ACADEMIC REGULATIONS
PROGRAM STRUCTURE
and
DETAILED SYLLABUS

Master of Technology

(Design for Manufacturing)

(Two Year Regular Programme)

(Applicable for Batches admitted from 2017)

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

ACADEMIC REGULATIONS

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

For all Postgraduate Programmes (M.Tech)
GR17 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology-2017 Regulations (GR 17 Regulations) are given hereunder. These regulations govern all the Post Graduate programmes offered by various departments of Engineering with effect from the students admitted to the programmes from 2017-18 academic year.

1. **Programme Offered:** The Post Graduate programme offered by the department is M.Tech, a two-year regular programme in that discipline.

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

3. **Admissions:** Admission into the M.Tech Programme in any discipline shall be made subject to the eligibility and qualifications prescribed by the University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in PGCET conducted by the APSCHE for M. Tech Programmes or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time.

4. **Programme Pattern:**
   a) A student is introduced to "Choice Based Credit System (CBCS)" for which he/she has to register for the courses at the beginning of each semesters as per the procedure.
   b) Each Academic year of study is divided into two semesters.
   c) Minimum number of instruction days in each semester is 90.
   d) The total credits for the Programme is 88.
   e) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
   f) A student has a choice of registering for credits from the courses offered in the programme.
   g) All the registered credits will be considered for the calculation of final CGPA.

5. **Award of M.Tech Degree:** A student will be declared eligible for the award of the M. Tech Degree if he/she fulfills the following academic requirements:
   a) A student shall be declared eligible for the award of M.Tech degree, if he/she pursues the course of study and completes it successfully in not less than two academic years and not more than four academic years.

b) A Student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the date of admission, shall forfeit his/her seat in M.Tech courses.

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

6. Attendance Requirements

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

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above 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) 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 of the College from time to time.

b) The following is the division of marks between internal and external evaluations.

S.no	Particulars	Internal	External	Total
1	Theory	30	70	100
2	Practical	30	70	100
3	Comprehensive Viva	-	100	100
4	Seminar	30	70	100
5	Project work	30	70	100

c) The marks for internal evaluation per semester per theory course are divided as follows:

i. **Mid written examinations: 20 Marks**
ii. **Assignment: 5 Marks**
iii. **Continuous Assessment: 5 Marks**
iv. **Total: 30Marks**

d) Mid-Term Written Examination: There shall be two mid-term written examinations during a semester. The first mid-term written examination shall be conducted from the first

50 per cent of the syllabus and the second mid-term written examination shall be conducted from the remaining 50 per cent of the syllabus. The mid-term written examinations shall be evaluated for **20 marks** and average of the marks scored in the two mid-term written examinations shall be taken as the marks scored by each student in the mid-term written examination for that semester.

e) **Assignment:** Assignments are to be given to the students and marks not exceeding 5 (5%) per semester per paper are to be awarded by the teacher concerned.

f) **For Internal Evaluation in Practical/Lab Subjects:** The marks for internal evaluation are 30. Internal Evaluation is done by the teacher concerned with the help of the other staff member nominated by Head of the Department. Marks Distribution is as follows:

i.	**Writing the program/Procedure:**	**10 Marks**
ii.	**Executing the program/Procedure:**	**10 Marks**
iii.	**Viva:**	**05 Marks**
iv.	**Continuous assessment:**	**05 Marks**
v.	**Total:**	**30Marks**

g) **For External Evaluation in Practical/Lab Subjects:** The Semester end examination shall be conducted by an external examiner and a staff member of the Department nominated by Head of the Department. Marks distribution is as follows:

i.	**Writing the program/Procedure:**	**20 Marks**
ii.	**Executing the program/Procedure:**	**20 Marks**
iii.	**Viva:**	**15 Marks**
iv.	**Lab Record:**	**15 Marks**
v.	**Total:**	**70 Marks**

h) **Comprehensive Viva:** There shall be a Comprehensive Viva-Voce in II year I semester. The Comprehensive Viva-Voce will be conducted by the committee consisting of Head of the Department and two senior faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects he/she studies during the M.Tech course of study. The Comprehensive Viva-Voce is valued for 100 marks by the committee. There are no internal marks for the Comprehensive Viva-voce.

i) **Seminar:** There shall be two Seminar Presentations by the student, one each in I and II semesters. For the seminar, the student shall collect the information on a specialized topic other than his/her project and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by a Departmental committee consisting of the Head of the department, seminar Supervisor and a senior faculty member. **The seminar shall be evaluated for 100 marks. Internal evaluation is for 30 marks and external for 70 marks.**

j) Evaluation of Main Project Work: A Project Review Committee (PRC) is to be constituted by the Principal/Director with Head of the Department as the Chairman and two other senior faculty members of the department.

i. Registration for Project work: A candidate is permitted to register for the project work after satisfying the attendance requirements of all the courses (theory and practical courses) up to III Semester.

ii. After satisfying the registration requirements, a candidate is permitted to register for the project work after satisfying, the title, objectives and plan of action of his project work to the Project Review Committee for its approval. Only after obtaining the approval of Project Review Committee of the Department, the student can initiate the project work. Any changes thereafter in the project are to be approved by PRC. The student has to work under the guidance of both internal guide (one faculty member of the department) and external guide (from Industry not below the rank of an officer). Internal guide is allotted by the Head of the Department or Coordinator of the Project Work whereas external guide is allotted by the industrial organization in which the project is undertaken.

iii. The candidate shall submit status of the report in two stages at least with a gap of 20 days between them.

iv. The work on the project shall be initiated in the beginning of the fourth semester and the duration is one semester. A candidate is permitted to submit project report only after successful completion of theory and practical courses with the approval of PRC and not earlier than 40 days from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of the thesis to the Head/Coordinator (through internal research guide) and shall make an oral presentation before the PRC.

v. After approval from the PRC, the final thesis is to be submitted along with ANTI-PLAGIARISM report from the approved agency with a similarity index not more than 30%.

vi. Two hardcopies and one soft copy of the project work (dissertation) certified by the research supervisors shall be submitted to the College/Institute.

vii. The thesis shall be adjudicated by one external examiner selected by the Institute out of 5-member panel, submitted by the department.

viii. The marks allotted for project work review are 100, out of which30 are for internal and 70 for external. Internal evaluation marks are awarded by the PRC on the basis of the student's performance in the three pre-submission reviews and the external evaluation is done by the external examiner.

ix. The marks allotted for project work and dissertation are 100, out of which 30 are for internal and 70 for external. Internal evaluation marks are awarded by the PRC on the basis of the student's performance in the three pre-submission reviews and the external evaluation is done by the external examiner. In both internal and external evaluations the student shall score at least 40% marks and an aggregate of 50% marks to pass in the project work. If the report of the examiner is favourable, Viva-voce examination shall be conducted by a Board consisting of the Supervisor, Head and the External Examiner who adjudicated the project work.

The Board shall jointly evaluate the student's performance in the project work.

x. In case the student doesn't pass through the project work, he has to reappear for the viva-voce examination, as per the recommendations of the Board. If he fails succeed at the second Viva-voce examination also, he will not be eligible for the award of the degree, unless he is asked to revise and resubmit the Project by the Board. Head of the Department and Project coordinator shall coordinate and make arrangements for the conduct of viva-¬voce examination. When one does get the required minimum marks both in internal and external evaluations the candidate has to revise and resubmit the dissertation in the time frame prescribed by the PRC. If the report of the examiner is unfavourable again, the project shall be summarily rejected.

xi. If the report of the viva-voce is not satisfactory, the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination, he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit.

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for re-counting of his/her answer book on payment of a prescribed fee.
9. **Re-evaluation of the End Examination Answer Books:** A student can request for re-evaluation of his/her answer book on payment of a prescribed fee.
10. **Supplementary Examinations:** A student who has failed in an end semester examination can appear for a supplementary examination, as per the schedule announced by the College/Institute.
11. **Malpractices in Examinations:** Disciplinary action shall be taken in case of malpractices during Mid/ End-examinations as per the rules framed by the Academic Council.

12. **Academic Requirements**

a) A student shall be deemed to have secured the minimum academic requirement in a subject if he / she secures a minimum of 40% of marks in the Semester-end Examination and a minimum aggregate of 50% of the total marks in the Semester-end examination and Internal Evaluation taken together.

b) A student shall be promoted to the next semester only when he/she satisfies the requirements of all the previous semesters.

c) In order to qualify for the award of M.Tech Degree, the student shall complete the academic requirements of passing in all the Courses as per the course structure including Seminars and Project if any.

d) In case a Student does not secure the minimum academic requirement in any course, he/she has to reappear for the Semester-end Examination in the course, or re-register for the same course when next offered or re-register for any other specified course, as may be required. However, one more additional chance may be provided for each student, for improving the internal marks provided the internal marks secured by a student are less than 50% and he/she failed finally in the course concerned. In the event of taking another chance for re-registration, the internal marks obtained in the previous attempt are nullified. In case of re-registration, the student has to pay the re-registration fee for each course, as specified by the College.

e) 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 (Above Average)	6	Marks>=50 and Marks < 60
F (Fail)	0	Marks < 50
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-B. 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) Skthe SGPA of kth semester(1 to 4) is the ratio of sum of the product of the number of credits and grade points to the total creditsof all courses registered by a student,

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

Where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course and n is the number of courses registered in that semester.

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

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

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

13. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of M. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes:

Class Awarded		CGPA Secured
3.1	First class with distinction	CGPA > 7.75
3.2	First Class	CGPA ≥ 6.75 and CGPA < 7.75
3.3	Second Class	CGPA ≥ 6.00 and CGPA < 6.75

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

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

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

17. **General Rules**

a) The academic regulations should be read as a whole for the purpose of any interpretation.

b) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

c) In case of any error in the above rules and regulations, the decision of the Academic Council is final.

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.

M.Tech (DFM) **M.Tech (DFM) PROGRAMME STRUCTURE** **I Year-I Semester**

Sub-Code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5107	PC	Advanced Mechanics of Solids	3	1	0	4	30	70	100
GR17D5108	PC	Materials Technology	3	1	0	4	30	70	100
GR17D5109	PC	Precision Engineering	3	1	0	4	30	70	100
	OE-I	**Open Elective – I**	3	1	0	4	30	70	100
	Elective I		3	1	0	4	30	70	100
GR17D5111	PE	Special Manufacturing Processes							
GR17D5112	PE	Finite Element Applications in Manufacturing							
GR17D5113	PE	Quality Engineering in Manufacturing							
	Elective II		3	1	0	4	30	70	100
GR17D5114	PE	Advanced CAD							
GR17D5115	PE	Mechatronics							
GR17D5116	PE	Advanced Elasticity & Plasticity							
GR17D5117	Lab	Manufacturing Simulation & Precision Engg Lab	0	0	2	2	30	70	100
GR17D5173	SPW	Seminar – I	0	0	2	2	30	70	100
		Total	**18**	**6**	**4**	**28**	**240**	**560**	**800**

M.Tech (DFM) **M.Tech (DFM) PROGRAMME STRUCTURE** **I Year-II Semester**

Sub-Code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5118	PC	Design of Hydraulics & Pneumatics systems	3	1	0	4	30	70	100
GR17D5119	PC	Total Quality Management	3	1	0	4	30	70	100
GR17D5120	PC	Computer Aided Manufacturing	3	1	0	4	30	70	100
	OE-I	**Open Elective – I**	3	1	0	4	30	70	100
	Elective III		3	1	0	4	30	70	100
GR17D5122	PE	Industrial Robotics							
GR17D5123	PE	Tool Design							
GR17D5124	PE	Production and Operations Management							
	Elective IV		3	1	0	4	30	70	100
GR17D5125	PE	Performance modeling and Analysis of Manufacturing Systems							
GR17D5126	PE	Computational Fluid Dynamics							
GR17D5127	PE	Automation in Manufacturing							
GR17D5128	Lab	CAD/CAM Lab	0	0	2	2	30	70	100
GR17D5174	SPW	Seminar – II	0	0	2	2	30	70	100
		Total	18	6	4	28	240	560	800

II Year-I Semester

Sub-code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5175	SPW	Comprehensive Viva-voce	-	-	-	4	0	100	100
GR17D5176	SPW	Project work Review	-	-	-	12	30	70	100
Total			-	-	-	16	30	170	200

II Year-II Semester

Sub- code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5177	SPW	Project work and Dissertation	-	-	-	16	30	70	100
Total			-	-	-	16	30	70	100

A student has a choice to select one Open Elective Pool I in I Semester and one Open Elective Pool II in II Semester.

