

Ordinance No. V (42A)
Master of Technology
(M.Tech.)

(Discipline: Production Engineering)



Faculty of Engineering & Technology

**SWAMI VIVEKANAND SUBHARTI UNIVERSITY,
MEERUT**

SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
ORDINANCE No. V (42A) RELATING TO
MASTER OF TECHNOLOGY (M.Tech.) PROGRAMME

(As per AICTE)

(Effective from the Session – 2018-19)

General

- This ordinance may be called “**Ordinance Relating to Master of Technology (M.Tech)**” Programme.
- It shall come enforced with immediate effect session 2018-19.
- This supersedes the previous Ordinance from the relating to Master of Technology (M.Tech).
- The degree “Master of Technology” acronym as M.Tech. shall be of two years (four semesters) in the branches of Engineering.

CHAPTER - 1

1.1 Introduction

Chhatrapati Shahuji Subharti Institute of Technology and Engineering is a constituent Institute of Swami Vivekanand Subharti University, Meerut has been established in 2005 with the vision we make every decision to support the career and personal development of our learners. Our curriculum, teaching and services demonstrate that we value the diverse profiles of our learners. The University boasts of highly qualified, dedicated and competent faculty from all walks of life, world class infrastructure, fully equipped Laboratories with latest state-of-the-art equipment and a huge library with recent knowledge resources including e-resources. Swami Vivekanand Subharti University is providing a safe and healthy working environment for teaching and non-teaching employees, students, and visitors etc.

1.2 Vision

To become a dynamic, demand driven, quality conscious, efficient and innovative institute capable of becoming active partner in the techno-economic growth of the Nation and to provide world class technological education and research inputs to the society.

1.3 Mission

Strive to create centre of excellence in specialized areas of technology and enable its academic beneficiaries to become competent professionals capable of providing sustainable solutions to challenging problems of the society and industry.

1.4 Programme Educational Objectives (PEOs):

The Programme Educational Objectives of M.Tech. programmes are:

PEO1. To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms

PEO2. To prepare graduates who will contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise

PEO3. To prepare graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, design and implementation skills

PEO4. To prepare graduates who will thrive to pursue life-long learning to fulfill their goals

1.5 Programme Outcomes (POs):

Engineering programmes are designed to prepare graduates to attain the following program outcomes:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

CHAPTER – 2

General

2.1 The M.Tech. programme is available in the following discipline:

1) **Computer Science & Engineering Department**

- Computer Science & Engineering
- Cyber Security

2) **Electrical & Electronics Engineering Department**

- Power Electronics & Drives
- Energy Technology

3) **Electronics & Communication Engineering Department**

- Radiofrequency & Microwave
- Microelectronics

4) **Mechanical Engineering Department**

- Production Engineering

5) **Environmental Engineering Department**

- Environmental Engineering & Management

6) **Civil Engineering Department**

- Construction Management
- Structural Engineering

2.2 Modification/ addition/ deletion in the of specialties offered in the above list can be made by the faculty from time to time in accordance with the direction of the Academic Council which shall be subject to fulfillment of statutory norms, prescribed condition and approval by the Statutory Authorities.

2.3 The eligibility qualification for admission to the M.Tech. programmes in Swami Vivekanand Subharti University, Meerut in different specialties shall be as given below in the Table of Eligibility Qualification for M.Tech. admission:

Eligibility Qualification for M.Tech. Admission:

Department	Specialization	Eligibility
Computer Science & Engineering	Computer Science & Engineering	<p>1. BE/B.Tech Electrical and Electronics/ Electronics & Communication/ Electronics Engineering/ Information Technology/ Computer Science & Engineering/ Instrumentation & Control/ Electronics & Instrumentation/ Instrumentation/ Computer Hardware & Software</p> <p style="text-align: center;">Or</p> <p>2. Five year integrated M.Sc in Information Technology/ Computer Science/ Software Engineering/ Computer Science/ Electronics.</p> <p style="text-align: center;">Or</p> <p>3. M.Sc (02 Year)</p>
	Cyber Security	<p>1. BE/B.Tech. Electrical and Electronics/ Electronics & Communication/ Electronics Engineering/ Information Technology/ Computer Science & Engineering/ Instrumentation & Control/ Instrumentation/ Electronics & Instrumentation/ Computer Hardware & Software.</p> <p style="text-align: center;">Or</p> <p>2. Five year integrated M.Sc. in Information Technology/ Computer Science/ Software Engineering/ Computer Science/ Electronics.</p> <p style="text-align: center;">Course & M.Sc (2 Year) in IT Related</p>

		<p align="center">Major Courses</p> <p>3. Electronics/Electronics and Communication, Mathematics, Physics.</p> <p align="center">M.C.A.</p> <p align="center">AMIETE/AMIE</p>
Electrical & Electronics Engineering	Power Electronics & Drives	BE/B.Tech/B.Sc (Engg) (EC, EEE, EE & EI). <p align="center">Or</p> Associate Membership of Professional Bodies Approved by the Competent Authority. <p align="center">Or</p> M.Sc. (Engg in Electrical) or Equivalent Degree.
	Energy Technology	BE/B.Tech/B.Sc (Engg) (EC, EEE, EE, EI, ME, Chemical & Auto). <p align="center">Or</p> Associate Membership of Professional Bodies Approved by the Competent Authority. <p align="center">Or</p> M.Sc. (Electronics, Physics, Chemistry) or Equivalent Degree
Electronics & Communication Engineering	Radiofrequency & Microwaves	B.Tech/BE/B.Sc (Engg) (EC, EE, EI & EEE). <p align="center">Or</p> Associate Membership of Professional Bodies Approved by the Competent Authority. <p align="center">Or</p> M.Sc. (Electronics, Physics with specialization in) or Equivalent Degree
	Microelectronics	B.Tech/BE/B.Sc (Engg) (EC, EE, EI & EEE). <p align="center">Or</p> Associate Membership of Professional Bodies Approved by the Competent Authority. <p align="center">Or</p> M.Sc. (Electronics, Physics with specialization in) or Equivalent Degree.
Mechanical Engineering	Production Engineering	B.Tech./BE/B.Sc (Engg) (ME, Production or Mechatronics). <p align="center">Or</p> Associate Membership of Professional Bodies Approved by the Competent Authority.
Environment Engineering	Environmental Engineering & Management	B.Tech./BE/B.Sc (Engg)/Environment Engg./Civil Engg./Biotechnology/Chemical Engg./Mechanical Engg./Electrical & Electronics Engg./Fire Safety Engg.)

