic –II (Fuzzy Membership, Rules) Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

UNIT V

Genetic Algorithm(GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

TEXT BOOKS:

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, “Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications” Prentice Hall of India.

2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.

3. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press.

REFERENCES

1. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India
2. P. Vas: Artificial-Intelligence-Based Electrical Machines and Drives: Application of Fuzzy, Neural, Fuzzy- Neural, and Genetic-Algorithm-Based Techniques, Oxford University Press, 1999.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATIONS RESEARCH
(Open Elective-III)

Course Code: GR17A4163 **LTPC**
IV B. Tech I Semester **2103**

UNIT I

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

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

UNIT II

TRANSPORTATION MODELS: Formulation – Methods for finding feasible solution, Optimal solution, unbalanced transportation problem –Degeneracy.

ASSIGNMENT MODELS - Formulation – Optimal solution **-** Variants of Assignment Problem

UNIT III

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

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

UNIT IV

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

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

UNIT V

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

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

TEXT BOOKS

1. Operations Research/ Prem Kumar Gupta,Dr.D.S. Hira

2. Operations Research / S. D.Sharma-Kedarnath

3. Operation Research /J.K.Sharma/MacMilan.

REFERENCES

1. Operations Research / R.Pannerselvam,PHI Publications.

2. Introduction to O.R /Taha/PHI

3. Operations Research / Wagner/ PHI Publications.

4. Introduction to O.R/Hiller &Libermann (TMH).

5. Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson Education.

6. Operations Research: Methods & Problems / Maurice Saseini, ArhurYaspan& Lawrence Friedman

7. O.R/Wayne L.Winston/Thomson Brooks/cole

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

MOBILE COMPUTING AND APPLICATIONS

(Open Elective III)

Course Code: GR17A4164	**LTPC**
IV Year I Semester	**2103**

UNIT I

Introduction to Mobile Computing: Introduction, applications, simplified referenced model.

Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Comparison.

UNIT II

Telecommunication systems: GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

UNIT III

Mobility and location-based services: Introduction, Data Acquisition of Location Information, GIS, Location Information Modeling, Location-Based Services Applied, Utilizing Location-Based Services with Mobile Applications, Representing Location with UML, Security and Privacy of Location Information, Localization and Internationalization, Latest Developments in Location-Based Efforts

UNIT IV

The Mobile Development Process: Introduction, Back to the Dimensions of Mobility, Applying the Wisdom Methodology to Mobile Development, UML-Based Development Cycle for Mobile Applications

Architecture, Design, and Technology Selection for Mobile Applications: Introduction, Practical Concerns with Architectures, Architectural Patterns for Mobile Applications

UNIT V

Mobile Application Development Hurdles: Introduction, Voice User Interface Hurdles, Hurdles with Multimodal Applications, Problems with Building Location-Based Applications, Power Use.

Testing Mobile Applications: Introduction, Validating the Mobile Use Cases before Development, The Effect of the Dimensions of Mobility on Software Testing, Stress Testing and Scalability Issues, Testing Location-Based Functionality.

Support for Mobility: File systems: Consistency, coda, little work, Ficus, Mio-NFS, Rover.

Outlook: Architecture of future networks.

TEXT BOOKS

1. **Jochen Schiller**, "Mobile Communications", Second Edition, Pearson education, 2004. (Unit I-All chapters, Unit II-All chapters, & Unit V: Last two chapters)

2. **Reza B'far, "**Mobile Computing Principles: Designing And Developing Mobile Applications With UML And XML", Cambridge University Press, 2005. (Unit III-All chapters, Unit IV-All chapters and Unit V - First two chapters).

REFERENCES

1. **Adelstein, Frank, Gupta, Sandeep KS, Richard, Golden, Schwiebert, Loren,** "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.

2. **Hansmann, Merk, Nicklous, Stober**, "Principles of Mobile Computing", Springer, second edition, 2003.

3. **Martyn Mallick,** "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003.

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

BUSINESS INTELLIGENCE

(Open Elective – III)

Course Code: GR17A4165 **LTPC**

IV Year I Semester **2103**

UNIT I

Business Data and Business Intelligence: An Introduction: What is data? Data and business, Big Data, Information and insight, challenges in data decision, operational and informational data, Data decision challenge, Decision Support System, understanding Business Intelligence, Business Intelligence and its components, Importance of Business Intelligence, Business Intelligence areas, Business Intelligence Implementation, Business Intelligence and Integration Implementation, Overview of IBM Cognos BI.