Open Elective Pool-I

Sub-code	Group	Subject	L	T	P	C	Int.	Ext.	Total
GR17D5178	OE-I	E- Commerce and Applications (CSE)	3	1	0	4	30	70	100
GR17D5179		Enterprise Resource Planning (IT)	3	1	0	4	30	70	100
GR17D5180		Modern Control Theory (EEE)	3	1	0	4	30	70	100
GR17D5181		Computer Oriented Numerical Methods in Engineering (CE)	3	1	0	4	30	70	100
GR17D5182		Advanced Computer Architecture (ECE)	3	1	0	4	30	70	100
GR17D5183		Operations Research (ME)	3	1	0	4	30	70	100

Open Elective Pool-II

Sub-Code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5184	OE-II	Human Computer Interaction (CSE)	3	1	0	4	30	70	100
GR17D5185		Big Data and Analytics (IT)	3	1	0	4	30	70	100
GR17D5186		Neural and Fuzzy Systems (EEE)	3	1	0	4	30	70	100
GR17D5187		Project Management (CE)	3	1	0	4	30	70	100
GR17D5188		Hardware Software Co-Design(ECE)	3	1	0	4	30	70	100
GR17D5189		Non-Conventional Energy Resources(ME)	3	1	0	4	30	70	100

I- SEMESTER

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED MECHANICS OF SOLIDS

M.Tech (Design for Manufacturing) I Year - I Semester

Course Code: GR17D5107 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Introduce the concepts of continuum mechanics, theory of elasticity and solid mechanics.
- Solve advanced solid mechanics problems using classical methods
- Employ commercial software to advanced solid mechanics problems.
- Analyze the structural responses to various loading conditions.
- Implant the two dimensional elasticity problems and plate problems.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Analyze solid mechanics problems using classical methods and energy methods.
- Estimate stresses and deflections of beams under unsymmetrical loading.
- Identify the shear center of thin wall beams.
- Obtain stresses and deflections of beams on elastic foundations.
- Apply various failure criteria for general stress states at points.
- Develop a basic understanding and ability to use ANSYS for the modeling and solution of beam, frame, and shell structures.
- Compare theoretical solutions with those obtained using analysis software.

UNIT- I

Shear center: Bending axis and shear center, shear center for axis-symmetric and unsymmetrical sections

Unsymmetrical bending: Bending stresses in beams subjected to nonsymmetrical bending, deflection of straight beams due to nonsymmetrical bending.

UNIT-II

Curved beam theory: Winkler Bach formula for circumferential stress, limitations, correction factors, radial stress in curved beams, closed ring subjected to concentrated and uniform loads-stresses in chain links.

UNIT-III

Torsion: Linear elastic solution; prandtal elastic membrane (Soap-Film) analogy; narrow rectangular cross section; hollow thin wall torsion members ,multiply connected cross section.

UNIT-IV

Theory of plates: Introduction; stress resultants in a flat plate; kinematics: strain-displacement relations for plates; equilibrium equations for small displacement theory of flat plates; stress-

strain- temperature relation for isotropic plates: strain energy of a plate; boundary conditions for plate;

Two Dimensional Elasticity Problems: in polar co-ordinators, general equations in polar coordinates, stress distribution symmetrical about an axis, pure bending of curved bars, displacements for symmetrical stress distributions, rotating discs.

UNIT-V

Beams on Elastic Foundation: General theory, infinite beam subjected to concentrated load, boundary conditions, infinite beam subjected to a distributed load segment, semi-infinite beam with concentrated load near its end, short beams

Contact stresses: Introduction, problem of determining contact stresses, assumptions on which a solution for contact stresses is based, expressions for principal stresses, method of computing contact stresses, deflection of bodies in point contact, stresses for two bodies in contact over narrow rectangular area (Line contact), loads normal to area, stresses for two bodies in line contact, normal and tangent to contact area.

TEXT BOOKS

1. Advanced Mechanics of materials by Boresi & Sidebottom-Wiely International.
2. Theory of elasticity by Timoschenko S.P. and Goodier J.N. McGraw-Hill Publishers

REFERENCE BOOKS

1. Advanced strength of materials by Den Hortog J.P.
2. Theory of plates, Timoshenko.
3. Strength of materials & Theory of structures (Vol I & II) by B.C Punmia

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing Power point presentations.
2. Seminars are conducted on new technologies related to subject.
3. Assignments are given.
4. Group discussions are conducted on familiar topics related to subject.
5. Industrial visits for practical exposure to understand and explore things.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MATERIALS TECHNOLOGY

M.Tech (Design for Manufacturing) I Year - I Semester
Course Code: GR17D5108 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Introduce elastic and plastic behaviour of metals and polymers.
- Impart the knowledge on strengthening mechanisms of metals and polymers.
- Analyze the fracture behaviour analysis of ductile and brittle materials.
- Gain the skill of identifying the relationship between materials selection and processing for various applications-Case studies.
- Develop the knowledge on composites, superalloys, adhesives, coatings and application of these in aero, auto, Marine, Machinery and Nuclear.

COURSE OUTCOMES: At the end of the course, the student will be able to

- Apply core concepts in materials technology to solve engineering problems.
- Analyze materials for design and construction and the importance of lifelong learning.
- Study the fiber and dispersion strengthening mechanisms in materials
- Perform the fracture analysis of metals
- Examine the theories of fracture for brittle and ductile materials.
- Select the best material for particular engineering applications
- Describe the scope of modern metal composites.

UNIT-I

Elastic And Plastic Behavior: Elasticity in metals and polymers, mechanism of plastic deformation, role of dislocations, yield stress, shear strength of perfect and real crystals, strengthening mechanism, work hardening, solid solution, grain boundary strengthening.

UNIT-II

Poly phase, mixture, precipitation, particle, fiber and dispersion strengthening, effect of temperature, strain and strain rate on plastic, behavior, super plasticity, deformation of non crystalline material.

UNIT-III

Fracture Behavior: Griffith's Theory, stress intensity, factor and fracture toughness, Toughening Mechanisms, Ductile and Brittle transition in steel, High Temperature Fracture, Creep, Larson, Miller parameter, Deformation and Fracture mechanism maps. Fatigue, Low and High cycle fatigue test, Crack Initiation and Propagation mechanism and Paris Law, Effect of surface and metallurgical parameters on Fatigue analysis, Sources of failure, procedure of failure analysis.

UNIT- IV

Material Selection: Motivation for selection, cost basis and service requirements, selection for mechanical properties, strength, toughness, fatigue and creep. Selection for Surface durability, Corrosion and Wear resistance, Relationship between Materials Selection and Processing, Case studies in Materials Selection w i t h relevance to Aero, auto, Marine, Machinery and Nuclear applications.

UNIT- V

Modern Metallic Materials: Dual Phase Steels , Micro alloyed, High Strength, Low alloy (HSLA) Steel, Transformation induced plasticity (TRIP) Steel, Maraging Steel, Intermetallic, Ni and Ti Aluminides, Smart Materials, Shape Memory alloys, Metallic Glass Quasi Crystal and Nano Crystalline Materials. Fibres, Foames, Adhesives and coatings, Advanced structural ceramics: WC, Tic, Tac, Al2O3, Si3N4, CBN, Diamond Properties, processing and applications.

TEXT BOOKS

1. Mechanical Metallurgy George E Dieter
2. Selection and use of engineering materials Charles JA, Butter worth, Heir maker

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing Power point presentations.
2. Seminars are conducted on new technologies related to subject.
3. Assignments are given.
4. Group discussions are conducted on familiar topics related to subject.
5. Industrial vists for practical exposure to understand and explore things.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRECISION ENGINEERING

M.Tech (Design for Manufacturing) I Year - I Semester
Course Code: GR17D5109 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Introduction to concepts of accuracy, geometric dimensioning, tolerancing, Datum's creation, process capability.
- Representation and application of geometric dimensioning, surface finish and tolerance.
- Draw process drawings for different operations and tolerance work sheets.
- Summarize machining considerations during manufacturing.
- Processing of nanotechnology, working of surface-mechanical, optical and CMM measuring systems.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Define datum planes for any oddly configured bodies and demonstrate the accuracy of Numerical Control system.
- Reproduce process drawings, tolerance worksheets and tolerance zone conversions.
- Demonstrate mechanical measuring system processing to find dimensional features and surface finish.
- Interpret the overall performance with tolerance analysis.
- Inculcate the nanotechnology processing technique to manufacture intelligent precision products with extremely high precision and high construction.
- Make use of measuring systems to check the dimensional quality and surface finish of the product.
- Examine the process by calculating process capability of the experiment

UNIT-I

Concepts of Accuracy: Introduction: Types of errors and tolerances. Concepts of accuracy MFTW(Machine, Fixture, Tool, Work) System, IS919-1993 Limits and Fits, Spindle inaccuracies, Thermal effects on accuracies, Accuracy of Numerical control system, Errors due to Numerical Interpolation. Displacement Measurement System and velocity Lags.

UNIT- II

Geometric Dimensioning And Tolerancing: Representation of Geometric dimensioning and tolerances, MMC, LMC and RFS, Tolerance Zone conversions, Effect of positional tolerances and its representation, Computation of transnational and rotational accuracy, geometric analysis and application.

UNIT- III

Datums: Six degree of freedom, Datum point, Datum line and Datum Plane, Three mutually perpendicular planes, 3-2-1 principle of location, 4-1-1 and V' block location.
Cylindrical and Diamond pin location, Grouped datum system with Spigot and Recess pair, equalizing datum. Datum oddly configured.
Analysis of Surface Finish: Importance of Surface finish, Representation and analysis of Surface finish, Relationship between attainable tolerance grades and different machining process, Cumulative affect of tolerances and sure fit law, normal law and truncated normal law.

UNIT-IV

Tolerance Analysis: Process capability, Mean, Median, Mode Variance Skewness, Kurtosis, 6sigma, Cp, Cpk, Cost aspects, Application of 6sigma limits to inaccuracies and performance analysation.
Tolerance Charting Techniques: Operation sequence for typical shaft type components, preparation of process drawings for different operations, tolerance work sheets and centrally analysis, Examples, Design features to facilitate machining, Datum featured, functional and manufacturing. Components design-Machining considerations, redesign for manufacturing, Examples.

UNIT-V

Fundamentals of Nano-Technology: System of Nanometer accuracies- mechanism of metal processing-Nano Physical processing of Atomic bit units. Nano Technology and Electrochemical atomic bit processing.
Measuring System Processing: In processing or In-Situ measurement of position of processing point-post process and on machine measurement of dimensional features and surface-mechanical and optical measuring systems. Working systems of CMM. Laser alignment and testing.

TEXT BOOKS

1. Precision Engineering in manufacturing / Murthy.R.L / New Age International (P) limited, 1996
2. Geometric Dimensioning and Tolerancing / James D.meadows / Marcel Deckker inc.1995
3. Mechatronics by HMT

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing Power point presentations.
2. Seminars are conducted on new technologies related to subject.
3. Assignments are given.
4. Group discussions are conducted on familiar topics related to subject.
5. Industrial vists for practical exposure to understand and explore things.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

SPECIAL MANUFACTURING PROCESSES

Elective - I

M.Tech (Design for Manufacturing) I Year - I Semester
Course Code: GR17D5111 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Provide the concepts of surface treatments and coatingsbased on the application of manufacturing processes for materials
- Impart knowledge of selection and design of ceramics and composite materials
- Inculcate the selection of best methods to manufacture steel and aluminum
- Expose e- manufacturing and nano-technology processes
- Identify the appropriate heat treatment and welding technique for the material to be joined.

COURSE OUTCOMES: At the end of the course, the student will be able to

- Provide Knowledge of protective coatings, based on the description of the basic systems of industrially produced Metals.
- Select the most appropriate manufacturing process for fabricating ceramic and composite components
- Indicate which processes are likely to be used for production steel and aluminum
- Implement e-manufacturing technique to any manufacturing products.
- Explain the state-of-the-art characterization methods for nano-materials
- Explain various hardening of materials through heat applications
- Create parts using information provided in blueprints to the given specifications

UNI-I

Surface treatment: Scope, Cleaners, Methods of cleaning, Surface coating types, Ceramic and Organic methods of coating, Economics of coating. Electroforming, Chemical vapor deposition, Thermal spraying, Ion implantation, Diffusion coating, and Cladding.

UNIT-II

Processing of Ceramics: Applications, Characteristics, Classification. Processing of Particulate ceramics, Powder preparations, consolidation, Drying, Sintering, Hot compaction, Area of application, Finishing of ceramics.

Processing of Composites: Composite Layers, Particulate and fiber reinforced composites. Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

UNIT-III

Metal processing and manufacturing: Introduction -The manufacturing engineering discipline - Materials used in manufacturing - Raw materials to finished product - Primary manufacturing processes – steel making - Primary manufacturing processes - aluminium production -Major casting techniques -Solidification mechanism - Solidification volume shrinkage - Heat transfer during solidification - Defects produced during casting -Design of shape castings for manufacturing

UNIT-IV

E-Manufacturing, Nanotechnology, High speed machining: Rapid Prototyping: Working principles, Methods, Stereo Lithography, Laser Sintering, Fused Deposition method, Applications and Limitations.

UNIT-V

Welding and Heat treatment: Solid state Welding Processes: Working Principles, Cold welding, Ultrasonic welding, Friction welding, Resistance welding, Explosion welding and Diffusion Bonding.Heat treating furnaces and equipment, Design Considerations for Heat treating.

TEXT BOOKS

1. Manufacturing and Technology/ Kalpakjian/Pearson Education, INC/Forth Edition
2. Process and Materials of Manufacturing/R.a.Lindburg/Forth Edition, PHI
3. Principles of Metal Manufacturing Process/ J.Beddoes and M.J.Bibby.

