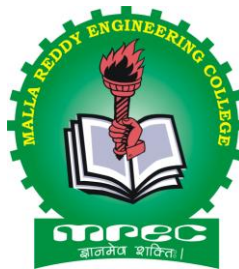# COURSE STRUCTURE
AND
DETAILED SYLLABUS
(MR14 Regulations)

for

M.TECH. (ADVANCED MANUFACTURING SYSTEMS)

(Applicable for the batches admitted from 2014-15)

DEPARTMENT OF MECHANICAL ENGINEERING

MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)
Maisammaguda, Dhulapally (Post via. Kompally), Secunderabad – 500100

ACADEMIC REGULATIONS MR 14 FOR M. TECH. (REGULAR) DEGREE COURSE
(Effective for the students admitted into first year from the academic year 2014-2015)

The M.Tech Degree of Malla Reddy Engineering College, Hyderabad shall be conferred on candidates by the Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad who are admitted to the program and fulfill all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS

Admission to the above program shall be made subject to the eligibility, qualifications and Specialization as prescribed by the university/college from time to time.

Admissions shall be made on the basis of merit/rank obtained by the qualifying candidate at an Entrance Test conducted by the University/college or on the basis of any other order of merit approved by the University/college (say **PGECET/GATE)** subject to reservations as laid down by the Government from time to time.

2.0   AWARD OF M. TECH. DEGREE
2.1   A student shall be declared eligible for the award of the M. Tech. Degree, if he pursues a   course of study in not less than two and not more than four academic years. However, he is permitted to write the examinations for two more years after four academic years of course work.

2.2   A student, who fails to fulfill all the academic requirements for the award of the degree within four Academic years from the year of his admission, shall forfeit his seat in
      M. Tech. course.

2.3   The student shall register for all 88 credits and secure all the 88 credits.

2.4   The minimum instruction days in each semester are 90.

3.0   COURSES OF STUDY
The following specializations are offered at present for the M. Tech. course of study.
1.   Advanced Manufacturing Systems(AMS) - Shift II
2.   Computer Science(CSe) - Shift I
3.   Computer Science and Engineering(CSE) - Shift I & II
4.   Control Systems(CS) - Shift I & II
5.   Digital Systems and Computer Electronics(DSCE)   - Shift I
6.   Electrical Power Systems (EPS) - Shift I
7.   Embedded Systems(ES) - Shift I
8.   Geotechnical Engineering(GTE) - Shift I
9.   Machine Designs (MD) - Shift I
10. Power Electronics and Electrical Drives(PEED)   - Shift II
11. Structural Engineering(SE) - Shift I
12. Transportation Engineering(TE) - Shift II
13. Thermal Engineering(THE) - Shift I
14. VLSI System Design(VLSI SD) - Shift I

3.1   Departments offering M. Tech. Programmes with specializations are noted below:

Branch	Specialization	Specialization Code
Civil Engineering	1. Structural Engineering (SE)	11
	2. Transportation Engineering (TE)	12
	3. Geotechnical Engineering (GE)	13
Electrical and Electronics Engineering	1. Control Systems (CS)	22
	2. Power Electronics and Electric Drives (PEED)	23
	3. Electrical Power Systems (EPS)	24
Mechanical Engineering	1. Thermal Engineering (TE)	31
	2. Advanced Manufacturing Systems (AMS)	32
	3. Machine Designs (MD)	33
Electronics and Communication Engineering	1.Digital Systems and Computer Electronics (DSCE)	41
	2. VLSI System Design (VLSI SD)	42
	3. Embedded Systems (ES)	43
Computer Science and Engineering	1. Computer Science and Engineering (CSE)	51
	2. Computer Science (CSe)	52

4.0 ATTENDANCE

The programs are offered on a unit basis with each subject being considered as a unit.

4.1 A student shall be eligible to write University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

4.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee.

4.3 Shortage of Attendance below 65% in aggregate shall not be condoned.

4.4 Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class and their registration shall stand cancelled.

4.5 A prescribed fee shall be payable towards condonation of shortage of attendance.

4.6 A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

4.7 A student shall not be promoted to the next semester unless he satisfies the attendance requirements of the previous semester including the days of attendance in sports, games, NCC and NSS activities.

5.0 EVALUATION

The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

5.1 For the theory subjects 60 marks shall be awarded based on the performance in the End Semester Examination and 40 marks shall be awarded based on the Internal Evaluation. The internal evaluation shall be made based on the **average** of the marks secured in the two Mid Term-Examinations conducted-one in the middle of the Semester and the other immediately after the completion of instruction. Each mid term examination shall be conducted for a total duration of 120 minutes with Part A as 2 questions to be answered out of 4 questions each question for 10 marks and Part B with 4 questions to be answered out of 6 questions each question for 5 marks. If any candidate is absent for any subject of a mid -term examination, an additional exam will be conducted in the deserving cases based on the recommendations of the College Academic Committee. End semester examination is conducted for 60 marks with 5 questions to be answered out of 8 questions, each question carries 12 marks.

5.2 For practical subjects, 60 marks shall be awarded based on the performance in the End Semester Examinations and 40 marks shall be awarded based on the day-to-day performance as Internal Marks.

5.3 There shall be two seminar presentations during I year I semester and II semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Departmental Academic Committee consisting of Head of the Department, Supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.

5.4 There shall be a Comprehensive Viva-Voce in II year I Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is intended to assess the students' understanding of various subjects he has studied during the M. Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce.

5.5 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End semester Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

5.6 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.5) he has to reappear for the End semester Examination in that subject. A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and so has failed in the end examination. In such a case, the candidate must re-register for the subject(s) and secure the required minimum attendance. The candidate's attendance in the re-registered subject(s) shall be calculated separately to decide upon his eligibility for writing the end examination in those subject(s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt stand cancelled.

5.7 Laboratory examination for M. Tech. courses must be conducted with two Examiners, one of them being the Laboratory Class Teacher and the second examiner shall be another Laboratory Teacher.

6.0 EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation after taking up a topic approved by the Project Review Committee(PRC).

6.1   A Project Review Committee shall be constituted with Principal as chair person, Head of the Department, Coordinator, Supervisor and two other senior faculty members.