		<p style="text-align: center;">Or</p> <p>Associate Membership of Professional Bodies Approved by the Competent Authority.</p> <p style="text-align: center;">Or</p> <p>M.Sc (Environment Science, Physical Sciences, Life Science) or Equivalent Degree</p>
Civil Engineering	Construction Management	<p>B.E./B.Tech/B.Sc (Engg) Degree in Civil Engineering/ Mining Engineering/ Transportation Engineering/Environmental Engineering/ Structural Engineering/Construction Technology & Management of any recognized Indian University.</p> <p style="text-align: center;">Or</p> <p>Bachelor's Degree in Architecture of any recognized Indian University</p> <p style="text-align: center;">Or</p> <p>Associate Membership of Professional Bodies Pertaining to Civil Engineering/Architecture Approved by the Competent Authority.</p>
	Structure Engineering	<p>B.E./B.Tech/B.Sc (Engg) Degree in Civil Engineering of any recognized Indian University.</p> <p style="text-align: center;">Or</p> <p>Bachelor's Degree in Architecture of any recognized Indian University.</p> <p style="text-align: center;">Or</p> <p>Associate Membership of Professional Bodies Pertaining to Civil Engineering/Architecture Approved by the Competent Authority.</p>

2.4 Categories for M.Tech. Admission

Admission to M.Tech. in each specialty shall be approved in any one of the following categories:-

- 2.4.1 M.Tech. (Regular):** It shall be a Regular, Four Semester, Full Time Programme (24 month duration) in which the student will be expected to fulfill the complete requirement relating to the theory/Lab Work/Practical Training/Dissertation etc. while performing full time studies in the University and the Industries/institute/R&D Organization assigned to him/her by the university for completing the dissertation/Project Work.

- 2.4.2 **M.Tech. (2nd Shift):** with a view to allow opportunity for higher technical education to the engineering graduate employed in the field and teaching organizations, the university shall run M.Tech classes in the 2nd shift with identical curriculum and syllabi in the evening shift with class timing from 05:00 PM to 09:00 PM.
- 2.5 Provided further that the Vice Chancellor may exercise special powers to allow such 2nd shift classes to be conducted on *Saturday, Sunday and Holidays* to ensure complete and effective coverage of the syllabi and completing teaching hours as per requirement laid down by the statutory authorities/UGC

CHAPTER - 3

Teaching Courses

- 3.1 The programme will be two years duration, divided into four semesters (for M.Tech. Regular).
- 3.2 Annual Academic calendar shall be published by the university.

I , III Semester (Odd)	Session - 1st Aug. to 30th Nov Exam - 1st Dec. to 20th Dec.
II, IV Semester (Even)	Session - 1st Jan. to 10th May Exam - 1st May to 20th May

- 3.3 The documentation relating to the ‘**Study & Evaluation Scheme**’, ‘**Syllabus**’ and ‘**Credits Approved**’ for each subjects/course in the categories mentioned in each of the specialties stated in clause 2.1 above is provided in **Annexure-B1-B10** of the relevant programme in the Academic Ordinance.
- 3.4 Dissertation topics should be allotted to students in the third semester.

CHAPTER-4

Curriculum/Structure

- 4.1 The programme shall be spread over two academic years, spread over four semesters comprising actual teaching for a minimum of 90 days in each semester.
- 4.2 The programme focuses on the following aspects:
- (a) Competency
 - (b) Entrepreneurship
 - (c) Skill Enhancement
 - (d) Value Added Courses

(e) Extracurricular activities

4.3 Choice Based Credit System (CBCS):

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising Professional/Program Core Courses (PCC), Professional/Program Elective Courses (PEC), Mandatory Courses (MC) and Open Elective Courses (OEC). The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines to be followed.

Professional/Program Core Courses (PCC)

The departmental core consists of courses considered essential for a chosen engineering/science discipline including, engineering design, seminar, industrial training and project (PROJ).

Professional/Program Elective Courses (PEC)

The students are required to complete a specific number of elective courses. Every department offers a wide variety of elective courses to students providing them opportunity to discover their academic interest and enhancing their engagement in learning process.

Open Elective Courses (OEC)

The Open Electives courses are offered by different academic departments to the students of all disciplines. A wide range of elective courses is available with each branch. When a student opts elective courses offered in his/her program it will be termed as OEC.

Mandatory Courses (MC)

The mandatory courses considered essential for a B.Tech. programme to inculcate the essence of Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition etc.

CHAPTER-5

Attendance

5.1 The students are expected to attend all the classes and should not have less than 75 % attendance in theory as well as in practical classes, wherever held, to become eligible to appear for the university examination. Short fall in attendance can, however be

condoned in deserving cases to the extent of 10 % by the principal. If the short fall is more than 10 % but not more than 15 %, the Principal may recommend deserving cases to the Vice Chancellor for condo-nation. The order of the Vice chancellor in this regard shall be final.

CHAPTER-6

Examination

All Courses offered by SITE will have an evaluation system within two components as:

1. Continuous Comprehensive Assessment (CCA) accounting for 30% of the final grade that a student gets in a course, and
2. End-Semester Examination (ESE) accounting for the remaining 70% of the final grade that the student gets in a course.

A student will have to pass both the components i.e. CCA and ESE separately to become eligible to be declared successful in a course.

6.1 Continuous Comprehensive Assessment (CCA)

Award of Sessional Marks:

Sessional marks for theory subjects, practicals and projects shall be awarded as per the breakup of sessional marks given below:-

(i) Theory Subjects :

- a) Class test will comprise two mid-term test of equal weightage **- 20 Marks**
- b) Marks for regular class attendance **- 10 Marks**

(ii) Practical :

- a) Two–mid-term viva-voce test of equal weightage. **- 5 Marks**
- b) Teacher’s assessment (including 5 marks for regular attendance) based on lab record. **-10**

Marks

(iii) Make-up test may be held for those students who fail to appear in any one of the mid-term class test due to genuine unavoidable reasons, provided prior permission was consented from the Principal.