REFERENCE BOOKS

1. Advanced Machining Processes/V.K.Jain/Allied Publications
2. Introduction to Manufacturing Processes / John A schey/ Mc Graw Hill

TEACHING METHODOLOGY

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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

FINITE ELEMENT APPLICATIONS IN MANUFACTURING

Elective - I

M.Tech (Design for Manufacturing) I Year - I Semester
Course Code: GR17D5112 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Gain a fundamental understanding of the finite element method for solving boundary value problems .
- Analyze important concepts of variational form, minimum potential energy principles, and method of weighted residuals.
- Derive one dimensional problems such as truss, beam, and frame members, two-dimensional problems such as plain stress and plain strain elasticity problems, torsion problem.
- Introduce the finite element analysis of static and dynamic problems and heat transfer problems and manufacturing processes.
- Aanalysing skills in applying basic laws in mechanics and integration by parts to develop element equations and steps used in solving the problem by finite element method.

COURSE OUTCOMES: At the end of the course, the student will be able to

- obtain an understanding of the fundamental theory of the FEA method
- apply the concepts of minimum potential energy principles to solve structural mechanics problems.
- Compute Eigen values and eigenvectors of simple dynamic systems
- Obtain weak form from strong form and total potential, and recognize similarities between such solutions, and those obtained by variational principles and principal of virtual work.
- Develop the ability to generate the governing FE equations for systems governed by partial differential equations
- Obtain finite element solution and compare with exact solution of simple one dimensional problems.
- Apply the finite element procedure for stress analysis and design of load carrying structures and heat transfer problems and manufacturing processes.

UNIT-I

Introduction: Fundamentals – Initial, boundary and eigen value problems – weighted residual,Galerkin and Raleigh Ritz methods - Integration by parts – Basics of variational formulation– Polynomial and Nodal approximation.

UNIT-II

One Dimensional Analysis: Steps in FEM – Discretization. Interpolation, derivation of elements characteristic matrix, shape function, assembly and imposition of boundary conditions-solution and post processing – One dimensional analysis in solid mechanics and heat transfer.

UNIT-III

Shape Functions And Higher Order Formulations: Shape functions for one and two dimensional elements- Three noded triangular and four nodded quadrilateral element Global and natural co-ordinates—Non linear analysis – Isoparametric elements – Jacobian matrices and transformations – Basics of two dimensional, plane stress, plane strain and axisymmetric analysis.

UNIT- IV

Computer Implementation: Pre Processing, mesh generation, elements connecting, boundary conditions, input of material and processing characteristics – Solution and post processing – Overview of application packages – Development of code for one dimensional analysis and validation.

UNIT-V

Analysis Of Production Processes: FE analysis of metal casting – special considerations, latent heat incorporation,gap element – Time stepping procedures – Crank – Nicholson algorithm Prediction of grain structure – Basic concepts of plasticity and fracture – Solid and flow formulation – small incremental deformation formulation –Fracture criteria – FE analysis of metal cutting, chip separation criteria, incorporation of strain rate dependency – FE analysis of welding.

TEXT BOOKS

1. Reddy, J.N. An Introduction to the Finite Element Method, McGraw Hill,1985.
2. Rao, S.S., Finite Element method in engineering, Pergammon press, 1989.
3. Bathe, K.J., Finite Element procedures in Engineering Analysis, 1990.

REFERENCE BOOKS

1. Kobayashi,S, Soo-ik-Oh and Altan,T, Metal Forming and the Finite Element Methods, Oxford University Press, 1989.
2. Lewis R.W.Morgan, K, Thomas, H.R. and Seetharaman, K.N. The Finite Element Method in Heat Transfer Analysis, John Wiley, 1994.

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing power point presentations.
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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

QUALITY ENGINEERING IN MANUFACTURING

Elective - I

M.Tech (Design for Manufacturing) I Year - I Semester
Course Code: GR17D5113 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- The concept and techniques of quality engineering manufacturing.
- Demonstrate knowledge of international tolerance in engineering.
- Explain the relationship between customer's desire and satisfaction on quality.
- Study concepts of ISO 9000 series of quality standards.
- Illustrate when, and be able, to carry out a one way and two way
- Analysisof variance.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Apprehend the fundamentals of quality engineering in manufacturing.
- Comprehend the engineering aspects of improving quality in manufactured products.
- Develop quality as passion and habit.
- Illustrate the concept of quality by using quality tools to avoid quality loss.
- Enumerate the techniques to find out the variation in the data and obtain optimal results.
- Apply orthogonal arrays in designing, conducting and analyzing the experiments.
- Apply the international standards(ISO) in quality checks.

UNIT-I

Quality Value and Engineering: An overall quality system, quality engineering in production design, quality engineering in design of production processes.Loss Function and Quality Level: Derivation and use of quadratile loss function, economic consequences of tightening tolerances as a means to improve quality, evaluations and types tolerances.(N-type,S-type and L-type)

UNIT-II

Tolerance Design and Tolerancing: Functional limits, tolerance design for N-type, L-type and S-type characteristics, tolerance allocation for multiple components. Parameter and Tolerance Design: Introduction to parameter design, signal to noise ratios, Parameter design strategy, some of the case studies on parameter and tolerance designs.

UNIT-III

Analysis of Variance (ANOVA): NO-way ANOVA, One-way ANOVA, Two-way ANOVA, Critique of F-test, ANOVA for four level factors, multiple level factors.

UNIT-IV

Orthogonal Arrays: Typical test strategies, better test strategies, efficient test strategies, steps in designing, conducting and analyzing an experiment. Interpolation of Experimental Results: Interpretation methods, percent contribution, estimating the mean.

UNIT-V

Qality: ISD-9000 Quality System, BDRE, 6-sigma, Bench making, Quality circles, Brain Storming, Fishbone diagram, problem analysis.

TEXT BOOKS

1. Taguchi Techniques for Quality Engineering / Phillip J. Ross / McGraw Hill, Intl. II Edition, 1995.

REFERENCE BOOKS

1. Quality Engineering in Production systems / G. Taguchi, A. Elsayed et al / Mc.Graw Hill Intl. Edition, 1989.
2. Taguchi Methods explained: Practical steps to Robust Design / Papan P. Bagchi / Prentice Hall Ind. Pvt. Ltd., New Delhi.

TEACHING METHODOLOGY

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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED CAD
Elective - II

M.Tech (Design for Manufacturing) I Year - I Semester

Course Code: GR17D5114 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Impart knowledge of Computer Aided Design tools in design of machine components.
- Create Wire-frame, Surface and Solid models for Engineering Components using the CAD system.
- Gain the knowledge of special surfaces and solid model representation techniques to create models of complex products.
- Inculcate collaborative engineering principles in industry or organization.
- Implement Finite Element Methods in analysis of the Engineering components.

COURSE OUTCOMES: At the end of the course, the student will be able to

- Illustrate the basic principles of Computer Aided Design tools used in Engineering.
- Develop synthetic curves like cubic curve, Bezier curve, B-spline and NURBS to create wire frame models of engineering products.
- Apply analytical surfaces like plane surface, surface of revolution, tabulated cylinder to create standard surfaces of engineering products.
- Employ synthetic surfaces like cubic surfaces, Bezier surfaces and B-spline surfaces to create complex surfaces of engineering products.
- Examine special surfaces like coons patch, blending surface, ruled surface and sculptured surface to modify the surfaces developed.
- Create the solid model of the object using Boundary representation, Constructive solid geometry, Sweep representation methods. And able to recognize the CAD/CAM exchange formats.
- Analyze a CAD model using Finite Element Method (FEM).

UNIT-I

Cad Tools: Definition of CAD Tools, Types of system, CAD/CAM system evaluation criteria, brief treatment of input and output devices. Graphics standard, functional areas of CAD, Modeling and viewing, software documentation, efficient use of CAD software.

UNIT-II

Geometric modeling: mathematical description of Analytical curves such as Line, Circle, Ellipse, Parabola etc., Problems Wire frame models, wire frame entities parametric representation of synthetic curves, hermite cubic splines, Bezier curves B-splines, rational curves, NURBS, Problems

UNIT-III

Surface Modeling: Mathematical representation of surfaces, Surface model, Surface entities, Definition of a Patch, surface representation, Parametric representation of surfaces, plane surface, Tabulated Cylinder.

Parametric Representation Of Synthetic Surfaces - Hermite Bicubic surface, Bezier surface, B-Spline surface, COON surface, Surface of Revolution, Ruled Surface, Blending surface, Sculptured surface, Surface manipulation — Displaying, Segmentation, Trimming, Intersection, Transformations (both 2D and 3D).

UNIT-IV

Geometricmodelling-3D: Solid modeling, Solid Representation, Boundary Representation (B-rep), Constructive Solid Geometry (CSG).Difference between Feature-based and Parametric based modeling, Description of features such as Extrude, Sweep, Loft, Hole, Extrude-cut etc., CAD/CAM Exchange: Evaluation of data— exchange format, IGES data representations and structure, STEP Architecture, implementation, ACIS &DXF.

UNIT-V

Design Applications: Mechanical tolerances, Mass property calculations, Finite Element Modeling and Analysis, Preprocessing and Post processing in FEA, Types of Structural, Thermal analysis and Mechanical Assembly.

Collaborative Engineering: Collaborative Design, Principles, Approaches, Tools, Design Systems.

TEXT BOOKS

1. CAD/CAM Theory and Practice / Ibrahim Zeid / Mc Graw Hill international.

REFERENCE BOOKS

1. Mastering CAD/CAM / Ibrahim Zeid / Mc Graw lull international.
2. CAD/CAM / P.N.Rao / TMH.
3. CAD/CAM/CIM Radhakrishnan.

TEACHING METHODOLOGY

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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MECHATRONICS
Elective - II

M.Tech (Design for Manufacturing) I Year - I Semester
Course Code: GR17D5115 L/T/P/C : 3/1/0/4

COURSE OBJECTIVE : The Objective of this course is to provide the student to

- Impart the knowledge of Mechatronics systems such as controls, drives, real time interfacing and data acquisition systems.
- Inculcatethe concepts of electromechanical, hydraulic, and pneumatic systems.
- Impart the knowledge of PLC systems for controlling CNC machines.
- Inculcate the knowledge of microcontroller programming and microprocessors in design of embedded systems.
- Inculcate the knowledge of sensors, switches and control loops of CNC machines.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Design a mechatronic system such as pick and place robot, car park barriers, car engine management and bar code reader.
- Develop an intelligent and automated systems.
- Apply design principles of electromechanical, hydraulic and pneumatic systems to develop actuators and motion controllers.
- Design a PLC system for controlling the CNC machines.
- Apply the microcontroller programming, microprocessors in design of embedded systems.
- Design electromechanical systems for acquiring the CAD/CAM database.
- Design sensors and control loops for CNC machines.

UNIT-I

Introduction: Definition of Mechatronics products. Design considerations and tradeoffs, over view of mechatronic products. Types of automations and mechatronic elements. Intelligent machine vs. automatic. Economics and social justification.
Mechanical Systems, Electromechanical modules, actuators, motion controls and accuracies. Characteristics of electromechanical, Hydraulic, Pneumatic systems and comparison. Control parameters and system objectives, popular control system configuration-S curves. Motor load, Torque Inertia/acceleration torque analysis. Types of motors and speed control sytems

UNIT- II

Motion Controls: Motion control algorithms. Significance of feed forward control loops, shortfall, fundamental concepts of adaptive and fuzzy controls. Fuzzy logics compensatory control of transformation and deformation non linear Z-inertia.

UNIT- III

RLC, PLC: Architecture of intelligent Machines, Relay logic controllers. Programmable logic controllers. Architecture of PLC. Interfacing, Types of PLC's and selection. Advantages and applications

UNIT-IV

Micro Processors : Introduction to microprocessors and microcontrollers.Programming of microcontrollers. Limitations of microcontrollers. Concepts of embedded systems.

Computers: Manufaturing Data Bases, Database management systems. CAD/CAM Databases. Graphic database. Introduction to object oriented concepts. Object oriented model languages and interfacing. Procedures and methods in creation, edition and manipulation of Data

UNIT-V

Sensors: Types of sensors, mechanical, tactile and non tactile sensors, limit switches, proximity and optic sensors. Analogue & digital sensors and interfacing. Human-machine and Machine-Machine interfacing devices and strategy. Machine vision: Feature and pattern Recognition methods, concepts of perception and recognition in decision making CNC: Feedback control systems.

Encoders & Linear scales Position controls. Coordinated Measuring Machines. CNC software and applications, Flexible manufacturing systems.

TEXT BOOKS

1. "Designing intelligent machines" open university, London.Michel B.Histand and David G.Alciatore."
2. MECHATRONICS - HMT - McGraw-Hill Education
3. Mechatronics by MAHALIK Mc Graw Hill

REFERENCE BOOKS

1. Introduction to Mechatronics and measurement systems Tata MC Graw Hill
2. Control sensors and actuators "prentice Hall"Teaching Methodology:

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing power point presentations.
2. Seminars are conducted on new technologies related to subject.
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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED ELASTICITY & PLASTICITY

(Elective - II)

M.Tech (Design for Manufacturing) I Year - I Semester
Course Code: GR17D5116 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- To introduce to students the concepts of stresses, strains and stress-strain relationships, as well as the basic theory of elasticity, plasticity and failure criteria.
- To develop students with an understanding of how stresses and strains within engineering components are related to both loads and displacements imposed at their boundaries and to inertial loads.
- To prepare students for the use of different methods to analyze the stresses and strains within engineering components.
- To allow students become familiar with problem formulations and solutions in elasticity and plasticity; and prepare students for future study in advanced engineering mechanics.
- To develop analytical skills of solving problems using plain stress and plain strain.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Apply the differential equations of equilibrium and reciprocal theorem to structural problems.
- Analyze the structure using plasticity.
- Summarize the theories of plasticity and apply them in real time problems.
- Interpret the stress and strain distribution in bars and apply them in engineering problems.
- Interpret the stress and strain distribution in beams.
- Outline the deformation and creep of materials in plastic stage.
- Analyze and predict the characteristics of the materials in plastic stage using different methods practically.