6.2   Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical subjects).

6.3   After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the Departmental Academic Committee for its approval. Only after obtaining the approval of the Departmental Academic Committee can the student initiate the Project work. Departmental Academic Committee(DAC) Consists of Head of the Department as Chairman, along with two Senior Professors and few subject experts too.

6.4   If a candidate wishes to change his supervisor or topic of the project he can do so with approval of Departmental Committee. However, the Departmental Committee shall examine whether the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of topic as the case may be.

6.5   Candidate shall submit status report (in a bound-form) in two stages at least with a gap of 3 months between them.

6.6   The work on the project shall be initiated in the beginning of the second year and the duration of the project is for two semesters. A candidate is permitted to submit Project Thesis only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Principal (through Head of the Department) and shall make an oral presentation/demonstration before the PRC.

6.7   Three copies of the Project Thesis certified by the supervisor shall be submitted to the College/ Institute.

6.8   The thesis shall be adjudicated by one examiner selected by the College. For this, Head of the Department shall submit a panel of 3 examiners to the Chief Controller of Examinations of the College, who are eminent in that field with the help of the concerned guide and Head of the department.

6.9   If the report of the examiner is not favorable, the candidate shall revise and resubmit the Thesis, in the time frame as described by PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.

6.10   If the report of the examiner is favourable, Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work as one of the following:

A. Excellent
B. Good
C. Satisfactory
D. Not Satisfactory

The Head of the Department shall coordinate and make arrangements for the conduct of Viva- Voce examination.

If the report of the viva-voce is unsatisfactory, 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 he is asked to revise and resubmit by the Board.

7.0 AWARD OF DEGREE AND CLASS

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M. Tech. Degree he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured
First Class with Distinction	70% and above
First Class	Below 70 but not less than 60%
Second Class	Below 60% but not less than 50%
Pass Class	Below 50% but not less than 40%

The marks in internal evaluation and end examination shall be shown separately in the memorandum of marks.

8.0 WITH-HOLDING OF RESULTS

If the candidate has not paid any dues to the university or if any case of in-discipline is pending against him, the result of the candidate will be withheld and he will not be allowed into the next higher semester. The

issue of the degree is liable to be withheld in such cases.

9.0 TRANSITORY REGULATIONS

9.1 Discontinued, detained or failed candidates are eligible for admission to two earlier or equivalent subjects at a time as and when offered.

9.2 The candidate who fails in any subject will be given two chances to pass the same subject:otherwise, he has to identify an equivalent subject as per MR14 academic regulations.

10.0 GENERAL

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

10.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

10.3 The College may change or amend the academic regulations and syllabus at any time and the changes and amendments made shall be applicable to all the students with effect from the date notified by the College.

10.4 Wherever the word he, him or his occur, it will also include she, her and hers.

10.5 Wherever the word 'Subject' occurs in the above regulations, it implies the 'Theory Subject' and 'Practical Subject' or 'Lab'.

10.6 Transfers not allowed among group colleges.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any mark son the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shallot be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject tithe academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject

6	Refuses to obey the orders of the Chief Superintendent/Assistant –Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to the person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-incharge,or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police cases registered against them.
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations.
		The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action toward suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.

2. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
   (i)   A show cause notice shall be issued to the college.
   (ii) Impose a suitable fine on the college.
   (iii) Shifting the examination centre from the college to another college for a Specific period of not less than one year.

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)
M.Tech (Advanced Manufacturing Systems)

I YEAR   **COURSE STRUCTURE**   **I SEMESTER**

Code No:	Subject	L	T	P	Credits	Internal Exam	End Exam	Total Marks
43201	Automation in manufacturing	3	1	0	3	40	60	100
43202	Computer Aided Manufacturing	3	1	0	3	40	60	100
43203	Precision Engineering	3	1	0	3	40	60	100
43204	Design for Manufacturing & Assembly	3	1	0	3	40	60	100
432A1 432A2 432A3	**Elective-I** Special Manufacturing Processes Product Data Management Total Quality Management	3	1	0	3	40	60	100
432B1 432B2 432B3	**Elective-II** Advanced CAD Mechatronics Theory of Elasticity & Plasticity	3	1	0	3	40	60	100
43205	Advanced CAD/CAM Lab	0	0	3	2	40	60	100
43206	Seminar - I	-	3	-	2	50	-	50
	Total	18	9	3	22	225	525	750

I YEAR –II SEMESTER

Code No:	Subject	L	T	P	Credits	Internal Exam	End Exam	Total Marks
43207	Simulation Modeling of Manufacturing Systems	3	1	0	3	40	60	100
43208	Quality Engineering in Manufacturing	3	1	0	3	40	60	100
43209	Materials Technology	3	1	0	3	40	60	100
43210	Production and Operations Management	3	1	0	3	40	60	100
432C1 432C2 432C3	**Elective-III** Industrial Robotics Advanced Tool Design Design and Manufacturing of MEMS and Micro Systems	3	1	0	3	40	60	100
432D1 432D2 43110	**Elective-IV** Performance Modeling and Analysis of Manufacturing Systems Intelligent Manufacturing Systems Computational Fluid Dynamics	3	1	0	3	40	60	100
43211	Manufacturing Simulation & Precision Engineering lab	0	0	3	2	40	60	100
43212	Seminar - II	-	3	-	2	50	-	50
	Total	18	9	3	22	225	525	750

II YEAR –I SEMESTER

Code No:	Subject	L	T	P	Credits	Internal Exam	End Exam
43213	Comprehensive Viva Voce	-	-	-	2	-	100
	Total	-	-	-	2	-	100

II YEAR –II SEMESTER

Code No:	Subject	L	T	P	Credits	Internal Exam	End Exam
43214	Project Part II & Dissertation	-	-	-	42	-	**Grade**
	Total				42	-	

Grade: A-Excellent.   B-Good.   C-Satisfactory.   D-Unsatisfactory.

L – Theory.   T – Tutorial.   P – Practical.   C – Credits.

Note: All End Examinations (Theory and Practical) are of three hours duration.