(iv) A maximum of 10 marks in each subject shall be awarded for attending classes (theory/practical) as per the following norms:

- | | | |
|--|---|----------|
| 85 % or more attendance | - | 10 Marks |
| 80 % or more but less than 85 % attendance | - | 09 Marks |

75 % or more but less than 80 % attendance	-	08 Marks
70 % or more but less than 75 % attendance	-	07 Marks
65 % or more but less than 70 % attendance	-	06 Marks
60 % or more but less than 65 % attendance	-	05 Marks
51 % or more but less than 60 % attendance	-	04 Marks
50 % attendance	-	01 Marks
Less than 50 % attendance	-	0 Marks

6.2 END SEMESTER EXAMINATION (ESE)

The remaining 70% of the final grade of the student in a course will be assessed on the basis of an End Semester Examination (ESE) that will be for three hours duration and will cover the entire syllabus of the course. The question papers for the ESE will be got set by the Controller of Examinations (COE) of the Swami Vivekanand Subharti University (SVSU) by a selected faculty panel.

- 6.3 The entire programme has to completed within a maximum of four years from the date of original admission in the programme.

CHAPTER-7

Paper Setting

- 7.1 The work of setting the end semester examination papers and evaluation of scripts and conduct of the end semester practical examination shall be assigned to the course teachers as well as to outsiders, ordinarily in the ratio of 50:50 for internal and external valuation respectively.

Results

- 7.2 The result shall be prepared at the end of each academic year of the programme by aggregating the marks obtained in the theory and practical examinations in all the semesters of the programme till date.
- (a) The minimum passing marks in each theory subject (including sessional marks) shall be 40% and 50% in aggregate. The minimum pass marks in a project/ Practical subject (including sessional marks if any), Seminars, Industrial Training and Educational Tour, Viva-Voce etc. shall be 50%.
- (b) If a student obtained 40% marks in at least 50% of the papers (ignoring fractions) including project report, he/she will be provisionally promoted to the next year with carryover papers and will have to appear & obtain pass marks in carryover papers along with the subsequent regular examinations for the relevant semester.

(c) If a candidate fails in only one head/subject and having passed in all other head/subject of the given examination of the year than his/her deficiency of maximum five (05) marks may be fulfilled by grace marks after fulfilling the conditions given below:

7.3 If a candidate fails in only one head/subject and having passed in all other heads/subjects of the given examination of a **semester*/year**, then his/her deficiency of marks may be fulfilled by grace marks under the following conditions:-

- (i) Grace marks is not a matter of right of the student but is the discretion of the University.
- (ii) Provided that the candidate has appeared in the main examination of the concerned programme and falls short of pass marks by not more than five (05) marks in theory paper only. Benefit of above mentioned shall not be given to the candidate who had appeared in supplementary/special examination/carry over examination.
- (iii) Further, benefit of grace marks may be given only to the candidate who will pass the entire concerned examination of the **semester*/year** after awarding the grace marks and not for the purpose of promoting the student to next year with back papers or for improvement of division or percentage.
- (iv) If in a head/subject of an examination passing in Theory, Practical or sessional exams separately is mandatory, then the benefit of grace marks shall be given only in Theory examination of the University examination.
- (v) The award of grace marks permissible shall be on the basis of 1 grace mark for every 05 marks secured by an examinee over and above the minimum passing aggregate marks of all subjects of the year.

7.4 Awarding of Grace Marks shall be done as given below:-

Aggregate Marks Obtained over & above minimum passing marks	Permissible Grace Marks
1-5	1
6-10	2
11-15	3
16-20	4
21-25	5

Total number of Grace Marks given to the student will be marked with astrick (*) at the bottom of the mark sheet.

* Grace Mark in semester examination will be considered hereinafter.

A student not covered by clause 7.2 (a) to (c) above shall have the following options to complete his/her programme -

- (i) He/ she may take admission on payment of full annual programme fee and repeat the entire year of study. He /She shall be treated as a regular student. Or
- (ii) He /She may pay only University exam fee for the End Semester Examination and appear in the End Semester University exams directly. He /She shall not be allowed to attend classes and the Sessional marks obtained earlier shall be retained. Or
- (iii) He /She may pay half of the annual programme fee and attend classes. The sessional marks obtained by him/her earlier shall be retained. There will not be any requirement of minimum attendance for appearing in the University examination

7.5 A student will not be promoted to the next academic year if the carryover papers are more than 50% at one point of time.

Evaluation under Grading Assessment

7.6 The minimum Grade/ Grade Point required to pass each paper in a semester examination under CBCS shall be Grade D/ Grade Point 4 in each theory paper/ Practical/Project (wherever applicable) in External Examination and Internal Assessment separately.

Calculation Criteria

7.7 To implement the following grading system, the colleges/campuses shall use the following UGC recommended 10 point grading system:

Marks (%)	Letter Grades	Grade Points (G)
85-100	A++ (Outstanding)	10
75 to < 85	A+ (Excellent)	9
70 to <75	A (Very Good)	8
65 to <70	B+ (Good)	7
60 to <65	B (Above Average)	6
50 to <60	C (Average)	5
40 to <50	D (Pass)	4
0 to <40	F (Fail)	0
	AB (Absent)	0

7.8 **Computation of Semester Grade Point average (SGPA) and Cumulative Grade Point Average (CGPA)**

$$(S_i) = \sum (C_i \times G_i) / \sum C_i,$$

where C_i is the number of credits of the i^{th} programme and G_i is the grade point scored by the student in the i^{th} programme.

$$CGPA = \sum (C_i \times S_i) / \sum C_i$$

where S_i is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts

CHAPTER-8
Power to Modify

- 8.1** In the event of any emergent situation, if any deviation is considered necessary, the Vice-Chancellor is authorized to modify the ordinance. Subjected to subsequent ratification by the executive council.
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**SWAMI VIVEKANAND
SUBHARTI UNIVERSITY, MEERUT**



EVALUATION SCHEME & SYLLABUS

M.TECH.

(Production Engineering)

W.E.F. SESSION 2018-19

**SUBHARTI INSTITUTE OF TECHNOLOGY AND
ENGINEERING**

M.Tech 1st Year/1st Semester (Production Engineering)

w.e.f academic Session 2018-19

M.TECH. (PRODUCTION ENGINEERING)

FIRST SEMESTER (M.TECH) PRODUCTION ENGG.