UNIT-I

Elasticity: Two dimensional stress analysis, Plane stress, Plane strain, Equations of compatibility, Stress function, Boundary conditions.

Problem in rectangular coordinates: Solution by polynomials, Saint Venents Principles, Determination of displacement, Simple beam problems.

Problems in polar coordinates, General equations in polar coordinates- Stress distribution symmetrical about axis, Strain components in polar coordinates, Simple and Symmetric problems.

UNIT-II

Analysis of Stress and strain in three dimensions: Principle stresses, Homogeneous deformations, Strain spherical and deviatoric stress, Hydrostatic strain.

General theorems: Differential equations of equilibrium and compatibility, Displacement, Uniqueness of solution, Reciprocal theorem.

UNIT-III

Bending of Prismatic bars, Stress function, bending of cantilever beam, beam of rectangular cross section and beams of circular cross sections

UNIT- IV

Plasticity: Plastic deformation of metals, Structure of metals, Deformation, Creep stress relaxation deformation, Strain rate condition of constant maximum shear stress, Condition of constant strain energy approximate equation of plasticity.

UNIT-V

Methods of solving practical problems, the characteristic method, Engineering method, Compression of metal under press, Theoretical and experimental data drawing.

TEXT BOOKS

1. Theory of Elasticity by Timoshenko, S.P. and Goodier.J.N
2. An Engineering Theory of Plasticty by E.P.Unksov.

REFERENCE BOOKS

1. Applied Elasticity by W.T.Wang.
2. Theory of Plasticity by Hoffman and Sacks.

TEACHING METHODOLOGY

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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MANUFACTURING SIMULATION & PRECISION ENGINEERING LAB

M.Tech (Design for Manufacturing) I Year - I Semester
Course Code: GR17D5117 L/T/P/C : 0/0/4/2

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Impart the knowledge of material handling software like FLEXIM
- Implement the knowledge of FLEXIM software in developing material handling models.
- Implement the knowledge of PLC and Microcontroller programming in controlling machining operations.
- Impart the knowledge of robot programming in material handling.
- Implement the optimization techniques in shop floors layout in increase in productivity.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Demonstrate the functions of FLEXIM software. And able to apply FLEXIM software to create material handling models.
- Apply FLEXIM software in shop floor layouts to reduce the costof material handling.
- Create new machine layouts by studying the existing layouts using FLEXIM softwares to increase the productivity.
- Explain Programmable Logic Controller (PLC) and Microcontroller programming skills for project related applications.
- Apply various programs on robots like Mentor ROBOfor efficient material handling.
- Demonstrate the programs of Linear Synchronized Motor Controller(LSM) for efficient material handling.
- Apply all material handling systems to design and develop an efficient Flexible Manufacturing System (FMS).

FLEXISM SOFTWARE

a. Model description & Development
b. Model Development and assigning the parameters
c. Adding Team Operators, Fork Truck transporter,
d. Selection of object for statistics,
e. Viewing the statistics
f. Viewing 3D model
g. Global tables to define routing
h. Set-up a travel path network for a transporter
i. Multiple runs of the model
j. Study of AGV-Auto guided vehicle

PRECISION ENGINEERING

1. Electro Mechanical 2-Axis X-Y-table
2. Hydraulic / Pneumatic circuits
3. PLC-programming
4. Micro- Controller programming
5. Water Plasma spraying and cutting
6. Study & programming of Robot
7. Study of Chip formation & cutting forces on Lathe machine
8. Study of operation of Tool and cutter grinder-Twist drill
9. Study of Unconventional machining process
10. Condition monitoring of machine tools.

Softwares: FLEXISM 3.5, 'MENTOR ' Robotics Program, programmable logical controller, H simulator, Control X sim, LSM controller, P simulator.

TEACHING METHODOLOGY

1. Lecture is delivered on projector showing the software and its features.
2. Seminars are conducted on new technologies related to subject.
3. Exercises are created to practice of various models.
4. Quiz's are conducted to test the competency level of student with software
5. Industrial vists for practical exposure to understand and explore things.

OPEN ELECTIVE - I

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

E - COMMERCE AND APPLICATIONS
(Open Elective I)

M.Tech (CSE) I Year - I Semester

Course Code: GR17D5178 L/T/P/C : 3/1/0/4

Course Objectives

- To understand the interest and opportunity of e-commerce
- To know and understand the critical success factors in implementing an ecommerce
- System
- To know how to plan and how to manage e-commerce solutions
- To have hands on, real-life experience with electronic commerce applications
- To analyze and understand the human, technological and business environment
- Associated with e-commerce

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

- Understand the trends in e-Commerce and the use of the Internet.(Level 2)
- Analyze, Understand and Comparethe principles of E-commerce and basics of World Wide Web.(Level 2&4)
- Analyze, Understandthe concept of electronic data interchange and its legal, social and technical aspects.(Level 2&4)
- Understandand Evaluate the security issues ssssover the web, the available solutions and future aspects of e-commerce security .(Level 2&5)
- Understanding and Validating the concept of E-banking, electronic payment system.(Level 2&5)
- Understand, Analyze and Comparethe capabilities and limitation of agents, Web based marketing and various security Issues. (Level 2&4)
- Understandingand Evaluation of online advertisements, website design issues and Creating a business transaction using an e commerce site.(Level 2,5 &6)

UNIT-I

INTRODUCTION Traditional commerce and E commerce – Internet and WWW – role of WWW – value chains – strategic business and Industry value chains – role of E commerce, advantages of E commerce, anatomy of e commerce applications.

UNIT-II

INFRASTRUCTURE FOR E COMMERCE Packet switched networks – TCP/IP protocol script – Internet utility programmes – SGML, HTML and XML – web client and servers – Web client/server architecture – intranet and extranets.

UNIT-III

WEB BASED TOOLS FOR E COMMERCE Web server – performance evaluation - web server software feature sets – web server software and tools – web protocol – search engines – intelligent agents –EC software – web hosting – cost analysis

UNIT- IV

SECURITY Computer security classification – copy right and Intellectual property – electronic commerce threats – protecting client computers – electronic payment systems and risks involved in it –electronic cash __ micro payment system– strategies for marketing – sales and promotion – cryptography –authentication.

UNIT-V

INTELLIGENT AGENTS Definition and capabilities – limitation of agents – security – web based marketing – search engines and Directory registration – online advertisements – Portables and info mechanics – website design issues.

TEXT BOOKS

1. Ravi Kalakota, " Electronic Commerce", Pearson Education,
2. Gary P Schneider "Electronic commerce", Thomson learning & James T Peny Cambridge USA, 2001.

REFERENCES BOOK

1. EfraimTurvanJ.Lee, David kug and chung, "Electronic commerce" Pearson Education Asia 2001.
2. Brenda Kienew E commerce Business Prentice Hall, 2001.
3. Manlyn Greenstein and Miklos "Electronic commerce" McGraw-Hill, 2002.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENTERPRISE RESOURCE PLANNING
(Open Elective-I)

M.Tech (IT) I Year - I Semester

Course Code: GR17D5179 L/T/P/C : 3/1/0/4

PREREQUISITES

- Fundamentals of enterprise resource planning (ERP) systems concepts
- Importance of integrated information systems in an organization.

COURSE OBJECTIVES: The objective of the course is to provide the student

- Understanding of the basic concepts of ERP systems for manufacturing or service companies, and the differences among MRP, MRP II, and ERP systems
- Thinking in ERP systems: the principles of ERP systems, their major components, and the relationships among these components
- Capability to adapt in-depth knowledge of major ERP components, including material requirements planning, master production scheduling, and capacity requirements planning
- Understanding knowledge of typical ERP systems, and the advantages and limitations of implementing such systems
- Understanding the business process of an enterprise
- Grasp the activities of ERP project management cycle
- Understanding the emerging trends in ERP developments

COURSE OUTCOMES: At the end of the course the student will be able to

- Examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components
- Understand production planning in an ERP system, and systematicallydevelop plans for an enterprise
- Use methods to determine the correct purchasing quantity and right time to buy an item, and apply these methods to material management
- Understand the difficulties of a manufacturing execution system, select a suitable performance measure for different objectives, and apply priority rules to shop floor control
- Knowledge of ERP implementation cycle
- Awareness of core and extended modules of ERP
- Apply emerging trends in ERP

UNIT-I

Introduction: Overview – Benefits of ERP – ERP and Related Technologies – Business Process Reengineering – Data Warehousing – Data Mining – On–line Analytical Processing – Supply Chain Management.

UNIT-II

IMPLEMENTATION: Implementation Life Cycle – Implementation Methodology – Hidden Costs – Organizing Implementation – Vendors, Consultants and Users – Contracts – Project Management and Monitoring.

UNIT- III

BUSINESS MODULES: Business Modules in an ERP Package – Finance – Manufacturing – Human Resource –Plant Maintenance – Materials Management – Quality Management – Sales and Distribution.

UNIT- IV

ERP MARKET: ERP Market Place – SAP AG – PeopleSoft – Baan Company – JD Edwards World Solutions Company – Oracle Corporation – QAD – System Software Associates.

UNIT- V

ERP-Present and future : Turbo Charge the ERP System – EIA – ERP and E–Commerce – ERP and Internet – Future Directions in ERP.

TEXT BOOKS

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, 1999.
2. Joseph A. Brady, Ellen F. Monk, Bret J. Wangner, “Concepts in Enterprise Resource Planning” , Thomson Learning, 2001.
3. Vinod Kumar Garg and N.K .Venkata Krishnan, “Enterprise Resource Planning – concepts and Planning”, Prentice Hall, 1998.
4. Jose Antonio Fernandz, “ The SAP R /3 Hand book”, Tata McGraw Hill

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MODERN CONTROL THEORY
(Open Elective-I)

M.Tech (EEE) I Year - I Semester

Course Code: GR17D5180 L/T/P/C : 3/1/0/4

PREREQUISITE: Control Systems, Mathematics.

COURSE OBJECTIVES

- To familiarize students with the modelling of systems
- To familiarize the students with the state space analysis of dynamic systems and observe their controllability and Observability.
- To make students understand the concepts of describing function analysis of nonlinear systems and analyze the stability of the systems.
- To analyze the stability of the nonlinear systems.

COURSE OUTCOMES

- Ability to obtain the mathematical model of any system.
- Ability to obtain the state model for dynamic systems.
- Ability to analyze the controllability and Observability for various types of control systems.
- Ability to understand the various types of nonlinearity.
- Ability to analyze the stability of the nonlinear systems.
- Ability to synthesize the nonlinear systems.

UNIT-I

MATHEMATICAL PRELIMINARIES: Fields, Vectors, Vector Spaces — Linear combinations and Bases — Linear Transformations and Matrices — Scalar Product and Norms ,Eigenvalues, Eigen Vectors and a Canonical form representation of linear operators, The concept of state — State Equations for Dynamic systems, Time invariance and Linearity Non uniqueness of state model — State diagrams for Continuous-Time State models.

UNIT-II

STATE VARIABLE ANALYSIS: linear Continuous time models for Physical systems-- Existence and Uniqueness of Solutions to Continuous- time State Equations — Solutions of Linear Time Invariant Continuous-Time State Equations—State transition matrix and it's properties.

CONTROLLABILITY AND OBSERVABILITY-General concept of controllability— General concept of Observability—Controllability tests for Continuous-Time Invariant Systems ---
Observability tests for Continuous-Time Invariant Systems— Controllability and Observability of State Model in Jordan Canonical form— Controllability and Observability Canonical forms of State model.

UNIT- III

NON LINEAR SYSTEMS -I

Introduction to Non Linear Systems - Types of Non-Linearities-Saturation-Dead-Zone - Backlash Jump Phenomenon etc;— Singular Points-Introduction to Linearization of nonlinear systems, Properties of Non Linear systems-Describing function-describing function analysis of nonlinear systems-Stability analysis of Non-Linear systems through describing functions.

UNIT-IV

NON LINEAR SYSTEMS-II

Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase- plane analysis of nonlinear control systems.

UNIT-V

STABILITY ANALYSIS

Stability in the sense of Lyapunov, Lyapunovs stability and Lyapunov's instability theorems - StabilityAnalysis of the Linear continuous time invariant systems by Lyapunov second method — Generation of Lyapunov functions Variable gradient method — Krasooviski's method.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

EXT BOOKS

1. Modern Control System Theory by M.Gopal — New Age International -1999
2. Modern Control Fngineering by Ogata:K — Prentice Hall – 1997

REFERENCE BOOK

1. Control Systems Engineering, N. S. Nise: 4th Ed., Wiley, 2004.Engineering, 4th Ed., Wiley, 2004.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER–ORIENTED NUMERICAL METHODS IN ENGINEERING
(Open Elective-I)

M.Tech (CIvil) I Year - I Semester

Course Code: GR1775181 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES

- To develop the skill of solving linear algebraic systems by direct and iteration methods.
- To illustrate advanced matrix techniques in the determination of Eigen values and Eigen vectors of square matrix.
- To analyze the performance of various interpolation technique and perform error analysis.
- To compare various numerical differentiation and integration techniques. •
- To explain the various techniques to study Initial and Boundary value problems in ODE.
- To solve a range of problems on applicable software.