MALLAREDDY ENGINEERING COLLEGE
(AUTONOMOUS)

M.Tech (AMS)   **L   T/P/D   C**
I Year I Semester   **3   1/-/-   3**

AUTOMATION IN MANUFACTURING

UNIT - I
Over View of Manufacturing And Automation: Production systems, Automation in production systems, Automation principles and   strategies, Manufacturing operations, production facilities. Basic elements of an automated system, levels of automation; Hardware components for automation and process control, programmable logic controllers and personal computers.

UNIT - II
Material Handling and Identification Technologies: Material handling, equipment, Analysis. Storage systems, performance and location strategies, Automated storage systems, AS/RS, types. Automatic identification methods, Barcode technology, RFID.

UNIT - III
Manufacturing Systems And Automated Production Lines: Manufacturing systems: components of a manufacturing system, Single station manufacturing cells; Manual Assembly lines, line balancing Algorithms, Mixed model Assembly lines, Alternative Assembly systems. Automated production lines, Applications, Analysis of transfer lines.

UNIT - IV
Automated   Assembly   Systems: Fundamentals,   Analysis   of   Assembly   systems.   Cellular manufacturing, part families, cooling, production flow analysis. Group Technology and flexible Manufacturing systems, Quantitative Analysis.

UNIT - V
Quality Control And Support Systems: Quality in Design and manufacturing, inspection principles and strategies, Automated inspection, contact Vs non contact, CMM. Manufacturing support systems. Quality function deployment, computer aided process planning, concurrent engineering, shop floor control, just in time and lean production.

REFERENCES
1. Automation, production systems and computer integrated manufacturing/ Mikell.P Groover/PHI/3rd edition/2012.
2. Automation, Production Systems and CIM/ Mike J P. Grower/PHI
3. CAD/CAM/CIM/ P. Radha Krishnan & S. Subrahamanyarn and Raju/New Age International Publishers/2003.
4. System Approach to Computer Integrated Design and Manufacturing/ Singh/John   Wiley /96.
5. Computer Aided Manufacturing/Tien-Chien Chang, Richard A. Wysk and Hsu-Pin Wang/ Pearson/ 2009.
6. Manufacturing and Automation Technology / R Thomas Wright and Michael Berkeihiser/Good Heart/Willcox Publishers.

MALLAREDDY ENGINEERING COLLEGE
(AUTONOMOUS)

M.Tech (AMS) L T/P/D C
I Year I Semester 3 1/-/- 3

COMPUTER AIDED MANUFACTURING

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 toois,coolant fed tooling system, modular fixturing, quick change tooling system, automatic head changers. DNC Systems and Adaptive Control: Introduction, type of DNC systems, advantages and disadvantages of DNC, adaptive control with optimization, Adaptive control with constrains, 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, th creation of a DAPP — Based Post Processor.

UNIT - IV
Micro Controllers: Introduction, Hardware components, I/O pins, ports, 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): Introduction, Hardware components of PLC, System, basic structure, 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, Artificial Intelligence and expert system: Artificial Neural Networks, Artificial Intelligence in CAD, Experts systems and its structures.

REFERENCES
1. Computer Control of Manufacturing Systems / Yoram Koren / Mc Graw Hill. 1983.
2. Computer Aided Design Manufacturing - K. Lalit Narayan, K. Mallikarjuna Rao and
   M.M.M. Sarcar, PHI, 2008.
3. CAD/CAM Principles and Applications, P.N.Rao, TMH
4. CAD / CAM Theory and Practice,/ Ibrahim Zeid,TMH
5. CAD / CAM / CIM, Radhakrishnan and Subramanian, New Age
6. Principles of Computer Aided Design and Manufacturing, Farid Amirouche, Pearson
7. Computer Numerical Control Concepts and programming, Warren S Seames, Thomson.

MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)

M.Tech (AMS)   L   T/P/D   C
I Year I Semester   3   1/-/-   3

PRECISION ENGINEERING

UNIT I

Concepts of accuracy: Introduction - Concept of Accuracy of Machine Tools - Spindle and Displacement Accuracies - Accuracy of numerical Control Systems - Errors due to Numerical Interpolation Displacement Measurement System and Velocity lags.

Geometic deimensioning and tolerancing: Tolerance Zone Conversions - Surfaces, Features, Features of Size, Datum Features - Datum Oddly Configured and Curved Surfaces as Datum Features, Equalizing Datums - Datum Feature of Representation - Form controls, Orientation Controls - Logical Approach to Tolerancing.

UNIT II

Datum Systems: Design of freedom, Grouped Datum Systems - different types, two and three mutually perpendicular grouped datum planes; Grouped datum system with spigot and recess, pin and hole; Grouped Datum system with spigot and recess pair and tongue - slot pair - Computation of Transnational and rotational accuracy, Geometric analysis and application.

UNIT III

Tolerance Analysis: Process Capability, Mean, Variance, Skewness, Kurtosis, Process Capability Metrics, Cp, Cpk, Cost aspects, Feature Tolerances, Geometric Tolerances. Surface finish, Review of relationship between attainable tolerance grades and different machining process, Cumulative effect of tolerances sure fit law, normal law and truncated normal law.

UNIT IV

Tolerance Charting Techniques: Operation Sequence for typical shaft type of components, Preparation of Process drawings for different operations, Tolerance work sheet sand centrally analysis, Examples, Design features to facilitate machining; Datum Features - functional and manufacturing Components design - Machining Considerations, Redesign for manufactured, Examples.

UNIT V

Foundamentals of Nanotechnolgy: Systems of nanometer accuracies – Mechanism of metal Processing - Nano physical processing of atomic bit units. Nanotechnology and Electro chemical atomic bit processing.

Measuring Systems 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.

REFERENCES

1. Precision Engineering in Manufacturing/Murthy R.L./New Age International (P) limited, 1996.
2. Geometric Dimensioning and Tolerancing / James D. Meadows / Marcel Dekker inc. 1995.
3. Nano Technology / Norio Taniguchi / Oxford University Press, 1996.
4. Engineering Design - A systematic Approach / Matousek / Blackie & Son Ltd., London
5. Precision Engineering/VC Venkatesh & S Izman/TMH

MALLAREDDY ENGINEERING COLLEGE
(AUTONOMOUS)

M.Tech (AMS)   L   T/P/D   C
I Year I Semester   3   1/-/-   3

DESIGN FOR MANUFACTURING AND ASSEMBLY

UNIT - I
Introduction: Design philosophy steps in Design process - General Design rules for manufacturability-basic principles of design Ling for economical production - creativity in design. Materials: Selection of Materials for design Developments in Material technology - criteria for material selection - Material selection interrelationship with process selection process selection charts.