Sl/No	Course type	Subject Code	Subject Name	L-T-P	Th/Lab Marks (ESE)	Sessional		Total	Credit
						CT	TA		
1	Core –I	MMP-101	Advanced Manufacturing	3-0-0	70	20	10	100	3
2	Core-II	MMP-102	Simulation,Modelling&Analysis	3-0-0	70	20	10	100	3
3	Program Elective-I	MMP-011-014	PE-I	3-0-0	70	20	10	100	3
4	Program Elective-II	MMP-021-024	PE-II	3-0-0	70	20	10	100	3
5	Core	MMP-151	Simulation Modelling& Analysis Lab-I	0-0-4	35	--	15	50	2
6	Core	MMP-152	Advanced Manufacturing Lab-II	0-0-4	35	--	15	50	2
7	Core	METC-101	Research Methodology & IPR	2-0-0	70	20	10	100	2
8	Audit	METC-(111-118)	Audit course-I	2-0-0	70	20	10	100	0
TOTAL					490	120	90	700	18

Program Elective-I	MMP -011	Metal Forming
	MMP-012	Computer Integrated manufacturing systems
	MMP -013	CAD/CAM
	MMP -014	Machine tool Design

Program Elective-II	MMP -021	Advanced Welding Technology
	MMP -022	Machine Tool Design
	MMP -023	Advanced Optimization Techniques
	MMP -024	Maintenance Engineering

Audit Course 1 & 2 METC-(111-118)/ METC-(211-218)	English for Research Paper Writing
	Disaster Management
	Sanskrit for Technical Knowledge
	Value Education 5. Constitution of India
	Constitution of India
	Pedagogy Studies
	Stress Management by Yoga
Personality Development through Life Enlightenment Skills	

M.Tech 1st Year/IInd Semester (Production Engineering)

w.e.f academic Session 2018-19

SECOND SEMESTER (M.TECH) PRODUCTION ENGG.

Sl/No	Course type	Subject Code	Subject Name	L-T-P	Th/Lab Marks (ESE)	Sessional		Total	Credit
						CT	TA		
1	Core –III	MMP-201	Modern Welding & casting process	3-0-0	70	20	10	100	3
2	Core-IV	MMP-202	Advanced Industrial Engineering	3-0-0	70	20	10	100	3
3	Program Elective-III	MMP-031-034	PE-III	3-0-0	70	20	10	100	3
4	Program Elective-IV	MMP-041-044	PE-IV	3-0-0	70	20	10	100	3
5	Open Elective -V	MMP-051-054	EL-V	3-0-0	70	20	10	100	3
6	Core	MMP-251	Modern welding & casting process lab-III	0-0-3	35	--	15	50	2
7	Core	MMP-252	Seminar-I	0-0-1	--	--	50	50	1
8	Audit	METC-(211-218)	Audit course-II	2-0-0	70	20	10	100	0
TOTAL					455	120	125	700	18

Program Elective-III	MMP -031	Rapid Prototyping
	MMP -032	Supply Chain Management
	MMP -033	Industrial Automation & Robotics
	MMP -034	Reliability Engineering

Program Elective-IV	MMP -041	Composite Materials
	MMP-042	Design of Experiments
	MMP -043	Total Quality Management
	MMP -044	Flexible Manufacturing Systems

Open Elective-V	MMP -051	Material Management
	MMP -052	Advanced power plant Engineering
	MMP -053	Operation Research
	MMP -054	Industrial Safety

M.TechIInd Year/IIIrd Semester (Production Engineering)

w.e.f academic Session 2018-19

THIRD SEMESTER (M.TECH) PRODUCTION ENGG.

Sl/No	Course type	Subject Code	Subject Name	L-T-P	Th/Lab Marks (ESE)	Sessional		Total	Credit
						CT	TA		
1	Core	MMP-351	Seminar-II	0-0-6	--	--	100	100	3
2	Dissertation	MMP-352	Dissertation phase-I	0-0-26	300	--	200	500	13
	TOTAL				300	--	300	600	16

M.TechIInd Year/IVth Semester (Production Engineering)

w.e.f academic Session 2018-19

FOURTH SEMESTER (M.TECH) PRODUCTION ENGG.

Sl/No	Course type	Subject Code	Subject Name	L-T-P	Th/Lab Marks (ESE)	Sessional		Total	Credit
						CT	TA		
1	Dissertation	MMP-451	Dissertation phase-II	0-0-32	400	--	200	600	16
	TOTAL				400	--	200	600	16

TOTAL CREDIT=18+18+16+16=68

Syllabi Of M.Tech (Production Engineering) First Semester Subjects

Subject Name: Advanced Manufacturing

Subject Code: MMP-101

L T P : 3-0-0

Credit : 03

UNCONVENTIONAL MACHINING PROCESSES: Need for unconventional processes, Classifications of Unconventional Manufacturing Processes, Construction and working principal of unconventional machining processes such as USM, WJM, AJM, Chemical Machining, Electrolytic Grinding, EDM, LBM, EBM, Plasma Arc Cutting.

HIGH SPEED MACHINING: Introduction to high speed machining process, economics of high speed machining, material properties at high strain rates, influence of increasing speed on chip formation on stainless steel, aerospace aluminium and titanium and process parameter recommendations.

GENERATIVE MANUFACTURING PROCESSES (GMP) FOR RAPID PROTOTYPING

General features and classification, issues related to CAD and GMP software, Overviews of generative manufacturing processes, two dimensional layer-by-layer techniques and direct three-dimensional techniques for RP.

GROUP TECHNOLOGY AND FLEXIBLE MANUFACTURING SYSTEM:

Group Technology-part families, Parts classification and coding, Production flow analysis, Machine cell design, Benefits of group technology, Flexible manufacturing systems- Introduction, FMS workstations, Computer control system, Planning for FMS, Applications and benefits.

COMPUTER INTEGRATED MANUFACTURING: Introduction, Evaluation of CIM, CIM hardware and software, to be used in CIM system, Database requirements. Concurrent engineering-Principles, design and development environment, advance modeling techniques.

Books

1. Metal Cutting Principles, M.C. Shaw, Oxford Clarendon Press
2. Metal Cutting Theory and Practice, Bhattacharya, New Central Book Agency
3. Fundamentals of Metal Cutting and Machine Tools, B.L. Juneja and G.S. Sekhon, New Age International
4. Principles of Metal Cutting, G. Kuppaswamy, Universities Press
5. Fundamentals of Machining and Machine Tools, D.G. Boothroy and W.A. Knight, Marcel Dekker, NY
6. Fundamentals of Metal Casting, H. Loper and Rosenthal, Tata McGraw Hill

7. Metal forming-Fundamentals and Applications, T Altan, Soo-Ik-Oh and H.L. Gegel,
American Society of Metals,

Metal Park, 1983

Subject Name: Simulation, Modeling & Analysis

Subject Code: MMP-102

L T P : 3-0-0

Credit : 03

Introduction: Simulation: a tool, advantages and disadvantages of simulation, areas of application, systems and system environment, components of a system, discrete and continuous systems, discrete event system simulation.