UNIT II

Data warehouse: An Overview Data warehouse architecture, Data warehouse Modelling and Design, Challenges , Data Modelling requirements, Modelling Techniques; Entity relationship Modelling, Dimensional Modelling, Temporal Modelling, Multidimensional data modelling, ERM Vs MDDM, What is Metadata, Types of metadata, Benefits of metadata, Data Analytics Techniques: OLAP and OLTP systems

UNIT III

Building and Accessing a Data Warehouse: Enterprise data warehouse, Challenges of Building a Warehouse, Data warehouse for decision support system, Data Analytics, Data analytics techniques, Information Mining Vs Data mining, Usage of Data Mining, Information Integration, Data warehouse Master Data Management System, MDM Logical Architecture, DB2 UDB Warehouse

UNIT IV

IBM Cognos BI: IBM Cognos Framework Manager, Connection of Framework Manager to Cognos Business Intelligence, Framework Manager Query Model, Frame work manager Model Types, Enterprise Components, Architecture, Security, Query Modes, Model types, Framework Manager Workflow, Administration Workflow, Cognos Configuration

UNIT V

Query and Reporting: Query and Process flow, Report studio, Generation of different reports such as List, cross tab ,Charts, Prompts etc, Focus reports using prompts and filters, Drilling from one report to another, Report using Relational Data

TEXT BOOKS

1. Chuck Ballard, Dirk Herreman, Don Schau, Rhonda Bell,Data Modeling Techniques for Data Warehousing , IBM [ebook]

2. Business Analytics : Data Analytics & Decision Making by S. Christian Albright and Wayne L. Winston.
3. Analytics at Work by Morisson
4. Competing on Analytics - Davenport
5. IBM Cognos 10 Report Studio : Practical Examples by Philip & Roger
6. IBM Cognos BI 10.2 Administration Essentials by Mehmood Awan Khalid

GOKARAJU RANGARAJUINSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF SATELLITE COMMUNICATIONS

(OPEN ELECTIVE-III)

Course Code: GR17A04166	**L T PC**
IV Year I Semester	**2 1 0 3**

UNIT-I

Introduction: Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.

UNIT-II

Orbital Mechanics and Launchers: Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT-III

Satellite Subsystems: Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.

UNIT-IV

Satellite Link Design: Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example.

UNIT-V

Earth Station Technology: Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods.

Low Earth Orbit and Geo-stationary Satellite Systems: Orbit consideration, coverage and frequency considerations, delay and throughput considerations, system considerations, operational NGSO constellation designs.

Text Books:

1. Satellite communications-Timothi Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite communications Engineering-Wilbur L.Prichard, Robert A. Nelson & Henry

1. Satellite communications: Design principles-M. Richharia, BS publications, 2nd Edition, 2003.
2. Fundamentals of Satellite communications-K.N.Rajarao, PHI, 2004.
3. Satellite communications-Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

REFRIGERATION AND AIR CONDITIONING

Subject Code: GR17A4051	**LTPC**
IV B. Tech II Semester	**2 1 0 3**

UNIT I

Introduction: Introduction to Refrigeration, Necessity, Methods of refrigeration, Unit of refrigeration; Coefficient of performance (COP), Refrigerants- Classification, Nomenclature, Desirable properties, Comparative study, secondary refrigerants, Introduction to eco-friendly Refrigerants.

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

UNIT II

Vapour Compression (VC) Refrigeration Systems:(A) Simple Vapour Compression (VC) Refrigeration systems- Limitations of Reversed Carnot cycle with vapour as the refrigerant; Analysis of VC cycle considering degrees of sub cooling and superheating; VC cycle on P-V, T-S and P-H diagrams; Effects of operating conditions on COP.

UNIT III

Vapour Absorption Refrigeration Systems : Vapour Absorption Refrigeration Systems – Basic Systems, Actual COP of the System, Relative merits and demerits, Properties of aqua ammonia; Electrolux Refrigeration.

Steam Jet Refrigerating System- Introduction, Analysis, Relative merits and demerits. Cascade Refrigerating Systems- Necessity, Selection of Pairs of refrigerants for the system, Concept of cascade temperature, Analysis, Multistaging.

UNIT IV

Psychrometry & Air Conditioning Processes: Properties of Air-water vapour mixture-Gibbs Dalton law, Specific humidity, Dew point temperature, Degree of saturation, Relative humidity, Enthalpy, Wet bulb temp, Psychometric chart, Psychrometry of air-conditioning processes, Basic processes in conditioning of air; Psychometric processes in air washer- Problems

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

UNIT V

Air Conditioning Systems with Controls & Accessories: Classifications, Layout of plants; Equipment selection; Air distribution system; Duct systems Design; Filters; Refrigerant piping;

Design of summer air-conditioning and Winter air conditioning systems; Temperature sensors, Pressure sensors, Humidity sensors, Actuators, Safety controls; Accessories; Problems.