UNIT- II
Machining Process: Overview of various machining processes - general design rules for machining-Dimensional tolerance and surface roughness - Design for machining - Ease -Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.
Metal Casting: Appraisal of various casting processes, selection of casting process, - general design considerations for casting - casting tolerances - use of solidification simulation in casting design - product design rules for sand casting.

UNIT- III
Metal Joining: Appraisal of various welding processes, Factors in design of weldments - general design guidelines - pre and post treatment of welds - effects of thermal stresses in weld joints -design of brazed joints. Forging - Design factors for Forging - Closed dies forging design - parting lines of die5 drop forging die design - general design recommendations. Extrusion & Sheet Metal Work: Design guidelines for extruded sections - design principles for Punching, Blanking, Bending, Deep Drawing - Keeler Goodman Forming Line Diagram - Component Design for Blanking.

UNIT-IV
Assemble Advantages: Development of the assemble process, choice of assemble method assemble advantages social effects of automation.
Automatic Assembly Transfer Systems: Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free - transfer machine.

UNIT-V
Design Of Manual Assembly: Design for assembly fits in the design process, general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and fastening, effect of part symmetry on handling time, effect of part thickness and size on handling time, effect of weight on handling time, parts requiring two hands for manipulation, effects of combinations of factors, effect of symmetry effect of chamfer design on insertion operations, estimation of insertion time.

REFERENCES:
1. Assembly Automation and Product Design/ Geoffrey Boothroyd/ Marcel Dekker Inc., NY, 1992.
2. Engineering Design - Material & Processing Approach/ George E. Deiter/McGraw Hill Intl. 2nd Ed. 2000.
3. Hand Book of Product Design/ Geoffrey Boothroyd/ Marcel and Dekken, N.Y. 1990.
4. Computer Aided Assembly London/ A Delbainbre/.
5. Product Design for Manufacturing and Assembly/ Geoffrey Boothroyd, Peter Dewhurst & Winston Ansthony K night/CRC Press/2010

MALLAREDDY ENGINEERING COLLEGE
(AUTONOMOUS)

M.Tech (AMS)   L   T/P/D   C
I Year I Semester   3   1/-/-   3

SPECIAL MANUFACTURING PROCESS
(ELECTIVE – I)

UNIT- I
Surface Treatment: Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapor deposition, thermal spraying, Ion implantation, diffusion coating, Diamond 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
Fabrication of Microelectronic Devices:
Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in micro electronics, surface mount technology, Integrated circuit economics.

UNIT - IV
E-Manufacturing: Nano manufacturing techniques and micromachining, High Speed Machining and hot machining

UNIT -V
Rapid Prototyping: Working Principles, Methods, Stereo Lithography, Laser Sintering, Fused Deposition Method, Applications and Limitations, Rapid tooling, Techniques of rapid manufacturing

REFERENCES:
1.Manufacturing Engineering and Technology I Kalpakijian / Adisson Wesley, 1995.
2. Process and Materials of Manufacturing / R. A. Lindburg / 1th edition, PHI 1990.
3. Microelectronic packaging handbook / Rao. R. Thummala and Eugene, J. Rymaszewski / Van Nostrand Renihold,
4. MEMS & Micro Systems Design and manufacture / Tai — Run Hsu / TMGH
5. Advanced Machining Processes / V.K.Jain / Allied Publications.
6. Introduction to Manufacturing Processes / John A Schey I Mc Graw Hill.

MALLAREDDY ENGINEERING COLLEGE
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M.Tech (AMS)   **L   T/P/D   C**
I Year I Semester   **3   1/-/-   3**

PRODUCT DATA MANAGEMENT
(ELECTIVE – I)

UNIT- I

Introduction -Need for IPPD - strategic importance of product development - integration of customer, designer, material supplier and process planner, Competitor and costumer - behavior analysis. Understanding customer - promoting customer understanding - involve customer in development and managing requirements - Organization - process management and improvement - Plan and establish product specification.

UNIT - II

Concept Generation and Selection: Task - Structured approaches -Clarification-Search-Externally and internally - explore systematically - reflect on the solutions and process - concept selection- methodology - benefits.
Product Archetecture: Implications - Product change - variety - component standardization-product performance - manufacturability.

UNIT - III

Product Development Management: Establishing the architecture - creation - clustering -geometric layout development - fundamental and incidental interactions - related system level design issues - secondary systems - architecture of the chunks - creating detailed interface specifications.
Industrial Design: Integrate process design - Managing costs - Robust design - Integrating CAE, CAD, CAM tools - simulating product performance and manufacturing processing electronically - Need for industrial design - impact - design process.

UNIT - IV

Investigation of customer needs - conceptualization - refinement - management of the industrial design process - technology driven products - user - driven products - assessing the quality of industrial design.

UNIT - V

Design For Manufacturing And Product Development: Definition - Estimation of manufacturing cost - reducing the component costs and assembly costs - Minimize system complexity. Prototype basics- Principles of prototyping- planning for prototypes- Economics analysis-Understanding and representing tasks - baseline project planning - accelerating the project execution.

REFERENCES:

1. Product Design and Development/ Kari T. Ulrich and Steven D. Eppinger/ McGraw Hill International Edns. 1999.
2. Concurrent Engg/integrated Product development / Kemnneth Crow / DRM Associates, 26/3, via Olivera, Palos Verdes, CA 90274(310)377-569, Workshop Book.
3. Effective Product Design and Development/ Stephen Rosenthal/ Business One Orwin,Homewood, 1992, ISBN, 1-55623-603-4.
4 Tool Design-Integrated Methods for Successful Product Engineering / Staurt Pugh / Addsion Wesley Publishing, Neyourk, NY, 1991, ISBN 0-202-41369-5.
5. Production and Operations Management/Chase/TMH

MALLAREDDY ENGINEERING COLLEGE
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M.Tech (AMS)   L   T/P/D   C
I Year I Semester   3   1/-/-   3

TOTAL QUALITY MANAGEMENT
(ELECTIVE – I)

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: Definition 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: The importance of customer satisfaction and loyalty- Creating satisfied customers, Understanding the customer needs, Process Vs. Customer, internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer - Supplier relationships. Bench Marketing: Evolution of Bench Marketing, meaning of Bench marketing, benefits of bench marketing, the bench marketing process, pitfalls of bench marketing.