General Principles: Concepts in discrete event simulation, time advance algorithm, manual simulation using event scheduling, basis properties and operations.

Models In Simulation: Terminology and concepts, statistical models: queuing systems; inventory systems; reliability and maintainability, limited data, discrete distributions: Bernoulli distribution; Binomial distribution; Geometric distribution, continuous distribution: Uniform distribution; Exponential distribution; Gamma distribution; Normal distribution; Weibull distribution; Triangular Distribution; Lognormal distribution, poisson process,

Queueing Models: Characteristics of queuing systems, the calling population, system capacity, arrival process, service mechanism, queuing notations, long run measures of performance of queuing systems, server utilization in $G/G/1/\infty/\infty$ queues, server utilization in $G/G/C/\infty/\infty$ queues, server utilization and system performance, costs in queuing problems, Larkovian models.

Random Number Generation: Properties of random numbers, Pseudo random numbers, techniques of generating random numbers, tests of random numbers. Random Variate generation: Inverse transform technique, Direct transformation for the Normal and Lognormal distribution, Convolution Method, Acceptance rejection technique. Input Modelling And Validation: Steps in the development of model, data collection, distribution identification, Parameter estimation, Goodness of Fit Tests, selecting input models without data, verification and validation of simulation models.

Books:

1. Simulation Modelling and Analysis by Law and Kelton, Mc Graw Hill.
2. Simulation Model Design & execution by Fishwick, Prentice Hall.
3. Discrete event system simulation by Banks, Carson, Nelson and Nicol.

Subject Name: Simulation, Modelling & Analysis Lab-I

Subject Code: MMP-151

L T P : 0-0-4

Credit : 02

1. Study of simulation software Like ARENA , MATLAB.
2. Simulation of translational and rotational mechanical systems
3. Simulation of Queuing systems
4. Simulation of Manufacturing System
5. Generation of Random number
6. Modeling and Analysis of Dynamic Systems
7. Simulation mass spring damper system
8. Simulation of hydraulic and pneumatic systems.
9. Simulation of Job shop with material handling and Flexible manufacturing systems
10. Simulation of Service Operations

Subject Name: Advanced Manufacturing Lab-II

Subject Code: MMP-152

L T P : 0-0-4

Credit : 02

1. Exercises on Manual CNC Part programming using G& M codes.
2. Machining of parts on CNC Machines including preparation of part program, after simulation of tool path using suitable CAM software package.
3. Part Programming using CAM software like MASTERCAM
4. CNC programming on Turning and Milling process
5. Experiments on micro-machining
6. Study and experimentation with CMM
7. Experiments with NDT techniques
8. Experiments with non conventional machining processes such as EDM,USM, Abrasive Use of Surface roughness meter and related experiments
9. Use of 3D scanner and experiments

Subject Name: Research Methodology & IPR

Subject Code: METC-101

L T P : 2-0-0

Credit : 02

Module 1: Introduction to Research and Problem Definition Meaning, Objective and importance of research, Types of research, steps involved in research, defining research problem

Module 2: Research Design

Research design, Methods of research design, research process and steps involved, Literature

Survey Unit 3:

Data Collection Classification of Data, Methods of Data Collection, Sampling, Sampling techniques procedure and methods, Ethical considerations in research

Unit 4:

Data Analysis and interpretation Data analysis, Statistical techniques and choosing an appropriate statistical technique, Hypothesis, Hypothesis testing, Data processing software (e.g. SPSS etc.), statistical inference, Interpretation of results

Unit 5:

Technical Writing and reporting of research Types of research report: Dissertation and Thesis, research paper, review article, short communication, conference presentation etc., Referencing and referencing styles, Research Journals, Indexing and citation of Journals, Intellectual property, Plagiarism

Text Books:

1. C. R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques , New Age International publishers, Third Edition.
2. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, 2nd Edition, SAGE, 2005
3. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
4. Creswell, John W. Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications, 2013

PROGRAM ELECTIVE – I

Subject Name: METAL FORMING

Subject Code: MMP- 111

L T P : 3-0-0

Credit : 03

Module I

Review of two dimensional stress and strain, state of stress in three dimensions, Stress tensor, Invariants, Mohr's circle for 3-dimensional state of stress, strain at a point- Mohr's circle for strain, Hydrostatic & Deviatoric components of stress, Elastic stress-strain relations.

Module II

Elements of theory of plasticity; Flow curve, True stress & true strain, Yield criteria for ductile metals, Von Mises & Tresca yield criteria, combined stress tests. The yield locus, Anisotropy in yielding, Yield surface, Levy-Mises, Prandtl-Reuss Stress-Strain relation, Classification of forming processes variables in metal forming and their optimization

Module III

Analysis of deformation processes- Method based on homogeneous compression slip line field theory, Upper bounds and lower bounds, Slab method of analysis. Flow stress determination, Hot working, Cold working, Strain rate effect, Friction and lubrication, Deformation zone geometry, Workability, Residual stress.

Module IV

Analysis of metal forming processes (only limited portion), Forging: Load calculation in plane strain forging, Rolling: Forces & geometrical relationship in rolling, Rolling load and torque in cold rolling, Von-Karman work equation, Extrusion: Analysis of extrusion process, extrusion pressure, Drawing: Drawing load

TEXT BOOK(S):

1. Mechanical Metallurgy: By- Dieter, Mc Graw Hill Book Co.
2. Plasticity- Chakraborty- McGraw Hill.

REFERENCE(S):

1. Engineering Plasticity: BY- Johnson & Mellor, Van Nostrand.
2. Metal working –Avitzur, Mc Graw Hill
3. Industrial Metal working- G.W. Rowe

Subject Name: Computer Integrated manufacturing systems

Subject Code: MMP- 112

L T P : 3-0-0

Credit : 03

UNIT I INTRODUCTION

Brief introduction to CAD and CAM – Manufacturing Planning, Manufacturing control Introduction to CAD/CAM – Concurrent Engineering - CIM concepts – Computerised elements of CIM system –Types of production - Manufacturing models and Metrics – Mathematical models of Production Performance – Simple problems – Manufacturing Control – Simple Problems – Basic Elements of an Automated system – Levels of Automation – Lean Production and Just-In Time Production.