COURSE OUT COMES: At the end of the course the student will be able to

- Solve linear algebraic system by direct and iteration methods.
- Apply the knowledge of Eigen values and Eigen vectors to some contents in engineering.
- Develop the skill of working with symmetric matrices in the study of Engineering problems.
- Apply the knowledge of interpolation and extrapolation of uniform and non uniform data to certain contents of Civil Engineering.
- Apply the knowledge of numerical differentiation and integration to some contents of Civil Engineering
- Learn grid based methods to solve Initial and Boundary value problems that arise in engineering problems.
- Develop the skill of solving computational problems using software.

UNIT-I

Solutions of linear equations: Direct method – Cramer's rule, Guass – Elimination method-Gauss Jordan elimination – Triangulation (LU Decomposition) method – Iterative methods Jacobi – Iteration method – Gauss – Siedel iteration, Successive over –relaxation method.

Eigen values and eigen vectors: Jacobi method for symmetric matrices- Given's method for symmetric matrices-Householder's method for symmetric matrices-Rutishauser method of arbitrary matrices –Power method.*Demonstration of solutions using open source software in Numerical Methods.

UNIT-II

Interpolation: Linear Interpolation - Higher order Interpolation - Lagrange Interpolation – Interpolating polynomials using finites differences- Hermite Interpolation -piece-wise and spline Interpolation.*Demonstration of solutions using open source software in Numerical methods.

UNIT - III

Finite Difference and their Applications: Introduction- Differentiation formulas by Interpolating parabolas – Backward and forward and central differences- Derivation of Differentiation formulae using Taylor series- Boundary conditions- Beam deflection – Solution of characteristic value problems- Richardson's extrapolation- Use of unevenly spaced pivotal points- Integration formulae by interpolating parabolas- Numerical solution to spatial differential equations. *Demonstration of solutions using open source software in Numerical Methods.

UNIT-IV

Numerical Differentiation: Difference methods based on undetermined coefficients- optimum choice of step length– Partial differentiation. Numerical Integration: Method based on interpolation-method based on undetermined coefficient – Gauss – Lagrange interpolation method- Radaua integration method- composite integration method – Double integration using Trapezoidal and Simpson's method.*Demonstration of solutions using open source software in Numerical Methods.

UNIT-V

Ordinary Differential Equation: Euler's method – Backward Euler method – Mid point method – single step method, Taylor's series method- Boundary value problems-case studies. *Demonstration of solutions using open source software in Numerical Methods.

***NOTE:** Demonstration of solutions using open source software in Numerical Methods only for the knowledge of students to apply in their Project Works. Not for examination.

TEXT BOOKS

1. M.K.Jain-S.R.K.Iyengar, R.K.Jain Numerical methods for scientific and engineering computations, Willey Eastern Limited, 1987
2. S.S.Shastry, Numerical methods.
3. Curtis I.Gerala, Applied numerical analysis, Addisson Wasley published campus.

REFERENCES BOOKS

1. C.Chopra, Raymond P.Canal, Numerical methods for Engineers Stevan, Mc. Graw Hill book Company, 4th edition, 2002.
2. C.Xavier, C Language and Numerical methods, New age international publisher, 2003.
3. Dr. M.Shanta Kumar, Computer based numerical analysis, Khanna Book publishers, New Delhi.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED COMPUTER ARCHITECTURE
(Open Elective-I)

M.Tech (ECE) I Year - I Semester

Course Code: GR17D5182 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES

- To learn how to build the best processor/computing system understanding the underlying tradeoffs and ramifications.
- To identify and analyze the attributes of computer architecture design with recent trend technology.
- To identify the techniques to improve the speed and performance of computers – Parallelism in Instruction level – Hardware approaches - pipelining,dynamic scheduling, superscalar processors, and multiple issue of instructions.
- To implement the design aspects and categorize various issues , causes and hazards due to parallelisms.
- To examine and compare the performance with benchmark standards.
- To understand the framework for evaluating design decisions in terms of application requirements and performance measurements.
- To learn the design and analysis of complex and high performance multiprocessors and supporting subsystems from the quantitative aspect.

COURSE OUTCOMES: After going through this course the student will be able to

- An ability to discuss the organisation of computer-based systems and how a range of design choices are influenced by applications.
- An ability to understand the components and operation of a memory hierarchy and the range of performance issues influencing its design.
- An ability to interpret the organisation and operation of current generation parallel computer systems, including multiprocessor and multicore systems.
- An ability to understand the various techniques to enhance a processors ability to exploit instruction-level parallelism (ILP), and its challenges.
- An ability to know the classes of computers, and new trends and developments in computer architecture.
- An ability to develop the applications for high performance computing systems.
- An ability to undertake performance comparisions of modern and high performance computers.

UNIT -I

Fundamentals of Computer Design: Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, measuring and reporting performance, Quantitative principles of computer design, Amdahl's law.

Instruction set principles and examples- Introduction, classifying instruction set- memory addressing type and size of operands, Operations in the instruction set.

UNIT-II

Pipelines: Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

Memory Hierarchy Design: Introduction, review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT-III

Instruction Level Parallelism (ILP) - The Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, High performance instruction delivery- Hardware based speculation.

ILP Software Approach:

Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware verses Software.

UNIT-IV

Multi Processors and Thread Level Parallelism: Multi Processors and Thread level Parallelism-Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – Memory architecture, Synchronization.

UNIT-V

Inter Connection and Networks: Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.
Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, an Imprint of Elsevier.

REFERENCE BOOKS

1. John P. Shen and Miikko H. Lipasti -, Modern Processor Design : Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing - Kai Hwang, Faye A.Brigs., MC Graw Hill.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATIONS RESEARCH
(Open Elective-I)

Mtech(ME) I Year - I Semester

Course Code: GR17D5183 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide

- Analysis of quantitative methods and techniques for effective Decision–making.
- Constructing models that are used in solving business decision problems.
- Introduce the students to the use of basic methodology for the solution of linear programs and integer programs.
- Introduce the students to methods for solving large-scale transportation and assignment problems.
- Illustrate how sequencing is carried out in assigning jobs to machines
- Understand the concept of Inventory and apply different models in optimizing the same.
- Apply PERT/CPM: [Project scheduling and allocation of resources] to schedule and control construction of dams, bridges, roads etc. in an optimal way.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Apply various linear programming techniques for optimal allocation of limited resources such as machine, materials and money
- Solve transportation problems to minimize cost and understand the principles of assignment of jobs and recruitment polices.
- Solve game theory problems.
- Solve problems of inventory and develop proper inventory policies.
- Apply PERT/CPM: [Project scheduling and allocation of resources] to schedule and control construction of dams, bridges, roads etc in a optimal way.
- Solve sequencing problems.
- Develop optimum replacement policy

UNIT-I

Introduction: Definition and scope of operations research(OR),ORmodel, solving the O**R** model, art of modeling, phases of OR study.

Linear Programming:

Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

UNIT-II

Transportation Problems: Types of transportation problems, mathematical models, transportation algorithms

Assignment: Allocation and assignment problems and models, processing of job through machines.

UNIT-III

Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.
Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

UNIT-IV

Theory of Games: Rectangular games, Min-max theorem, graphical solution of 2xnormx2 games, game with mixed strategies, reduction to linear programming model.
Quality Systems: Elements of Queuing model, generalized Poisson queuing model.

UNIT-V

Inventory Control: Models of inventory, operation of inventory system, quantity discount.
Replacement models: Equipments that deteriorate with time, equipments that fail with time.

Text/ Reference Books:

1. Wayne L. Winston,"OperationsResearch", Thomson Learning, 2003.
2. Hamdy H. Taha, "Operations Research - An Introduction", Pearson Education, 2003.
3. R. Panneer Seevam, "Operations Research", PHI Learning, 2008.
4. V. K. Khanna, "Total Quality Management", New Age International, 2008.

Teaching Methodology:

- Lecture is delivered on blackboard, preparing OHP sheets and by preparing Power point presentations.
- Seminars are conducted on new technologies related to subject.
- Assignments are given.
- Group discussions are conducted on familiar topics related to subject.
- Industrial visits for practical exposure to understand and explore things.

II- SEMESTER

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

DESIGN OF HYDRAULIC & PNEUMATIC SYSTEMS

M.Tech (Design for Manufacturing) I Year - II Semester
Course Code: GR17D5118 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Introduce the students, the basic concepts of hydraulic and pneumatic systems.
- Expose the students with various hydraulic and pneumatic actuators.
- Provide knowledge on fluid power systems and its applications to real time.
- Know the problem, which occur in fluid power systems and take necessary troubleshooting maintenance activities.
- Get practiced in designing hydraulic and pneumatic systems.

COURSE OUTCOMES: At the end of the course, the student will be able to

- Gain knowledge on hydraulic and pneumatic systems concepts.
- Compare the various actuators and choose according to required application.
- Determine the components and accessories required in constructing a hydraulic power pack.
- Design hydraulic and pneumatic circuits.
- Solve the problem that occurs in fluid power systems and take relevant troubleshooting/ maintenance activities.
- Gain the skills on hydraulic and pneumatic power pack with its components and accessories.
- Analyze the problems that will occur during operating fluid power systems and take decision and troubleshooting/maintenance activities

UNIT-I

Oil-Hydraulic Systems: Pascals Law, Bramah's press. Bernoulli's principle, Torricelli principle. Fluid properties. Viscocity, Effect of temperatures, dust and decay of Oils .Oil Hydraulic elements and their representation in the circuits. Comparison of Mechanical, Electrical, Hydraulic & Pneumatic systems for force and motion analysis in automation.

UNIT-II

Hydraulic Pumps: Classification of Pumps, Gear Pump, Vane Pump, piston Pump, bent axis in line piston pumps. Internal and external Gear pumps. Selection and specification of Pumps. Actuators: Design of linear Actuators, Cushioning, Seals. Mounting details.Piston rod diameter and its effect on the pressure. Servo Controlled Valves. Hydraulic Counter Balancer Circuit, Sequencing and Synchronising Circuits, Rotary Actuators.

UNIT-III

Hydraulic Power Pack: Elements of Power pack. Design of Hydraulic Power pack, Line pressure, Discharge & Motor selection, Power Pack size and capacity. Importance of pressure relief Valve and safety systems. Heating and Cooling systems for Hydraulic Power pack.

UNIT-IV

Hydraulic Circuits: Meter-in, Meter-out, Bleed off circuits. Direction Control valves, Solenoid Valves, Flow Control and Pressure control Valves. Pressure compensation, Accumulators. Pneumatic Circuits: FRL-Unit, Pneumatic line in the Industry, Applications of Pneumatic Equipment. Hydro Pneumatic Circuits.

UNIT-V

Automation: Hydraulic and Pneumatic equipment in Automation, LowCos Automation, Relay Circuits, PLC Circuits, Micro Controllers,

Trouble Shooting: Hydraulic & Pneumatic equipment Trouble Shooting, Simulation software, Sensors, Hydraulic and Pneumatic E2q2uipment maintenance.

TEXT BOOKS

1. S.R Majumdar, Oil Hydraulics systems.Tata MC.graw Hill
2. S.R Majumdar, Pneumatic Systems,Principles & maintenance Tata McGraw Hill

REFERENCE BOOKS

1. Andrew Parr, Hydraulic & Pneumatics jaico Publishing House.
2. Antony Esponssito, Fluid Power with applications,Prentice Hall

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing power point presentations.
2. Seminars are conducted on new technologies related to subject.
3. Assignments are given.
4. Group discussions are conducted on familiar topics related to subject.
5. Industrial vists for practical exposure to understand and explore things

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

TOTAL QUALITY MANAGEMENNT

M.Tech (Design for Manufacturing) I Year - II Semester
Course Code: GR1775119 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Introduce the students, the basic concepts of hydraulic and pneumatic systems.
- Expose the students with various hydraulic and pneumatic actuators.
- Provide knowledge on fluid power systems and its applications to real time.
- Know the problem, which occur in fluid power systems and take necessary troubleshooting/ maintenance activities.
- Get practiced in designing hydraulic and pneumatic systems.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Gain knowledge on hydraulic and pneumatic systems concepts.
- Compare the various actuators and choose according to required application.
- Determine the components and accessories required in constructing a hydraulic power pack.
- Design hydraulic and pneumatic circuits.
- Solve the problem that occurs in fluid power systems and take relevant troubleshooting/ maintenance activities.
- Gain the skills on hydraulic and pneumatic power pack with its components and accessories.
- Analyze the problems that will occur during operating fluid power systems and take decision and troubleshooting/maintenance activities

UNIT-I

Introduction: The concept of TQM, Quality and Business performance, attitude and involvement of top management, communication, culture and management systems, Management of Process Quality: Defination of quality, Quality Control, a brief history, Product Inspection vs, Process control, Statistical Quality Control, Control Charts and Acceptance Sampling.

UNIT-II

Customer Focus and satisfaction: Process Vs. Customer, internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer-Supplier relationships. Bench marking, Evolution of bench marking, meaning of bench marking, benefits of bench marking, the bench marking process, pitfalls of bench marking.

UNIT-III

Organizing for TQM: the systems approach, Organizing for quality implementation, making the transition from a traditional to a TQM organization, Quality Circle. Productivity, Quality and Reengineering: The leverage of Productivity and Quality, Management systems Vs. Technology, Measuring Productivity, Improving Productivity Re-engineering.