UNIT - III

Organizing for TQM: The systems approach, Organizing for quality implementation, making the transition from a traditional to a TQM organizing, Quality Circles. 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 ISO9000 ANSI/ASQCQ-90. Series Standards, benefits of ISO9000 certification, the third party audit, Documentation ISO9000 and services, the cost of certification implementing the system.

REFERENCES

1. Total Quality Management / Joel E.Ross/Taylor and Franscis Limited
2. Total Quality Management/P.N.Mukherjee/PHI
3. Beyond TQM / Robert L.Flood
4. Statistical Quality Control / E.L. Grant / McGraw Hill.
5. Total Quality Management- A Practical Approach/H. Lal
6. Quality Management/Kanishka Bedi/Oxford University Press/2011
7. Total Engineering Quality Management/Sunil Sharma/Macmillan

MALLAREDDY ENGINEERING COLLEGE
(AUTONOMOUS)

M.Tech (AMS)   L   T/P/D C
I Year I Semester   3   1/-/-   3

ADVANCED CAD
(ELECTIVE – II)

UNIT- I

Principles of Computer Graphics: Introduction, graphic primitives, point plotting, lines, Bresenham's circle algorithm, ellipse, transformation in graphics, coordinate systems, view port, 2D and 3D transformation, hidden surface removal, reflection, shading and generation of characters.

UNIT- II

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.

Geometricmodelling: Types of mathematical representation of curves, wire frame models wire frame entities parametric representation of synthetic curves her mite cubic splines Bezier curves B-splines rational curves.

UNIT- III

Surface Modeling: Mathematical representation surfaces, Surface model, Surface entities surface representation, Parametric representation of surfaces, plane surface, rule surface, surface of revolution, Tabulated Cylinder.

UNIT- IV

Parametric representation of synthetic surfaces:

Hermite Bicubic surface, Bezier surface, B- Spline surface, COONs surface, Blending surface Sculptured surface, Surface manipulation — Displaying, Segmentation, Trimming, Intersection, Transformations (both 2D and 3D).

UNIT- V

Geometricmodelling-3D: Solidmodeling, Solid Representation, Boundary Representation (B-Rep), Constructive Solid Geometry (CSG).

CAD/CAM Exchange : Evaluation of data - exchange format, IGES data representations and structure, STEP Architecture, implementation, ACIS & DXF. Design Applications: Mechanical tolerances, Mass property calculations, Finite Element Modeling and Analysis and Mechanical Assembly.

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

REFERENCES

1. Mastering CAD/CAM / Ibrhim Zeid / Mc Graw Hill International.
2. CAD/CAM Principles and Applications/ P.N.Rao/TMH/3rd Edition
3. CAD/CAM /Groover M.P./ Pearson education
4. CAD/CAM Concepts and Applications/ Alavala/ PHI
5. CAD / CAM / CIM, Radhakrishnan and Subramanian/ New Age
6. Principles of Computer Aided Design and Manufacturing/ Farid Amirouche/ Pearson
7. Computer Numerical Control Concepts and programming/ Warren S Seames/ Thomson.

MALLAREDDY ENGINEERING COLLEGE
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M.Tech (AMS)   L   T/P/D   C
I Year I Semester   3   1/-/-   3

ADVANCED MECHATRONICS
(ELECTIVE – II)

UNIT-I

Mechatronics systems, elements, levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion , force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II

Solid state electronic devices, PN junction diode, BJT, FET, DIA and TRIAC. Analog signal conditioning, amplifiers, filtering. Introduction to MEMS & typical applications.

UNIT-III

Hydraulic and pneumatic actuating systems, Fluid systems, Hydraulic and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems: Mechanical actuating systems and electrical actuating systems.

UNIT-IV

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V

System and interfacing and data acquisition, DAQS , SCADA, A to D and D to A conversions; Dynamic models and analogies, System response. Design of mechatronics systems & future trends.

REFERENCES:

1. MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran & GK Vijaya Raghavan/WILEY India Edition/2008
2. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.
3. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
4. Mechatronics - N. Shanmugam / Anuradha Agencies Publishers.
5. Mechatronics System Design / Devdas shetty/Richard/Thomson.
6. Mechatronics/M.D.Singh/J.G.Joshi/PHI.
7. Mechatronics - Electronic Control Systems in Mechanical and Electrical Engg. 4th Edition, Pearson, s2012 W. Bolton
8. Mechatronics - Principles and Application Godfrey C. Onwubolu, Wlsevier, 2006 Indian print

MALLAREDDY ENGINEERING COLLEGE
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M.Tech (AMS)   **L   T/P/D   C**
I Year I Semester   **3   1/-/-   3**

THEORY OF ELASTICITY AND PLASTICITY
(ELECTIVE – II)

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 Venent's 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 - Beams of circular cross-section.

UNIT - IV
Plasticity: Plastic deformation of metals - Structure of metals - Deformation - Creep stress relaxation of 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.

REFERENCES:
1. Theory of Elasticity/Timoshenko S.P. and Goodier J.N./Koakusha Publishers
2. An Engineering Theory of Plasticity/E.P. Unksov/Butterworths
3. Applied Elasticity/W.T. Wang/TMH
4. Theory of Plasticity for Engineers/Hoffman and Sacks/TMH
5. Theory of Elasticity and Plasticity/Sadhu Singh/ Khanna Publishers
6. Theory of Elasticity and Plasticity/Harold Malcolm Westergaard/Harvard University Press

MALLAREDDY ENGINEERING COLLEGE
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M.Tech (AMS)   **L   T/P/D   C**
 I Year I Semester   **-   -/3/-   2**

ADVANCED CAD/CAM LAB

Features and selection of CNC turning and milling centers. Practice in part programming and operation of CNC turning machines, subroutine techniques and use of cycles. Practice in part programming and operating a machining center, tool planning and selection of sequences of operations, tool setting on machine, practice in APT based NC programming. Practice in Robot programming and its languages. Robotic simulation using software. Robo path control, preparation of various reports and route sheets, Simulation of manufacturing system using CAM software, controller operating system commands.