UNIT II PRODUCTION PLANNING AND CONTROL AND COMPUTERISED PROCESS PLANNING

Process planning – Computer Aided Process Planning (CAPP) – Logical steps in Computer Aided Process Planning – Aggregate Production Planning and the Master Production Schedule – Material Requirement planning – Capacity Planning- Control Systems-Shop Floor Control Inventory Control – Brief on Manufacturing Resource Planning-II (MRP-II) & Enterprise Resource Planning (ERP) - Simple Problems.

UNIT III CELLULAR MANUFACTURING

• Group Technology (GT), Part Families – Parts Classification and coding – Simple Problems in Opitz Part Coding system – Production flow Analysis – Cellular Manufacturing – Composite part concept – Machine cell design and layout – Quantitative analysis in Cellular Manufacturing – Rank Order Clustering Method - Arranging Machines in a GT cell – Hollier Method – Simple Problems.

UNIT IV FLEXIBLE MANUFACTURING SYSTEM (FMS) AND AUTOMATED GUIDED VEHICLE

SYSTEM (AGVS) • Types of Flexibility - FMS – FMS Components – FMS Application & Benefits – FMS Planning and Control– Quantitative analysis in FMS – Simple Problems. Automated Guided Vehicle System (AGVS) – AGVS Application – Vehicle Guidance technology – Vehicle Management & Safety.

UNIT V INDUSTRIAL ROBOTICS

• Robot Anatomy and Related Attributes – Classification of Robots- Robot Control systems – End Effectors – Sensors in Robotics – Robot Accuracy and Repeatability - Industrial Robot Applications – Robot Part Programming – Robot Accuracy and Repeatability – Simple Problems

TEXT BOOK:

1. Mikell.P.Groover “Automation, Production Systems and Computer Integrated Manufacturing”, Prentice Hall of India, 2008.
2. Radhakrishnan P, Subramanyan S.and Raju V., “CAD/CAM/CIM”, 2nd Edition, New Age International (P) Ltd, New Delhi, 2000.

Subject Name: CAD/CAM

Subject Code: MMP- 113

L T P : 3-0-0

Credit : 03

Mathematical Elements, CAD, Solid modeling methods, Database structures for CAD, CSG formulation, B-rep and wire frame methods, Intersection surface generation methods, Boundary file generation methods, Feature based modeling systems, Surface modeling, B- splines, Coons and Bezier surfaces, NURBS and surface patches, fitting surfaces for arbitrary digested points, Offset surfaces, Fillet surfaces, Sewn surfaces.

Features recognition from the databases, IGES, STEP, PDES, and DXF data exchange formats, Graphic standards for CAD/CAM such as GKS, PHIGS and VDI.

Concurrent engineering integration of manufacturing principles and analytical principles in design, Manufacturing information generation from CAD data, Planar sectioning, Penalty functions, cavity milling, Optimization of cutter path, Effect of tool profile geometry, Methods for multi-axis machining, Methods for software design for CAD/CAM system, use of software libraries, Development of software package for a specific problem as part of course using software libraries. Introduction to automation, CAM/CIM, Part programming, Interpolator & Control.

Books:

1. Computer Graphics D Hearn & M P Baker Prentice Hall
2. CAD/CAM Theory and Practice Ibrahim Zeid & R Sivasubramanian Tata McGraw-Hill
3. Mathematical Elements for Comp. Graphics D F Rogers and J A Adams McGraw-Hill International
4. Computer Aided Engineering & Design Jim Browne New ATC International
5. The Engineering Database D.N. Chorafas and S.J. Legg Butterworths
6. Principles of CAD J Rooney & P Steadman Longman Higher Education
7. CAD/CAM H P Groover and E W Zimmers Prentice Hall
8. Computer Integrated Design and Manufacture D Bedworth, M Henderson & P Wolfe MacGraw Hill Inc.

Subject Name: CAD/CAM

Subject Code: MMP- 113

L T P : 3-0-0

Credit : 03

Machine Tool Drive: working and auxiliary motion in machine, Machine tool drives, Hydraulic transmission, Mechanical transmission, General requirements of machine tool design, Layout of machine tools.

Regulation of Speed and Feed Rates: Aim of speed feed regulation, stepped regulation of speed, design of speed box, Design of feed box, Special cases of gear box design, Set stopped regulation of speed and feed rates.

Design of Machine Tool Structure: Fundamentals of machine tool structures and their requirements, Design criteria of machine tool structure, Static and dynamic stiffness, Design of beds and columns, Design of housing models, Techniques in design of machine tool structure. Design of Guide-ways and power Screws: Function and type of guide-ways, design of slide-ways, protecting devices for slide-ways, Design of power screws.

Design of Spindles and Spindle Supports: Materials for spindles, Design of spindles, Antifriction bearings, sliding bearings.

Books:

1. Machine Tool Design, N.K. Mehta, Tata McGraw Hill.
2. Machine Tool design Handbook, CMTI, Bangaluru.

PROGRAM ELECTIVE – II

Subject Name: ADVANCED WELDING TECHNOLOGY

Subject Code: MMP- 121

L T P : 3-0-0

Credit : 03

UNIT-I

Introduction: Welding as compared with other fabrication processes, Importance and application of welding, classification of welding processes, Health & safety measures in welding. Welding Power Sources: Physics of welding Arc, Basic characteristics of power sources for various arc welding processes, Transformer, rectifier and generators.

Physics of Welding Arc: Welding arc, arc initiation, voltage distribution along the arc, arc characteristics, arc efficiency, heat generation at cathode and anode, Effect of shielding gas on arc, isotherms of arcs and arc blow. Metal Transfer: Mechanism and types of metal transfer in various arc welding processes.

UNIT-II

Welding Processes: Manual Metal Arc Welding (MMAW), TIG, MIG, Plasma Arc, Submerged Arc Welding, Electrode Gas and Electroslag, Flux Cored Arc Welding, Resistance welding, Friction welding, Brazing, Soldering and Braze welding processes, Laser beam welding, Electron beam welding, Ultrasonic welding, Explosive welding, Friction Stir Welding, Underwater welding & Microwave welding.

UNIT-III

Heat Flow Welding: Calculation of peak temperature; Width of Heat Affected Zone

(HAZ); cooling rate and solidification rates; weld thermal cycles; residual stresses and their measurement; weld distortion and its prevention.