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

TEXT BOOKS

1. A course in Refrigeration & Air Conditioning – Arora & Domkundwar, Dhanpat Rai & sons.
2. Refrigeration & Air conditioning –C.P. Arora, TMH, New Delhi.

REFERENCES

1. Refrigeration & Air conditioning –R.C. Jordan and G.B. Priester, Prentice Hall of India.
2. Refrigeration & Air conditioning –W.F. Stocker and J.W. Jones, TMH, New Delhi.
3. Refrigeration & Air conditioning- Manohar Prasad Wiley Estern limited, New Delhi.

4. Refrigeration & Air conditioning by R.S.Khurmi.

Data book: Refrigeration and Psychrometric Properties (charts and tables) by C P Kothandaraman

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PRODUCTION PLANNING AND CONTROL
(Professional Elective-IV)

Course Code: GR17A4052	**L T P C**
IV B. Tech II Semester	**3 1 0 4**

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

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

UNIT III
ROUTING & SCHEDULING -Routing- Definition – routing procedure – Route sheets – Bill of material – factors affecting routing procedure, Schedule – definition – difference with loading, Factors affecting scheduling

UNIT IV
Scheduling: Scheduling policies – techniques, standard scheduling methods- job shop, flow shop. Line balancing, aggregate planning – methods for aggregate planning – Chase planning, expediting, control aspects.

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

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

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PLANT LAYOUT & MATERIAL HANDLING
(Professional Elective-IV)

Subject Code: GR17A4053	**LTPC**
IV B. Tech II Semester	**3 10 4**

UNIT I

Introduction: Classification of Layout, Advantage and Limitations of different layouts, Layout design procedures. Overview of the plant layout

PROCESS LAYOUT & PRODUDT LAYOUT: Selection, specification, implementation and follow up, comparison of product and process layout.

UNIT II

Heuristics of Plant layout – ALDEP, CORELAP, CRAFT Group Layout , Fixed position layout – Quadratic assignment model , Branch and bound method.

UNIT III

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

UNIT IV

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

UNIT V

Methods to minimize cost of material handling – Maintenance of Material Handling Equipment, Safety in handling

Ergonomics of material handling equipment. Design, Miscellaneous equipment.

TEXT BOOKS

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

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

TRIBOLOGY
(Professional Elective-IV)

Course Code: GR17A4054	**LTPC**
IV B. Tech II Semester	**3 1 0 4**

UNIT I

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

UNIT II

Hydrodynamic Lubrication: Friction forces and power loss in lightly loaded bearing, Petroff's law, Tower's experiments, mechanism of pressure development in an oil film, Reynold's investigation and Reynold's equation in 2D.

UNIT III

Idealized Journal Bearing: Introduction to idealized journal bearing, load carrying capacity, condition for equilibrium, Sommerfeld's numbers and significance of it; Partial bearings, end leakages in journal bearing, numerical problems.

Slider / Pad Bearing With A Fixed And Pivoted Shoe: Pressure distribution, Load carrying capacity, coefficient of friction, frictional resistance in a pivoted shoe bearing, numerical examples.

UNIT IV

Oil Flow And Thermal Equilibrium Of Journal Bearing: Oil flow through bearings, self-contained journal bearings, bearings lubricated under pressure, thermal equilibrium of journal bearings.

Hydrostatic Lubrication: Introduction to hydrostatic lubrication, hydrostatic step bearings, load carrying capacity and oil flow through the hydrostatic step bearing. 06 Hours

UNIT V

Bearing Materials: Commonly used bearings materials, properties of typical bearing materials. Advantages and disadvantages of bearing materials.

Behavior Of Tribological Components: Selection, friction, Wear of ceramic materials, wear measurements, effects of speed, temperature and pressure. Tribological measures, Material selection, improved design, surface engineering .