UNIT-IV

The Cost of Quality: Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost Information, Accounting Systems and Quality Management.

UNIT-V

ISO9000: Universal standards of Quality: ISO around the world, The ISO9000ANSI/ASQCQ-Series Standards, benefits of ISO9000 certification, the third party audit, Documentation ISO9000 and services, the cost of certification implementing the system.

REFERENCE BOOKS

1. "Total Quality Management" by Joel E.Ross.
2. "Beyond TQM" by Robert L.Flood.
3. Statistical Quality Control" by Grant.

TEACHING METHODOLOGY

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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER AIDED MANUFACTURING

M.Tech (Design for Manufacturing) I Year - II Semester
Course Code: GR17D5120 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Develop CNC programs of lathe and Milling machines.
- Outline the Interchangeable tooling, coolant fed, and automatic head changer tooling for CNC machines.
- Express the need, functions, communications and major variables in the DAPP-Based post processor.
- Gain the knowledge on components, selection, programming and applications of microcontrollers and programmable logical controls (PLC's) in CNC machines.
- Apply the knowledge of computer aided process planning (CAPP), Computer Aided Quality Control tools and Expert systems in Manufacturing of Engineering products

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Demonstrate machining fundamentals including speed and feed calculations, tooling systems, work-holding systems and Postprocessor's for Computer Numerical Control milling and turning equipment
- Develop Computer Numerical controlled (CNC) programs and Automatically Programmed Tools (APT) programs for CNC milling and turning equipment.
- Explain applications of microcontrollers and programmable logic controllers(PLC's)in CNC machines.
- Apply Computer Aided process planning techniques and Computer Aided quality control Methods to improve productivity and product quality.
- Explain expert systems and its structure used in various industries and adapt principles of Artificial Neural Networks (ANN), Artificial Intelligence to improve productivity.
- Outline contact and non-contact inspection instruments for measuring dimensional accuracy of the part.
- Illustrate the principle of working, applications, limitations of coordinate measuring machine.

UNIT -I

Computer Aided programming: General information. APT Programming , Examples Apt programming probkms (2D machining only).NC programming on CAD/CAM systems, the design and implementation of post processors Introduction to CAD/ CAM software, Automatic Tool Path generation.

UNIT-II

Tooling for CNC Machines: Interchangeable tooling system, preset and qualified tools, coolant fed tooling system. Modular fixturing, quick change tooling system, automatic head changers. DNC Systems and Adaptive Control Introduction type of DNC systems, advantages arid disadvantages of DNC, adaptive control with optimization. Adaptive control with constraints, Adaptive control of machining processes like turning, grinding.

UNIT-III

Post Processors for CNC: Introduction to Post Processors: The necessity of a Post Processor, the general structure of a Post Processor, the functions of a Post Processor, DAPP, based, Post Processor Communication channels and major variables In the DAPP- based Post Processor, the creation of a DAPP- Based Post Processor.

UNIT-IV

Micro Controllers: Introduction. Hardware components, I/O pins, external memory, counters, timers and serial data I/O interrupts. Selection of Micro Controllers Embedded controllers. Applications and Programming of Micro Controllers. Programming Logic Controllers (PLC's): Introducation, Hardware Components of PLC System, basic strucgture, principle of operations, programming mnemonics timers, Internal relays and counters Applications of PLC's in CNC Machines.

UNIT-V

Computer Aided Process Planning, Hybrid CAAP System, Computer Aided Inspection and quality control. Coordinate Measuring Machine, Limitations of CMM, Computer Aided Testing, Optical Inspection Methods. Artifical Intelligence and expert system; Artificial Neural Networks, Artitical Intelligence in CAD. Experts systems and its structures.

TEXT BOOKS

1. Computer Control of Manufacturing Systems / Yoram Koren / Mc Graw Hill. 1983.
2. Computer Aided Design Manufacturing, K. Lalit Narayn, K. Mallikarjuna Rao and MMM Sarear PHI 2008.

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing power point presentations.
2. Seminars are conducted on new technologies related to subject.
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5. Industrial vists for practical exposure to understand and explore things.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

NON CONVENTIONAL ENERGY RESOURCES

M.Tech (Design for Manufacturing) I Year - II Semester
Course Code:GR17D5189 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Interduce the need of the non-convectional energy sources.
- Impart the role of non-convectional energy for the environment.
- Identify the energy resources utilization systems.
- Recognise the source and potential of wind energy and understand the classifications of wind mills.
- Summarize the principles of bio-conversion, ocean energy and geo thermal energy.

COURSE OUTCOMES: At the end of the course the learners will be able to

- Choose the appropriate renewable energy as an alternate for conventional power in any application.
- Analyze the environmental and cost economics of using renewable energy sources compared to fossil fuels.
- Apply the principles of various energy systems in day to day life.
- Analyze the industrial needs and convert theoretical model to practical circuits with wide range of specifications.
- Evaluate the importance of the renewable resources of energy as the fossil fuels are depleting in the world very fast express about clean and green energy for next generation.
- Analyse large scale demand of heat energy for meeting day to day domestic, institutional and industrial requirements can be met by utilizing solar thermal systems, biogas, PV cells, wind energy,Geothermal, MHD etc.
- Design the various techniques and models fabricated in utilizing the above said sources of energy.

UNIT-I

Introduction: Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits.
Solar Cells: Theory of solar cells. solar cell materials, solar cell array, solar cell power plant, limitations.

UNIT-II

Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT-III

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.
Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations.
Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

UNIT-IV

Thermo-electrical and thermionic Conversions: Principle of working, performance and limitations.
Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. Performance and limitations of energy conversion systems.

UNIT-V

Bio-mass: Availability of bio-mass and its conversion theory.
Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations.
Wave and Tidal Wave: Principle of working, performance and limitations. Waste Recycling Plants.

TEXT/REFERENCES BOOKS

1. John Twideu and Tony Weir, “Renewal Energy Resources” BSP Publications, 2006.
2. M.V.R. Koteswara Rao, “ Energy Resources: Conventional & Non-Conventional “ BSP Publications,2006.
3. D.S. Chauhan,”Non-conventional Energy Resources” New Age International.
4. C.S. Solanki, “Renewal Energy Technologies: A Practical Guide for Beginners” PHI Learning.

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing power point presentations.
2. Seminars are conducted on new technologies related to subject.
3. Assignments are given.
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5. Industrial vists for practical exposure to understand and explore things.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

INDUSTRIAL ROBOTICS

M.Tech (Design for Manufacturing) I Year - II Semester
Course Code: GR17D5122 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Familiar with the automation and applicationsof robotics.
- Proficient with the fundamental concepts of kinematics of robots.
- Emphasize the concepts about robot End-effectors and their design.
- Introduce Robot Programming methods & Languages of robot.
- Incorporate knowledge about various Sensors and their applications in robots.

COURSE OUTCOMES: At the end of the course, the student will be able to

- Familiarized with the Robot Anatomy and Robot configurations
- Well-versed with the automation and Robot applications.
- Skilled with the principles of kinematic of robot.
- Nurtured with the Programming methods & various Languages of robots.
- Equipped with the principles of various Sensors and their applications in robots
- Acquainted with the concepts of Robot cell design and control
- Develop sound knowledge about robot end effectors and their design concepts.

UNIT-I

Introduction: Automation and Robotics, Robot anatomy, robot configuration, motions joint notation work volume, robot drive system, control system and dynamic performance, precision of movement. Control System and Components: basic concept and modals controllers control system analysis, robot activation and feedback components. Positions sensors, velocity sensors, actuators sensors, power transmission system.

UNIT-II

Motion Analysis And Control: Manipulator kinematics, position representation forward transformation, homogeneous transformation, manipulator path control, robot dynamics, configuration of robot controller.

UNIT-III

End Effectors: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design Sensors: Desirable features, tactile, proximity and range sensors, uses sensors in robotics. Machine Vision: Functions, Sensing and Digitizing-imaging, Devices, Lighting techniques, Analog to digital single conversion, Image storage, Image processing and Analysis-image data reduction, Segmentation feature extraction. Object recognition, training the vision system, Robotics application.

UNI- IV

Robot Programming: Lead through programming, Robot programming as a path in space, Motion interpolation, WAIT, SINGNAL AND DELAY commands, Branching capabilities and Limitations.

Robot Languages: Textual robot languages, Generation, Robot language structures, Elements in function.

UNIT-V

Robot Cell Design and Control: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work design, Work and control, Inter locks, Error detection, Work cell controller. **Robot Application:** Material transfer, Machine loading/unloading. Processing operation, Assembly and Inspection, Feature Application.

TEXT BOOKS

1. Industrial robotics, Mikell P.Groover /McGraw Hill.

REFERENCE BOOKS

1. Robotics, K.S.Fu / McGraw Hill.
2. Yoram Koren," Robotics for Engineers' Mc Graw-Hill, 1987.
3. Kozyrey, Yu. "Industrial Robots", MIR Publishers Moscow, 1985.

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing power point presentations.
2. Seminars are conducted on new technologies related to subject.
3. Assignments are given.
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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

TOOL DESIGN
Elective III

M.Tech (Design for Manufacturing) I Year - II Semester

Course Code: GR17D5123 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Inculcate the selection of best cutting tool material for machining
- Impart knowledge of selection and design of single and multi-point cutting tool.
- Inculcate the principle of jigs and fixtures for holding the workpiece
- Inculcate the selection of locating and clamping for a given component
- Impart knowledge in Design of die and punch for blanking, piercing and bending operations

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Learn the importance of selecting the proper cutting tool material and cutting tool angles required to machine a work piece.
- Identify cutting tools and explain the purpose of each type of rake and clearance angle
- Identify the applications of various types of cutting tool materials.
- Study and practically perform the calibration of checking fixtures.
- Design and check fixture on CAD software.
- Learn briefly the theoretical concepts of jigs and fixtures.
- Select the right tool material for making dies depending upon the tonnage required for the particular operation.

UNIT-I

Tool Materials: Classification of work & Tool materials. Low carbon, high carbon and alloy steels. Carbides, coated carbides, ceramics, CBN, Diamonds. Abrasive materials Theory of Metal Cutting Single point tool nomenclature, Wedge angle, Rake angle, Clearance angle, Plan approach angle, Oblique angle Orthogonal cutting & oblique cutting, Shear plane, Merchant Circle. Chip thickness analysis. Tool nomenclature, orthogonal system, Normal rake System, British System, DIN System.

UNIT-II

Design of Cutting Tools: Single point cutting tools, determination of shank size, Boring tools, Micro bore tools, Multi point tools, Drill nomenclature, end mills, reamers, brazed tools, insert tools, Types of milling cutters, cutting parameters, milling cutters selection, Grinding wheels.

UNIT-III

Design of Jig and Fixures: Basic principles of work holding, location and clamping. .Morse & ISO tapers. jig definition and types drill jig bush design., Line boring principles. Vices, milling, boring, lathe, grinding fixtures. CNC tooling, concepts of auto Tool changers.

UNIT-IV

Design of Sheet Metal Blanking and Piercing Dies: Fundamentals of die cutting operation, power press types, general press information, materials handling equipment. Cutting action in punch and die operations. Die clearance, types of die construction. Die design fundamentals-banking and piercing die construction, pilots, stripper and pressure pads presswork material, strip layout, short run tooling for piercing.

UNIT-V

Design Of Metal Bending, forming And Drawings Dies: Bending dies, drawing dies, forming dies, drawing operations, variables that effect metal flow during drawing. Determination of blank size, drawing force, single and double action draw dies. Application of Softwares
Die design by 2D & 3D softwares, Cad & Cam softwares. CNC machines.

TEXT BOOKS

1. Donaldson “Tool Design” Tata McGraw Hill
2. George F Dieter “Mechanical Metallurgy” Tata McGraw Hill

REFERENCE BOOKS

1. Taylor Altan, Sool Ik-Oh and Harold L. Gegel O. “American Society for metals”.1983
2. Kurt Lange “Hand Book of metal forming”, Mc Graw-Hill.1987
3. Jigs and Fixtures - P. H Joshi - McGraw-Hill
4. Standard Clamping Devices (Grant, 1967).

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing power point presentations.
2. Seminars are conducted on new technologies related to subject.
3. Assignments are given.
4. Group discussions are conducted on familiar topics related to subject.
5. Industrial vists for practical exposure to understand and explore things.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRODUCTION AND OPERATIONS MANGEMENT

Elective - III

M.Tech (Design for Manufacturing) I Year - II Semester

Course Code: GR17D5124 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Introduction to the technical design and manufacturing operations and supply management to the sustainability of an enterprises.
- Import the basic principles of Project management and other business functions, such as human resources, purchasing, marketing, finance, etc.
- Distinguish the Just in Time principles and PERT techniques to reduce the lead time in production
- Analise the new demands of the globally competitive business environment that supply chain managers face today.
- Creation of the innovative technological tools to improve quality of production

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Demonstrate the operations and supply management to the sustainability of an Enterprise
- Interpret the basic principles of Project management.
- Identify various Production and Plant layouts.
- Examine the quality control of the production.
- Apply the Just In time (JIT) basic principles and applications.
- Recommend the the production schedule for productivity.
- Adapt PERT Technique to reduce the lead time in production.

UNIT-I

Operation Management, Definition, Objectives, Types of Production systems, historical development of operations management, Current issues in operation management.