UNIT-IV

Repair & Maintenance Welding: Hardfacing, Cladding, Surfacing, Metallizing processes

and Reclamation welding. Weldability: Effects of alloying elements on weld ability, welding of plain carbon steel, Cast Iron and aluminium. Micro & Macro structures in welding.

UNIT-V

Weld Design : Types of welds & joints, Joint Design, Welding Symbols, weld defects, Inspection/testing of welds, Introduction to Welding Procedure Specification & Procedure Qualification Record.

Books and References:

1. Welding and Welding Technology, by- Richard L. Little, McGraw Hill Education.
2. Welding Principals and Practices, by- Edwards R. Bohnart, McGraw Hill Education.
3. Welding Engineering and Technology, by- R. S. Parmar, Khanna Publishsers.
4. Welding Handbooks (Vol. I & II).

MANDATORY COURSES (MC)

AUDIT I and II:

METC-111/METC-211: ENGLISH

FOR RESEARCH PAPER WRITING

Course objectives:

Students will be able to:

- 1.** Understand that how to improve your writing skills and level of readability
- 2.** Learn about what to write in each section
- 3.** Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

Syllabus:

Unit I: Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit II: Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Unit III: Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

Unit IV: Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

Unit V:

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.

Unit VI: Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

Suggested Studies:

- 1.** Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
- 2.** Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
- 3.** Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
- 4.** Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

ADVANCE INDUSTRIAL ENGINEERING

MMP- 202

L T P 3 0 0

Productivity: Concept, Productivity improvement factors, Productivity appraisal, productivity analysis in the enterprise- The Kurosawa structural approach, Lawlor's approach, Gold's approach, Quick Productivity Appraisal approach (QPA), Inter-Firm Comparison (IFC).

Work Design: Work study, Method study, Work measurement, Standard output, Time study, Work sampling, Process analysis. Facility Layout: Principles of layout and facilities planning, Material flow patterns, Material handling systems, Types of material handling equipment. Value Engineering: Fundamental concepts and applications of value engineering, Function Analysis System Technique.

Systems Engineering: Introduction to Systems Engineering, Management Information System, Phases in System Engineering, System Life Cycle, System Maintenance.

References:

1. Prokopenko, J. "Productivity Management, A Practical Handbook", International Labour Organisation, 1992.
2. ILO, "Introduction to Work Study", George Kanawaty, 4th revised edition, Universal Book Corporation 2007.
3. Apple, J.M. "Plant layout and materials handling", Ronald Press Company, Newyork, 1977.
4. Tutty Herald G, "Compendium on Value Engineering", Indo-American Society, 1983.

DISSATER MANAGEMENT

METC-112/212

L-T-P- 2-0-0

UNIT-1

Disaster: Definition, Factors and Significance ; Difference Between Hazard And Disaster ; Natural And Manmade Disasters: Difference, Nature Types And Magnitude.

UNIT-1I

Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem, Natural Disasters: Earthquakes, Volcanisms Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster, Nuclear Reactor Meltdown, Industrial Accidents Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT-1II

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches, Areas Prone to Cyclonic Coastal Hazards With Special Reference To Tsunami Post-Disaster Diseases And Epidemics.

UNIT-1V

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard, Evaluation Of Risk: Application Of Remote Sensing Data From Meteorological And Other Agencies Media Reports, Governmental And Community Preparedness.

UNIT-V

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation, Techniques Of Risk Assessment, Global Co- Operation In Risk Assessment And Warning, People's Participation In Risk Assessment Strategies for Survival.

Books:

1. Environmental Hazards by Smith, K., Routledge, London,1992. 2. Geological Hazards by Bell, F.G., Routledge, London,1999.

Reference books: 1. Principles of Engineering Geology by Krynine, D.S. and Judd, W.R., CBS, New Delhi, 1998.

2. Natural Hazards by Bryant, E., Cambridge University Press. London, 1985.

3. Landslide Disaster – Assessment and Monitoring Nagarajan, R., Anmol Publications, New Delhi, 2001. 4. Environmental risks and hazards by Cutter, Susan L., Prentice Hall of India, New Delhi.1999.

5. Bill Mc Juire, Ian Mason and C. Killburn (2002) Natural hazards and Environmental change, Oxford University Press, New York.

6. Gupta, Harsh K. (2003) Disaster Management, Universities Press (India) Pvt. Ltd

7. Coppola, Damon P. (2006) Introduction to International Disaster Management,
8. Butterworth -Heinemann
9. Jha, Madan Kumar (2010) Natural and Anthropogenic Disasters: Vulnerability,
10. Preparedness and Mitigation, Springer
11. Glade, Thomas, Malcolm G. Anderson, Michael J. Crozier (2005) Landslide Hazard and
12. Risk, edited Springer
13. Singh, Surendra, Leszek Starkel, Hiambok Jones Syiemlieh (2008) Environmental Changes and Geomorphic Hazards, Bookwell.

FLEXIBLE MANUFACTURING SYSTEM

MMP-224

L T P 3 0 0

Introduction: FMS definition and classification of manufacturing systems, automated production cycle, Need of flexibility, Concept of flexibility, Types of flexibilities and its measurement.

FMS Equipment: Why FMS, Factors responsible for the growth of FMS, FMS types and applications, Economic justification for FMS, Functional requirements for FMS equipments, FMS processing and QA equipment, e.g., turning and machining centers, Co-ordinate measuring machines, Cleaning and deburring machines, FMS system support equipment, Automated material handling and storage equipment, cutting tool and tool management, Work holding considerations, Fixture considerations in FMS environment.

Group Technology: GT concepts, Advantages of GT, Part family formation-coding and classification systems; Part machine group analysis, Methods for cell formation, Use of different algorithms, mathematical programming and graph theoretic model approach for part grouping, Cellular vs FMS production. FMS related problem and Solution Methodology: · FMS design problems: Part assignment, Machine selection, Storage system selection, Selection of pallets and fixtures, Selection of computer hardware and software, designing for layout integration of machine storage, Material handling System and computer system, Communication networks.

FMS planning problems: Strategic planning, Part type selection, Machine grouping, production ratio and resource allocation, Machine loading problems. ·

Operational & Control problems: Part scheduling, Machines robots & AGVS, Process monitoring & control.

· **FMS Implementation:** Objectives, acceptance testing, Performance goals and expectation maintenance concerns.