MALLAREDDY ENGINEERING COLLEGE
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M.Tech (AMS)   L   T/P/D   C
 I Year II Semester   3   1/-/-   3

SIMULATION MODELING OF MANUFACTURING SYSTEMS

UNIT - I
System - ways to analyze the system - Model - types of models - Simulation - Definition - Types of simulation models - steps involved in simulation - Advantages & Disadvantages. Parameter estimation-estimator - properties - estimate - point estimate – confidence interval estimates-independent-dependent-hypothesis - types of hypothesis- step - types l& 2 errors - Framing - string law of large numbers.

UNIT - II
Building of Simulation model validation - verification - credibility - their timing - principles of valid simulation Modeling - Techniques for verification - statistical procedures for developing credible model. Modeling of stochastic input elements - importance - various procedures - theoretical distribution - continuous - discrete their suitability in modeling.

UNIT - III
Generation of random variables - factors for selection methods - inverse transform - composition-convolution - acceptance - rejection - generation of random variables - exponential-uniform-weibull-normal Bernoullie - Binomial uniform - poisson - Simulation languages - comparison of simulation languages with general purpose languages Simulation languages vs Simulators - software features - statistical capabilities - G P S S - S1MAN- SIMSCRIPT - Simulation of WMJI queue - comparison of simulation languages.

UNIT - IV
Output data analysis - Types of Simulation w. r. t output data analysis - warm up period- Welch algorithm - Approaches for Steady- State Analysis- replication- Batch means methods- corn pan Sons.

UNIT - V
Applications of Simulation - flow shop system- job shop system - M/MI1 queues with infinite and finite capacities - Simple fixed period inventory system - New boy paper problem.

REFERENCES:
1. Simulation Modelling and Analysis / Law, A.M.& Kelton / Mc Graw Hill, Edition/ New York, 1991.
2. Discrete Event System Simulation I Banks J. & Carson J.S., PH I Englewood Cliffs N/ 1984.
3. Simulation of Manufacturing Systems / Carrie A. / Wiley, NY, 1990.
4. A Course in Simulation / Ross, S.M., McMillan, NY, 1990.
5. Simulation Modelling and S1MNET/ Taha HA. / PH, Englewood Cliffs, NJ, 1987

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M.Tech (AMS)   **L   T/P/D   C**
 I Year II Semester   **3   1/-/-   3**

QUALITY ENGINEERING IN MANUFACTURING

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): Introduction to ANOVA, Need for ANOVA, NO-way ANOVA, Oneway 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 contributor, estimating the mean.

UNIT - V
Six Sigma and The Technical System: Six sigma DMAIC methodology, tools for process improvement, six sigma in services and small organizations, statistical foundations, statistical methodology.

REFERENCES:
1. Taguchi Techniques for Quality Engineering / Phillip J. Ross / McGraw Hill/ Intl. II Edition, 1995.
2. Quality Engineering in Production systems I G. Taguchi, A. Elsayed et al / Mc.Graw Hill Intl. Edition, 1989.
3. Taguchi Methods explained: Practical steps to Robust Design / Papan P. Bagchi I Prentice Hall Pvt. Ltd., New Delhi.

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M.Tech (AMS)   L   T/P/D   C
 I Year II Semester   3   1/-/-   3

MATERIAL TECHNOLOGY

UNIT I

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. 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 II

Griffth'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.

UNIT III

Fatigue, Low and High cycle fatigue test, Crack Initiation and Propagation mechanism and paris Law, Effect of surface and metallurgical parameters on Fatigue, Fracture of non-metallic materials, fatigue analysis, Sources of failure, procedure of failure analysis.

UNIT IV

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 with relevance to Aero, Auto , Marine, Machinery and Nuclear Applications.

UNIT V

Modern metallic materials: Dual Steels, Micro alloyed, High Strength Low alloy (HSLA) Steel, Transformation induced plasticity (TRIP) Steel, Maraging Steel, Inter metallics, Ni and Ti Aluminides, Smart Materials, Shape Memory alloys, Metallic Glass Quasi Crystal and Nano Crystalline Materials.
Nonmetallic materials: Polymeric materials and their molecular structures, Production Techniques for Fibers, Foams, Adhesives and Coatings, structure, Properties and Applications of Engineering Polymers, Advanced Structural Ceramics WC, TiC, TaC, Al_2O_3, SiC, Si_3N_4, CBN and Diamond - properties, Processing and applications.

REFERENCES
1. Mechanical Behavior of Materials/Thomas H. Courtney/ McGraw Hill/2 nd Edition/2000
2. Mechanical Metallurgy/George E. Dicter/McGraw Hill, 1998.
3. Selection and use of Engineering Materials 3e/Charles J.A/Butterworth Heiremann.
4. Engineering Materials Technology/James A Jacob Thomas F Kilduff/Pearson
5. Material Science and Engineering/William D Callister/John Wiley and Sons

MALLAREDDY ENGINEERING COLLEGE
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M.Tech (AMS)   **L T/P/D C**
I Year II Semester   **3 1/-/- 3**

PRODUCTION AND OPERATIONS MANAGEMENT

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 engineers - 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 - Gantt 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.

REFERENCES:
1. Operations Management/ E.S. Buffs/ John Wiley & Sons / 2007
2. Operations Management Theory and Problems/ Joseph G. Monks / Macmillan / McGraw Hill/3rd Edition.
3. Production Systems Management/ James I. Riggs / John Wiley & Sons.
4. Production and Operations Management/ Chary/ Mc Graw Hill/2004
5. Operations Management/ Richard Chase/ Mc Graw Hill/2006
6. Production and Operation Management / Panner Selvam / PHI.
7. Production and Operation Analysis/ Nahima/ Mc Graw Hill/2004

MALLAREDDY ENGINEERING COLLEGE
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M.Tech (AMS)   L   T/P/D   C
I Year II Semester   3   1/-/-   3

INDUSTRIAL ROBOTICS
(ELECTIVE – III)

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 models controllers control system analysis, robot actuation 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.