TEXT BOOKS

1. Fundamentals of Tribology ,Basu S K., Sengupta A N., Ahuja B.B., , PHI 2006

2. Introduction to Tribology Bearings, Mujumdar B. C., S. Chand company pvt. Ltd 2008.

REFERENCES

1. Theory and Practice of Lubrication for Engineers, Fuller, D., New York company 1998

2. Principles and Applications of Tribology, Moore, Pergamaon press 1998

3. Tribology in Industries, Srivastava S., S Chand and Company limited, Delhi 2002

4. Lubrication of bearings – Theoretical Principles and Design, Redzimovskay E I., Oxford press company 2000

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

UNCONVENTIONAL MACHINING PROCESSES
(Professional Elective-V)

Course Code: GR17A4045 **LTPC**
IV B. Tech II Semester **2 1 0 3**

UNIT I

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

UNIT II

MECHANICAL PROCESSES: Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT III

Abrasive jet machining, Water jet machining and abrasive water jet machine: Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations. Magnetic abrasive finishing, Abrasive flow finishing

UNIT-IV

THERMO ELECTRIC PROCESSES: General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications. Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes –General Principle and application of laser beam machining –thermal features, cutting speed and accuracy of cut. Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

UNIT V

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

Chemical machining principle, maskants, etchants, advantages andapplications of chemical machining.

TEXT BOOKS

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

REFERENCES

1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.

2. New Technology / Bhattacharya A/ The Institution of Engineers, India 1984.

3. Modern Production / Operations Management / Baffa&RakeshSarin.

4. Operations Management – S.N. Chary.

5. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.

6. Reliability Engineering & Quality Engineering by Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Galgotia Publications, Pvt., Limited.

7. Production Control A Quantitative Approach / John E. Biegel.

8. Production Control / Moore.

9. Operations Management / Joseph Monks.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

NUCLEAR POWER PLANT ENGINEERING
(Professional Elective-V)

Course Code: GR17A4056 **LTPC**
IV B. Tech II Semester **2 1 0 3**

Unit I

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

Unit II

Introduction to Nuclear Engineering:

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

Unit III

Nuclear Reactors:

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

Unit IV

Nuclear Power Plants: Nuclear Physics, Nuclear Reactors, Classification – Types of Reactors, Site Selection, Methods of enriching Uranium, Applications of Nuclear Power Plants.Nuclear Power Plants Safety: By-Products of Nuclear Power Generation, Economics of Nuclear Power Plants, Nuclear Power Plants in India, Future of Nuclear Power.

Economics of Power Generation: Factors affecting the economics, Load Factor, Utilization factor, Performance and Operating Characteristics of Power Plants. Economic Load Sharing, Depreciation, Energy Rates, Criteria for Optimum Loading, Specific Economic energy problems. Power Plant Instrumentation: Classification, Pressure measuring instruments, Temperature measurement and Flow measurement. Analysis of Combustion gases, Pollution – Types, Methods to Control.

Unit V

Nuclear material Structure of a power plant, Requirements of reactor materials, fuel materials, plutonium, uranium and thorium and their alloys, and compound core materials, beryllium, graphite control and shielding materials-magnesium and its alloys-coolant used in reactors radiation embrittlement-corrosion reactor materials-Mechanical properties of materials.

TEXT BOOKS

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

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPTIMIZATION TECHNIQUES
(Professional Elective-V)

Course Code: GR17A4057	**LTPC**
IV B. Tech II Semester	**2 1 0 3**

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

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

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

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

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

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

STOCHASTIC PROGRAMMING:
Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, co variance, joint probability distribution- stochastic linear, dynamic programming.

Simulation – Introduction – Types- steps – application – inventory – queuing – thermal system

TEXT BOOKS
1. Optimization theory & Applications / S.S.Rao / New Age International.
2. Introductory to operation Research / Kasan & Kumar / Springar

3. Optimization Techniques theory and practice / M.C.Joshi, K.M.Moudgalya/ Narosa Publications.
4.Optimization Techniques by N V S Raju/PHI

REFERENCES

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CAM and Simulation lab

Subject Code: GR17A4058 **LTPC**

IV B. Tech II Semester **0 022**

Simulation and Execution of following CNC Programs on Turning machine

- **Task 1.** Linear motion with G01 code
- **Task 2.** Circular motion with G02 and G03code
- **Task 3.** Plane and taper turning with G90cycle
- **Task 4.** Facing withG94 cycle
- **Task 5.** G70 & G71 Turning cycle
- **Task 6.** G74 drilling cycle
- **Task 7.** G75 grooving cycle
- **Task 8.** G76 threading cycle
- **Task 9.** Combined G74 drilling Cycle, G75 grooving cycle and G70 & G71 Turning cycle
- **Task 10.** G74 drilling Cycle, G75 grooving cycle G76 threading cycle and G70 & G71 Turning cycle

Simulation and Execution of following CNC Programs on Millingmachine

- **Task 11.** G91 surface milling Cycle for given different profiles
- **Task 12.** Drilling holes on plate.
- **Task 13.** End milling operation.

Softwares: FANUC controller for Turning and Milling machines.