Product design, Requirements of good product design, product development, approaches, concepts in product development, standardization, simplification, Speed to market, Introduction to concurrent engineering.

UNIT-II

Value engineering, objective, types of values, function & cost, product life cycle, steps in value engineering, methodology in value engineering, FAST Diagram, Matrix Method.

Location, Facility location and layout, Factors considerations in Plant location, Comparative Study of rural and urban sites, Methods of selection plant layout, objective of good layout, Principles, Types of layout, line balancing.

UNIT-III

Aggregate Planning, definition, Different strategies, Various models of Aggregate Planning, Transportation and graphical models.

Advance inventory control systems push systems, Material Requirement, Terminology, types of demands, inputs to MRP, techniques of MRP, Lot sizing methods, benefits and drawbacks of MRP, Manufacturing Resources Planning (MRP, II), Pull systems, Vs Push system, Just in time (JIT) philosophy kanban system, Calculation of number of kanbans Requirements for implementation JIT, JIT Production Process, benefits of JIT.

UNIT-IV

Scheduling , Policies , Types of scheduling , Forward and Backward Scheduling , Grant Charts , Flow shop Scheduling , n jobs and 2 machines, n jobs and 3 machines , job shop Scheduling , 2 jobs and n machines , Line of Balance.

UNIT-V

Project Management, Programming Evaluation Review Techniques (PERT), three times estimation, critical path, Probability of completion of project, critical path method, crashing of simple nature.

TEXT BOOKS

1. “Operation Management” by E.s.Buffs
2. “Operation Management” Theory and Problems : by Joseph G. Monks

REFERENCE BOOKS

1. “Operation Management” by E.s.Buffs
2. “Operation Management” Theory and Problems : by Joseph G. Monks
3. “Production Systems Management” by James I. Riggs.
4. “Production and Operation Management “ by Chary.
5. “ Operations Management” by chase
6. “ Production and Operation Management” by panner Selvam
7. “Producation and Operation Analysis” by Nahima

TEACHING METHODOLOGY

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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PERFORMANCE MODELLING AND ANALYSIS OF MANUFACTURING SYSTEMS

Elective IV

M.Tech (Design for Manufacturing) I Year - II Semester

Course Code: GR17D5125 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to to

- Introduce concept of controls in manufacturing systems.
- Impart knowledge in queuing model and networks to control manufacturing processes.
- Analyse Kanban system in industries..
- Demonstrate a basic understanding of network models employed in manufacturing industry.
- Application of different net work analyses like petrinets etc.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Gain the skill of the modelling and analysis of manufacturing systems
- Demonstrate the Kanban system is modeled in industry.
- Analyze basics of network models employed in manufacturing industry.
- Apply the queuing model for analysis of a flexible machine center.
- Examine the different types queuing network for manufacturing systems
- Compute the equations in manufacturing process to different transfer lines
- Employ the different net work analyses.

UNIT-I

Manufacturing Systems & Control: Automated manufacturing systems, modeling role of performance, simulation models-analytical models. Product cycle manufacturing automation, economics of scale and scope, input/output model, plant configurations. performance measures

- manufacturing lead time - work in process -machine utilization - throughput -capacity, flexibility, performability, quality control systems, control system architecture, factory communications, local area networks interconnection manufacturing automation protocol, database management system.

UNIT-II

Manufacturing processes: Examples of stochastic processes, poisson process discrete time markov chain models, definition and notation, sojourn times in states, examples of dtmcs in manufacturing, chapman kolmogorov equation, steady-state analysis. continuous time Markov chain models, definitions and notation, sojourn times in states, examples of CTMCS in manufacturing, equations for CTMCS evolution, Markov model of a transfer line, birth and death processes in manufacturing, steady state analysis of BD processes, typical BD processes in manufacturing.

UNIT-III

Queuing Model: Notation for queues, examples of queues in manufacturing systems, Performance measures, Little's result, steady state analysis of M/M/m queue, queues with general distributions and queues with breakdowns, analysis of a flexible machine center.

UNIT-IV

Queuing Networks: Examples of QN models in manufacturing, Little's law in queuing networks, Tandem queue, an open queuing network with feed back, an open central server model for FMS, Closed transfer line, Closed server model, Garden Newell networks.

UNIT V:

Petrinets: Classical Petri Nets, definitions, transition firing and reachability, Representational power, properties, manufacturing models. Stochastic Petri Nets, exponential timed Petri Nets, Generalized Stochastic Petri Nets, modeling of KANBAN systems, manufacturing models.

TEXT BOOKS

1. Viswanadham, N and Narahari, Y. "Performance Modeling of Automated Manufacturing Systems", Prentice Hall of India, New Delhi, 1994.

REFERENCES BOOKS

1. Trivedi, K.S., "Probability and Statistics with Reliability, Queuing and Computer Science Applications", Prentice Hall, New Jersey, 1982.
2. Gupta S.C., & Kapoor V.K., "Fundamentals of Mathematical Statistics", 3rd Edition, Sultan Chand and Sons, New Delhi, 1988.

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing power point presentations.
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3. Group discussions are conducted on familiar topics related to subject.

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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTATIONAL FLUID DYNAMICS
ELECTIVE-IV

M.Tech (Design for Manufacturing) | I Year - II Semester
Course Code: GR17D5126 | L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Describe the physical significance of each term in the governing equations for CFD
- Identify the use of a commercial CFD package to solve practical CFD problems
- Quantify and analyse the numerical error in CFD discretization schemes
- Develop finite difference and finite volume forms of the CFD equations for heat transfer and fluid flow problems
- Formulate explicit and implicit algorithms for solving the Navier-Stokes equations

COURSE OUTCOMES: At the end of the course, the student will be able to

- Implement FDM techniques to steady state and unsteady state problems in heat transfer.
- Examine various numerical techniques (FEM, FVM, FDM) available for solving CFD problems.
- Examine Explicit and ImplicitScheme for Hyperbolic Equations
  Formulate the FDM Scheme for Incompressible viscous flows Analyze
  the various FDM and FVM schemes for compressible flows Deduce
  the FVM schemes via FDM schemes for 2D and 3D problems
  Discuss standard variational methods for solving heat transfer and fluid flow problems.

UNIT-I

Introduction to Numerical Methods - Finite Difference, Finite Element and Finite Volume Methods – Classification of Partial Differential Equations – Solution of Linear Algebraic Equations – Direct and Iterative Approaches.

Finite difference methods: Taylor's series – FDE formulation for 1D and 2D steady state heat transfer problems – Cartesian, cylindrical and spherical co-ordinate systems – boundary conditions – Un steady state heat conduction – Errors associated with FDE - Explicit Method – Stability criteria – Implicit Method – Crank Nickolson method – 2-D FDE formulation – ADI – ADE.

UNIT-II

Finite Volume Method: Formation of Basic rules for control volume approach using 1D steady heat conduction equation – Interface Thermal Conductivity - Extension of General Nodal Equation to 2D and 3D Steady heat conduction and unsteady heat conduction.

UNIT-III

FVM to Convection and Diffusion: Concept of Elliptic, Parabolic and Hyperbolic Equations applied to fluid flow – Governing Equations of Flow and Heat transfer – Steady 1D Convection Diffusion – Discretization Schemes and their assessment – Treatment of Boundary Conditions.

UNIT-IV

Calculation of Flow Field: Vorticity & Stream Function Method - Staggered Grid as Remedy for representation of Flow Field - Pressure and Velocity Corrections – Pressure Velocity Coupling - SIMPLE & SIMPLER (revised algorithm) Algorithm.

UNIT-V

Turbulent Flows: Direct Numerical Simulation, Large Eddy Simulation and RANS Models Compressible Flows: Introduction - Pressure, Velocity and Density Coupling.

TEACHING METHODOLOGIES:

- Power Point presentations
- Tutorial Sheets
- Assignments

TEXT BOOKS

1. Computational Fluid Flow and Heat Transfer – Muralidharan&Sundarajan (Narosa Pub)
2. Numerical heat transfer and fluid flow – S.V. Patankar (Hemisphere Pub. House)
3. An Introduction to Computational Fluid Dynamics – FVM Method – H.K. Versteeg, W. Malalasekhara (PHI)
4. Computational Fluid Dynamics – Anderson (TMH)
5. Computational Methods for Fluid Dynamics – Ferziger, Peric (Springer)

REFERENCE BOOKS

1. Computational Fluid Dynamics, T.J. Chung, CambridgeUniversity
2. Computaional Fluid Dynamics – A Practical Approach – Tu, Yeoh, Liu (Elsevier)
3. Text Book of Fluid Dynamics, Frank Chorlton, CBS Publishers

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

AUTOMATION IN MANUFACTURING

ELECTIVE - IV

M.Tech (Design for Manufacturing) I Year - II Semester
Course Code: GR17D5127 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Introduce the fundamental concepts of automation in manufacturing.
- Impart the knowledge on design and fabrication of automated flow lines.
- Gain the skill of analysis and implementation on transfer lines
- Prioritize the line balancing methods in automated assembly systems.
- Inculcate knowledge on analysis of automated material handling systems in automation.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Identify the manufacturing tools, solutions to industrial applications.
- Visualize the automation systems and take up multi disciplinary tasks.
- Analyze the impact of automation in engineering solutions for society in global and economic context.
- Design and construct automated flow lines for simple products.
- Select the various material handling systems used in advanced automation systems.
- Classify the various manufacturing cells
- Examine the modern engineering tools, software and equipments to and solve the problems related to specific manufacturing applications.

UNIT-I

Fundamentals of Manufacturing Automation: Basic Principles of automation, types of automated systems, degrees of automation, automation reasons, Production operations and automation strategies, Plant Layout, Production concepts and mathematical models, design the parts for automation, Automatic loading systems.

UNIT-II

High Volume production Systems: Automated flow lines. Methods of work flow, transport transfer mechanism buffer storage, Control functions, Automation for machining operations Design and fabrication considerations.

UNIT-III

Analysis of Automated Flow Lines: Analysis of transfer lines without storage, partial automation automated flow lines with storage buffers implementing of automatic flow lines, Line balancing problems, Considerations in assembly line design.

UNIT-IV

Assembly Systems and Line Balance: Manual assembly lines, line balancing problem, methods of line balancing, ways to improve line balancing, flexible manual assembly lines, automated assembly systems, analysis of multi station assembly, manufacturing Cells, Automated Cells, Analysis of single station cells.

UNIT-V

Automated Material Handling: Types of equipment and functions, design and analysis of material handling system, conveyor system. Automated guided vehicle system, components operation, types, design of automated guided vehicles and applications. Automated storage and Retrieval systems, types, basic components and applications. Transfer lines, Design for Automated Assembly, Partial Automation, Communication Systems in Manufacturing.

TEXT BOOKS

1. Mikell. P.Groover" Automation, Production Systems and CIM", PHI Pvt, Ltd, 1998.

REFERENCE BOOKS

1. P.Radha Krishan & S. Subrahamanyan and Raju " CAD/CAM/CIM', New Age International Pub , 2003
2. Singh, "System Approach to Computer Integrated Design and manufacturing "John Wiely

TEACHING METHODOLOGY

1. Lecture is delivered on black board, preparing OHP sheets and by preparing power point presentations.
2. Seminars are conducted on new technologies related to subject.
3. Assignments are given.
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GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

CAD/CAM LAB

M.Tech (Design for Manufacturing) I Year - II Semester
Course Code: GR17D5128 L/T/P/C : 0/0/4/2

COURSE OBJECTIVES: The Objective of this course is to provide the student to

- Impart the knowledge of CAD software like Solid works or CATIA.
- Apply CAD software in creating 2D and 3D models and assembly of machine components.
- Develop CNC manual part programming and machining of components on Lathe and Milling machines.
- Inculcate the knowledge of CAM software in automatic generation of CNC programs.
- Gain the knowledge of Robot programming and its simulation.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Apply CAD sofwares like Solid Works or CATIA to create 2D model, 3D model of the objects, assembly of the parts and analyze the model.
- Demonstrate the constructional features of CNC Lathe and Milling machines.
- Examine the CAM software like FANUC or SINUMERIC, or HINUMERIC to generate CNC manual part programs for various Lathe and Milling machine operations.
- Create prototype models on CNC lathe and Milling machines using manual part programming.
- Develop automatic tool path generation and its CNC code using CAM software like MASTER CAM, ESPIRIT CAM etc.
- Illustrate the Robot programming and its simulation.
- Develop route sheets, Simulation of manufacturing systems using CAM softwares.

1. Features and Selection of CNC turning and milling centers.

1. Practice input programming and operation of CNC turning machines, subroutine techniques and use of cycles.
2. Practice in part programming and operating a machining center, tool planning and selection of sequences of operations, tool setting on machine,
3. Practice in APT based NC Programming.
4. Practice in Robot programming and its languages. Robotic simulation using software Robo path control,
5. Preparation of various reports and route sheets, Simulation of manufacturing systems using CAM software, controller operation system commands.

SOFTWARES

CNC XL TURNING MACHINE CNC XL MILLING MACHINE FANUC O MILL AND O TURN CONTROLLER DELMIA V6 R2013 SIMULIA-ABAQUS FLEXISIM 3.5

TEACHING METHODOLOGY:

1. Lecture is delivered on projector showing the software and its features.
2. Seminars are conducted on new technologies related to subject.
3. Exercises are created to practice to solve various industrial problems
4. Quiz's are conducted to test the competency level of student with software
5. Industrial vists for practical exposure to understand and explore things.