UNIT - IV
Robot Programming: Lead through programming, Robot programming as a path in space, Motion interpolation, WAIT, SIGNAL AND DELAY commands, Branching capabilities and Limitations.
Robot Languages: Textual robot Languages, Generation, Robot language structures, Elements in function.

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

REFERENCES:
1. Industrial Robotics / Groover M P /Pearson Edu.
2. Introduction to Robotic Mechanics and Control by JJ Craig, Pearson, 3rd edition.
3. Robotics / Fu K S/ McGraw Hill.
4. Robotic Engineering / Richard D. Klafter, Prentice Hall
5. Robot Analysis and Intelligence / Asada and Slotine / Wiley Inter-Science.
6. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.
7. Robotics and Control / Mittal R K & Nagrath I J / TMH

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M.Tech (AMS)	L	T/P/D	C
I Year II Semester	3	1/-/-	3

ADVANCED TOOL DESIGN
(ELECTIVE – III)

UNIT - I
Tool Materials:
Prosperities of materials: Tools steels, Cast Iron, Mild or low carbon steels, Non metallic and nonferrous materials, Heat treating

UNIT - II
Design of Cutting Tools:
Single Point cutting tools: Milling cutters, Drills, Selection of carbide steels - Determination of shank size for single point carbide tools, Determining the insert thickness for carbide tools

UNIT - III
Design of Jigs and Fixtures:
Basic principles of location and clamping: Locating methods and devices, Jigs-Definition Types, General considerations in the design of Drill jigs, Drill bushing, Methods of Construction. Fixtures-Vice fixtures, Milling, Boring Lathe Grinding fixtures, Design of Moulds and dies in plastics.

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 sheet metal bending, forming and drawing 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.

REFERENCES
1. Donaldson "Tool Design"/ Tata Mc Graw Hill
2. Production Technology/HMT/Tata McGraw Hill/
3. Production Technology by R.K. Jain and S.C. Gupta.
4. Mechanical Metallurgy/ George F Dieter/ Tata Mc Graw Hill
5. Machine Tools/C Elanchezhian & M. Vijayan/Anuradha Publications
6. Principles of Machine Tools, Bhattacharya A and Sen.G.C. New Central Book Agency
7. Hand Book of Metal forming/ Kurt Lange/ Mc Graw-Hill,.1987

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I Year II Semester   3   1/-/-   3

DESIGN AND MANUFACTURING OF MEMS AND MICRO SYSTEMS
(ELECTIVE – III)

UNIT I
Overview and working principles of Mems And Microsystems MEMS & Microsystems, Evolution of Micro fabrication, Microsystems & Microelectronics, Microsystems & Miniaturization, Applications of MEMS in Industries, Micro sensors, Micro actuation, MEMS with Micro actuators Micro accelerometers, Micro fluids.

UNIT II
Engineering Science for Microsystems Design And Fabrication: Atomic structure of Matter, Ions and Ionization, Molecular Theory of Mater and Intermolecular Force, Doping of Semiconductors, The diffusion Process, Plasma Physics, Electrochemistry, Quantum Physics

UNIT III
Engineering Mechanics for Microsystems Design: Static Bending of thin Plates, Mechanical Vibration, Thermo mechanics Fracture Mechanics, Thin-Film Mechanics, Overview of Finite Element Stress Analysis

UNIT IV
Thermo Fluid Engineering & Microsystems Design: Overview of Basics of Fluid Mechanics in Macro and Meso scales, Basic equations in Continuum Fluid dynamics, Laminar Fluid Flow in Circular Conduits, Computational Fluid Dynamics, Incompressible Fluid Flow in Micro conduits, Fluid Flow in Sub micrometer and Nano scale, Overview of Heat conduction in Solids, Heat Conduction in Multilayered Thin films and in solids in sub micrometer scale, Design Considerations, Process Design Mechanical Design, Mechanical Design using FEM, Design of a Silicon Die for a Micro pressure Sensor.

UNIT V
Materials For MEMS & Microsystems And Their Fabrication: Substrates and Wafers, Active substrate materials, Silicon as a substrate material, Silicon Compounds, Silicon Piezoresistors, Gallium Arsenide, Quartz, Piezoelectric Crystals and Polymers, Photolithography, Ion implantation, Diffusion and oxidation, chemical and physical vapor deposition, Etching, Bulk micro manufacturing, Surface Micromachining, The LIGA Process

REFERENCES
1. MEMs & Microsystems: Design & Manufacture/ Tai-Ran Hsu/Tata Mc-Graw Hill., ed./2002
2. An Introduction to Microelectromechanical Systems Engineering/ Maluf, M./ Artech House, Boston, 2000
3. Micro robots and Micromechanical Systems/ Trimmer, W.S.N/ Sensors & Actuators, vol19, no.1989.
4. Applied Partial Differential Equations/ Trim, D.W/ PWS-Kent Publishing/ Boston 1990.
5. Fundamentals of Microfabrication. Madou, M/ CRC Press, Boca Raton, 1997.
6. The Finite Element Method in Thermomechanics/ Hsu, T.R / Alien & Unwin, London.

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M.Tech (AMS)	**L T/P/D C**
I Year II Semester	**3 1/-/- 3**

PERFORMANCE MODELING AND ANALYSIS OF MANUFACTURING SYSTEMS
(ELECTIVE – IV)

UNIT I

Manufacturing Systems & Control: Automated Manufacturing Systems - Modeling - Role of performance modeling – 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 network interconnections - Manufacturing automation protocol - Database management system.

UNIT II

Manufacturing Processes: Examples of stochastics 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 CTMC 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 feedback - 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.

REFERENCES

1. Performance Modelling of Automated Manufacturing Systems/ Viswanadham, N and Narahari, Y/ Prentice Hall of India, New Delhi, 1994
2. Probability and Statistics with Reliability, Queuing and Computer Science Applications/ Trivedi, K.S./ Prentice Hall, New Jersey, 1982.
3. Fundamentals of Mathematical Statistics/ Gupta S.C. & Kapoor V.K./ 3rd Edition, Delhi, 1988

MALLAREDDY ENGINEERING COLLEGE
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M.Tech (AMS)	**L**	**T/P/D**	**C**
I Year II Semester	**3**	**1/-/-**	**3**

INTELLIGENT MANUFACTURING SYSTEMS
(ELECTIVE – IV)

UNIT I

Computer Integrated Manufacturing Systems Structure and functional areas of CIM system, - CAD, CAPP, CAM, CAQC, ASRS. Advantages of CIM.   Manufacturing Communication Systems - MAP/TOP, OSI Model, Data Redundancy, Top- down and Bottom-up Approach, Volume of Information. Intelligent Manufacturing System Components, System Architecture and Data Flow, System Operation.

UNIT II

Components of Knowledge Based Systems - Basic Components of Knowledge Based Systems, Knowledge Representation, Comparison of Knowledge Representation Schemes, Interference Engine, Knowledge Acquisition.

UNIT III

Machine Learning - Concept of Artificial Intelligence, Conceptual Learning, Artificial Neural Networks-Biological Neuron, Artificial Neuron, Types of Neural Networks, Applications in Manufacturing.

UNIT IV

Automated Process Planning - Variant Approach, Generative Approach, Expert Systems for Process Planning, Feature Recognition, Phases of Process planning. Knowledge Based System for Equipment Selection (KBSES) - Manufacturing system design. Equipment Selection Problem, Modeling the Manufacturing Equipment Selection Problem, Problem Solving approach in KBSES, Structure of the KRSES.

UNIT V

Group Technology: Models and Algorithms Visual Method, Coding Method, Cluster Analysis Method, Matrix Formation - Similarity Coefficient Method, Sorting-based Algorithms, Bond Energy Algorithm, Cost Based method, Cluster Identification Method, Extended CI Method.   Knowledge Based Group Technology - Group Technology in Automated Manufacturing System. Structure of Knowledge based system for group technology (KBSCIT) — Data Base, Knowledge Base, Clustering Algorithm.

REFERENCES

1. Intelligent Manufacturing Systems/ Andrew Kusiak/Prentice Hall.
2. Artificial Neural Networks/ Yagna Narayana/PHI/2006
3..Automation,ProductionSystemsandCIM/GrooverM.P./PHI/2007
4.   Neural networks: A comprehensive foundation/ Simon Hhaykin/ PHI.
5.   Artificial neural networks/ B.Vegnanarayana/PHI
6.   Neural networks in Computer intelligence/ Li Min Fu/ TMH/2003
7.   Neural networks/ James A Freeman David M S kapura/ Pearson education/2004
8.   Introduction to Artificial Neural Systems/Jacek M. Zurada/JAICO Publishing House Ed. 2006.

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COMPUTATIONAL FLUID DYNAMICS
(ELECTIVE – IV)

UNIT - I
Introduction: Finite difference method, finite volume method, finite element method, governing equations and boundary conditions, Derivation of finite difference equations.
Solution methods: Solution methods of elliptical equations — finite difference formulations, interactive solution methods, direct method with Gaussian elimination.
Parabolic equations-explicit schemes and Von Neumann stability analysis, implicit schemes, alternating direction implicit schemes, approximate factorization, fractional step methods, direct method with tridiagonal matrix algorithm.

UNIT - II
Hyperbolic equations: explicit schemes and Von Neumann stability analysis, implicit schemes, multi step methods, nonlinear problems, second order one-dimensional wave equations. Burgers equations: Explicit and implicit schemes, Runge-Kutta method.

UNIT - III
Formulations of Incompressible Viscous flows: Formulations of incompressible viscous flows by finite difference methods, pressure correction methods, vortex methods.
Treatment of compressible flows: potential equation, Euler equations, Navier-stokes system of equations, flow field-dependent variation methods, boundary conditions, example problems.

UNIT - IV
Finite Volume Method: Finite volume method via finite difference method, formulations for two and three-dimensional problems.

UNIT - V
Standard Variational Methods: Linear fluid flow problems, steady state problems, Transient problems.

REFERENCES:
1. Computational fluid dynamics/ T. J.C'hung/ Cambridge University press,2002.
2. Text book of fluid dynamics/ Frank Choriton/ CBS Publishers & distributors, 1985
3. Numerical heat transfer and fluid flow / Suhas V. Patankar/ Hema shava Publishers corporation & Mc Graw Hill.
4. Computational Fluid Flow and Heat Transfer/ Muralidaran/ Narosa Publications
5. Computational Fluid Dynamics: Basics with applications/John D. Anderson/ Mc Graw Hill.
6. Fundamentals of Computational Fluid Dynamics/Tapan K. Sengupta / Universities Press.
7. Introduction to Theoretical and Computational Fluid Dynamics/C. Pozrikidis /Oxford University Press/2nd Edition

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I Year II Semester   **-   -/3/-   2**

MANUFACTURING SIMULATION & PRECISION ENGINEERING LABORATORY

A.   MANUFACTURING SIMULATION

The students will be given training on the use and application of the following software to manufacturing problems:

1.   Auto MOD Software.
2.   PROMOD
3.   SLAM-II
4.   CAFIMS
5.   Flexsim

They also learn how to write sub routines in C-language and interlinking with the above packages.

Problems for modelling and simulation experiments:

1.   AGV planning
2.   ASRS simulation and performance evaluation
3.   Machines, AGVs and AS/RS integrated problems
4.   JIT system
5.   Kanban flow
6.   Material handling systems
7.   M.R.P. Problems
8.   Shop floor scheduling etc.

B. PRECISION ENGINEERING

1. Hydraulic and Pneumatic circuits
2. Closed loop control systems
3. Study of the chip formation in turning process
4. Study of operation of tool and cutter grinder, twist drill grinder, Centreless grinder
5. Determination of cutting forces in turning
6.   Experiments in unconventional manufacturing processes-AJM and study of USM, EDM, Laser Machining and Plasma spraying
7. Inspection of parts using tool makers microscope, roughness and form tester
8. Study of micro-controllers, programming on various CNC machine tools and also controllers
9. Studies on PLC programming
10. Study and programming of robots
11. Condition monitoring in machining process using acoustic emission.