OPEN ELECTIVE - II

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

HUMAN COMPUTER INTERACTION
(Open Elective-II)

M.Tech (CSE) I Year - II Semester

Course Code: GR17D5184 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: Students undergoing the course are expected to:

- Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
- Recognize how a computer system may be modified to include human diversity.
- Select an effective style for a specific application.
- Design mock ups and carry out user and expert evaluation of interfaces.
- Carry out the steps of experimental design, usability and experimental testing, and
- Evaluation of human computer interaction systems.
- Use the information sources available, and be aware of the methodologies and technologies supporting advances in HCI.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Describe what interaction design is and how it relates to human computer interaction and other fields.
- Describe the social mechanisms that are used by people to communicate and collaborate.
- Describe how technologies can be designed to change people's attitudes and behavior.
- Discuss how to plan and run a successful data gathering program.
- Discuss the difference between qualitative and quantitative data and analysis.
- Discuss the conceptual, practical, and ethical issues involved in evaluation.
- Describe how to perform two types of predictive techniques, GOMS and Fitts Law, and when to use them.

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 –Visually pleasing composition

–amount of information –focus and emphasis –presentation information simply and meaningfully –information retrieval on web –statistical graphics –Technological consideration in interface design.

UNIT-IV

Develop System Menus and Navigation Schemes-Select the proper kinds of Windows, -Select the proper Device based Controls, Choose the proper screen based controls.

UNIT-V

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

Interaction Devices – Keyboard and Function Keys – Pointing Devices – Speech Recognition Digitization and Generation – Image and Video Display – Drivers.

TEXT BOOKS

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dreamtech.
2. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia
3. Brian Fling, “Mobile Design and Development”, First Edition, Reilly Media Inc., 2009

REFERENCE BOOKS

1. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen, Pearson Education.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIG DATA ANALYTICS
(Open Elective-II)

M.Tech (IT) I Year - II Semester

Course Code: GR17D5185 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: The objective of the course is to provide the student:

- Understanding about big data for business intelligence
- Learning business case studies for big data analytics
- Learning about the cloud and big data
- Knowledge about risk management involved in big data
- Understandingnosql big data management
- Understanding about map reduce work flows.
- Capability to Perform map-reduce analytics using Hadoop and related tools

COURSE OUTCOMES: At the end of the course the student will be able to:

- Understand the importance of big data
- Understand challenges with big data
- Knowledge about the technological developments in big data environment
- Understanding about map reduce work flows
- Knowledge about nosql data environment.
- Analysis with Hadoop and related tools
- Capability of understanding the usage of big data in context to cloud and other technologies.

UNIT-I

INTRODUCTION TO BIG DATA What is big data, why big data, convergence of key trends , unstructured data ,industry examples of big data ,web analytics, big data and marketing, fraud and big data ,risk and big data ,credit risk management, big data in medicine, introduction to Hadoop open source technologies , cloud and big data

UNIT-II

UNDERSTANDING BIG DATA Types of digital data, characteristics of data, challenges with big data, definition of big data, big data analytics,data science, technologies in big data environments, CAP theorem.

UNIT-III

NOSQL DATA MANAGEMENT Introduction to NoSQL, aggregate data models, aggregates, key-value and document data Models, relationships, graph databases , schemaless databases ,materialized views, distribution models, sharding ,master-slave replication, peer-peer replication, sharing and replication

UNIT-IV

BASICS OF HADOOP Data format ,features of Hadoop, analyzing data with Hadoop , design of Hadoop distributed file system (HDFS) ,HDFS concepts, scaling out ,Hadoop streaming , Hadoop pipes, Hadoop related tools

UNIT- V

MAPREDUCE APPLICATIONS MapReduce workflows, unit tests with MRUnit , test data and local tests, anatomy of MapReduce job run ,classic Map-reduce, YARN ,failures in classic Map-reduce and YARN , job scheduling , shuffle and sort ,task execution, MapReduce types ,input formats, output formats

TEXT BOOKS

1. Seema Acharya,S.Chellappan,"Big Data and Analytics",Wiley,2014

REFERENCE BOOK

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
4. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

NEURAL AND FUZZY SYSTEMS
(Open Elective-II)

M.Tech (EEE) I Year - II Semester

Course Code: GR17D5186 L/T/P/C : 3/1/0/4

PRE–REQUISITE: Control Systems, Power Systems, Mathematics, Physics.

COURSE OBJECTIVES: The objective of the course is to provide the student

- To introduce the students with the concepts of learning methods.
- To provide students with the artificial neural networks and their architecture.
- To familiarize the students with the various applications of artificial neural networks.
- To introduce the concepts of the fuzzy logic control and their real time applications.

COURSE OUTCOMES: At the end of the course the student will be able to

- Define the advances in neural networks
- Evaluate the design and control of fuzzy systems.
- Articulate the applications of fuzzy control block sets.
- Evaluate the design of various models in neural networks
- To analyze the techniques of various types of neural networks
- Evaluate the design and control of associative memories
- Techniques to Design fuzzy logic system

UNIT-I

Introduction to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and- Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT-II

Essentials of Artificial Neural Networks: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

Feed Forward Neural Networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.

UNIT-III

Multilayer Feed forward Neural Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

Associative Memories

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

UNIT-IV

Self-Organizing Maps (SOM) and Adaptive Resonance Theory (ART)

Introduction, Competitive Learning, Vector Quantization, Self-Organized Learning Networks, Kohonen Networks, Training Algorithms, Linear Vector Quantization, Stability-Plasticity Dilemma, Feed forward competition, Feedback Competition.

UNIT-V

Classical and Fuzzy Sets and Fuzzy Logic System Components

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Applications Neural network applications: Process identification, Function Approximation, control and Process Monitoring, fault diagnosis and load forecasting.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOK

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and G.A.VijayalakshmiPai – PHI Publication.

REFERENCE BOOKS

1. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.
2. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
3. Neural Networks and Fuzzy Logic System by Bork Kosko, PHI Publications

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROJECT MANAGEMENT

M.Tech(Civil) I Year - II Semester

Course Code: GR17D5187 L/T/P/C : 3/1/0/4

COURSE OBJECTIVES: On completion of this Subject/Course, following objectives shall get accomplished

- To provide students about the basics of Management in general and Project Management in particular.
- To train the students about the Monitoring of Projects.
- To make understand the students about the Planning of projects.
- To make understand the students about the Scheduling of projects.
- To train the students about the drawing of CPM & PERT Networks.
- To train the students about teaching of Project Management to UG & PG students
- To motivate the students about the Research Development activities of Project Management which results in timely completion of projects without time and cost over runs.

Course outcomes: On completion of this Subject/Course the student shall be able to

- Perform the Project Management functions effectively.
- Plan the projects.
- Schedule the various activities of Projects.
- Monitor the actual progress with planned progress.
- Draw the CPM & PERT Networks/
- Handle Resources planning including levelling & smoothing.
- Interpret the Indian Contract Act and understand the litigations involved for better Contract Management.

UNIT- I

PROJECT PLANNING: Prime Objectives of Project Management, Main Functions of Project Management, Planning, Principles of Planning, Objectives of Planning, Steps involved in Planning, Stages of Planning, Advantages & limitations of Planning, Failures of Projects & Construction Projects.

UNIT-II

PROJECT SCHEDULING: Scheduling, Project/Construction Schedules, Steps involved in Scheduling, Methods of Scheduling, Bar Charts, Steps involved in Bar Charts, Limitations of Bar Charts, Milestone Charts and Limitations of Milestone Charts.

UNIT-III

PROJECT MONITORING: Network Techniques, Prime Objectives of Networks, Network Terminology, Types of Networks, CPM & PERT, Differences between CPM & PERT, Rules to draw the Network, Drawing of Networks, Advantages of Network , Critical Path, Float and its Types, Slack and Types of Slack.

UNIT-IV

PROJECT COST CONTROL: Direct Costs, Indirect Costs, Total Project Cost, Optimisation of Cost and Steps involved, Resources, Resources Smoothing and Resources Levelling, Crashing of Activities, Time and Cost Over runs of Project.

UNIT-V

PROJECT QUALITY & CONTRACTS:

Quality, Quality Control, Quality Assurance, Project Quality Plans in Construction Projects, Inspection & Test Plans, Method Statements, ISO Certification; Project Contracts, Contract Law, Types of Contracts and Indian Contract Act.

TEXT BOOKS

1. Project Planning and Control with PERT & CPM – BC Punmia, KK Khandielwala.
2. Project Scheduling & Monitoring in Practice – S Chowdhury

REFERENCE BOOKS

1. Project Management Handbook – Lock, Gower
2. Project Management – NJ Smith- Blackwell Publication.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

HARDWARE - SOFTWARE CO-DESIGN
(Open Elective-II)

M.Tech (ECE) I Year - II Semester

Course Code: GR17D5188 L/T/P/C : 3/1/0/4

Course Objectives

- Describe an embedded system design flow from specification to physical realization
- Describe structural behavior of systems.
- Master complex systems.
- Devise new theories, techniques, and tools in design, implementation and testing.
- Master contemporary development techniques.

Course Outcomes: After going through this course the student will be able to

- Gain knowledge of contemporary issues and algorithms used.
- Know the interfacing components, different verification techniques and tools.
- Demonstrate practical skills in the construction of prototypes.
- Understand the use of modern hardware and software tools for building prototypes of embedded systems.
- Apply embedded software techniques to satisfy functional and response time requirements.
- Apply verification tools.
- Understand design representation for system level synthesis.

UNIT-I:

Co- Design Issues: Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.

Co- Synthesis Algorithms:

Hardware software synthesis algorithms: hardware – software partitioning distributed system cosynthesis.

UNIT –II:

Prototyping and Emulation: Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure

Target Architectures: Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.

UNIT-III

Compilation Techniques and Tools for Embedded Processor Architectures: Modern embedded architectures, embedded software development needs, compilation technologies, practical consideration in a compiler development environment.

UNIT-IV

Design Specification and Verification: Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, interface verification

UNIT-V

Languages for System – Level Specification and Design-I: System – level specification, design representation for system level synthesis, system level specification languages,

Languages for System – Level Specification and Design-II:

Heterogeneous specifications and multi language co-simulation, the cosyma system and lycos system.

TEXT BOOKS

1. Hardware / Software Co- Design Principles and Practice – Jorgen Staunstrup, Wayne Wolf –2009, Springer.
2. Hardware / Software Co- Design - Giovanni De Micheli, Mariagiovanna Sami, 2002, Kluwer Academic Publishers

REFERENCE BOOKS

1. A Practical Introduction to Hardware/Software Co-design -Patrick R. Schaumont - 2010 –Springer

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

NON CONVENTIONAL ENERGY RESOURCES

(Course Objectives)

M.Tech (ME) I Year - II Semester
Course Code: GR17D5189 L/T/P/C : 3/1/0/4

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

- Interduce the need of the non-convectional energy sources.
- Impart the role of non-convectional energy for the environment.
- Identify the energy resources utilization systems.
- Recognise the source and potential of wind energy and understand the classifications of wind mills.
- Summarize the principles of bio-conversion, ocean energy and geo thermal energy.

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

- Choose the appropriate renewable energy as an alternate for conventional power in any application.
- Analyze the environmental and cost economics of using renewable energy sources compared to fossil fuels.
- Apply the principles of various energy systems in day to day life.
- Analyze the industrial needs and convert theoretical model to practical circuits with wide range of specifications.
- Evaluate the importance of the renewable resources of energy as the fossil fuels are depleting in the world very fast express about clean and green energy for next generation.
- Analyse large scale demand of heat energy for meeting day to day domestic, institutional and industrial requirements can be met by utilizing solar thermal systems, biogas, PV cells, wind energy, Geothermal, MHD etc.
- Design the various techniques and models fabricated in utilizing the above said sources of energy.

UNIT-I

Introduction: Various non-conven tionalenergy resources-Introduction, availability, classification, relative merits and demerits.
Solar Cells: Theory of solarcells. solarcell materials, solarcellarray, solar callower plant, limitations.

UNIT-II

Solar Thermal Energy: Solar radiation, floatplane collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT-III

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electricalconversion, non-electricalconversion,environmentalconsiderations.
Magneto-hydrodynamics (MHD):
Principle of working of MHD Power plant, performance and limitations

FuelCells:

Principle of working of various type souffle cell sand their working, performance and limitations.

UNIT-IV

Thermos and the rmionic Conversions:
Principle of working, performance and limitations.
Wind Energy: Wind power and it surcease, sites election, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. Performance and limitation sofenergy conversion systems.

UNIT-V

Bio-mass: Availability of bio-massand its conversion theory.
Ocean Thermal Energy Conversion (OTEC):
Availability, theory and working principle, per formance and limitations.
Wave and Tida lWave:
Principle of working, performance and limitations.Waste RecyclingPlants.

TEXT/REFERENCESBOOKS

1. John Twideu and TonyWeir, “Renewal Energy Resources” BSP Publications, 2006.
2. M.V.R.KoteswaraRao, “Energy Resources: Conventional&Non-Conventional “ BSPPublications,2006.
3. D.S.Chauhan, ”Non-conventional Energy Resources” New Age International.
4. C.S. Solanki, “Renewal Energy Technologies: A Practical Guidefor Beginners” PHILearning.