Books:

1. Automation, Production System & Computer Integrated Manufacturing Groover Englewood
2. Design and Operation of SMS Rankey IFS
3. Flexible Manufacturing System Wernecks Spring-Verlag
4. FMS in Practice Bonctto Northox Ford
5. Flexible Manufacturing Cells and systems W.W. Luggen Prentice Hall India
6. Performance Modelling of Automated Manufacturing Systems Vishwanathan

INDUSTRIAL SAFETY

SUBJECT CODE- MMP-234

L-T-P 3 0 0

OBJECTIVES: → For bringing high awareness for ensuring safe operations in industries, by appraisal of various factors involved in occupation of the employees and implementing the safety measures adopting cost-effective methods.

UNIT I: OPERATIONAL SAFETY 9 Hrs

Hot metal operation, boiler, pressure vessels – heat treatment shop – gas furnace operation – electroplating – hot bending pipes – safety in welding and cutting, Cold – metal operation – safety in machine shop – cold bending and chamfering of pipes- metal cutting – shot blasting, grinding, painting – power press and other machines. Management of toxic gases and chemicals – industrial fires and prevention – road safety – highway and urban safety – safety of sewage disposal and cleaning – control of environmental pollution – managing emergencies in industries – planning security and risk assessments, on – site and off site. Control of major industrial hazards.

UNIT II: SAFETY APPRAISAL AND ANALYSIS 9 Hrs

Human side of safety – personal protective equipment – causes and cost of accidents. Accidents prevention program – specific hazard control strategies – HAZOP training and development of employees – first aid – fire fight devices – accident reporting, investigation. Measurement of safety performance, accident reporting and investigation – plant safety inspection, job safety analysis – safety permit procedures. Product safety – plant safety rules and procedures – safety sampling – safety inventory systems. Determining the cost effectiveness of safety measurement.

UNIT III: OCCUPATIONAL HEALTH 9 Hrs

Concept and spectrum of health functional units and activities of operational health service – occupational and related disease – levels of prevention of diseases – notifiable occupational diseases Toxicology Lead – Nickel, chromium and manganese toxicity – gas poisoning (such as CO, Ammonia Chloride, SO₂, H₂S.) their effects and prevention – effects of ultra violet radiation and infrared radiation on human system.

UNIT IV: SAFETY AND HEALTH REGULATIONS 9 Hrs

Safety and health standards – industrial hygiene – occupational diseases prevention welfare facilities. The object of factories act 1948 with special reference to safety provisions, model rules 123a, history of legislations related to safety – pressure vessel act – Indian boiler act – the environmental protection act – electricity act – explosive act.

UNIT V: SAFETY MANAGEMENT 9 Hrs

Evaluation of modern safety concepts – safety management functions – safety organization, safety departmentsafety committee, safety audit – performance measurements and motivation – employee participation in safety - safety and productivity. Total no. of hrs : 45

REFERENCES

1. John.V .Grimaldi and Rollin. H Simonds,(1989) "Safety Managenent", All India traveler book seller, New Delhi
2. Krishnan N.V,(1996) "Safety in Industry", Jaico Publisher House
3. "Industrial Safety and the law", P.M.C Nair Publishers, Trivandrum
4. Singh, U.K and Dewan, J.M.,(1996) "Sagety, Security And Risk Management", APH publishinf company, New Delhi
5. John V Grimaldi,(2003) "Safety Management", AITB publisher

MODERN WELDING & CASTING PROCESS

SUBJECT CODE - MMP-201

L-T-P 3-0-0

Friction welding: Concepts, types and applications. Friction stir welding: Metal flow phenomena, tools, process variables and applications and induction pressure welding: Process characteristics and applications.

Explosive, diffusion and ultrasonic welding, principles of operation, process characteristics and applications.

EBW: Concepts, types and applications.

LBW: Physics of lasers, types of lasers, operation of laser welding setup, advantages and limitations, applications

Welding Metallurgy: Heat flow - temperature distribution-cooling rates - influence of heat input, joint geometry, plate thickness, preheat, significance of thermal severity number.

Design requirements, allowable stress values, workmanship and inspection, introduction to welding codes and standards, AWS D.

Casting Processes, classification, characteristics of sand casting processes, Solidification, Gating and Riser design, Nucleation and grain growth, Solidification of pure metals, short and long freezing range alloys. Rate of solidification, macrostructure and microstructure. Solidification contraction; gating and riser design calculations. Fluidity and its measurement. Mould-metal interface reactions.

Cast Metals and Alloys, Family of cast irons, Melting and casting technology; Inoculation. Technology of steel and non-ferrous cast metals. Gases in metals. Melting furnaces and refractoriness.

Casting defects Inspection, diagnosis and rectification. Mechanization and Automation (Use of robots) of Foundries, Casting Design, Wear net shape castings, and Numerical modeling applied to castings. Pollution Control, Energy and waste management in foundries

References

1. Schwartz M.,, Materials and Applications - Metal Joining Manual, McGraw-Hill, 1979
2. Nadkarni S.V., „Modern Arc Welding Technology, Oxford IBH Publishers, 1996
3. Christopher Davis, „Laser Welding - A Practical Guide, Jaico Publishing House, 1994
4. Parmar R S, Welding Engineering and Technology, Khanna Publishers, 1997
5. Mishra. R.S and Mahoney. M.W, Friction Stir Welding and Processing, ASM,2007
6. ScropeKalpakjian,, “Manufacturing processes for Engineering Materials”, Addison, Wesley,

1997.

7. Fundamentals of metal casting technology - P.C. Mukherjee, Oxford and IBH.

8. Mechanical Metallurgy, Dieter, Me Graw Hill, Kogakusha

9. Casting properties of metals and alloys - V. Korolkove.

10. Metal Casting-B.Ravi-PHI

MODERN WELDING & CASTING PROCESS LAB

SUBJECT CODE-251

L-T-P 0-0-3

Note: Conduct any Three Experiments/Study in each Part

Part I: Welding: 1. Study of arc characteristics in simulated MMA welding; arc gap-arc voltage relationship; recording of voltage oscillograms and its study.

2. Study of heat flow and temperature distribution in welding

3. Study of characteristics of TIG/MIG welding

4. Ultrasonic/dye penetrates inspection or computer simulation of welding heat flow/analysis of arc voltage pattern.

Part II: Casting: 1. Practice on CAD of gating and rise ring

2. Experiment to determine the effect of molding variables in sand moulds

3. To determine the effect of mould additive on the properties of castings

4. To determine the characteristics of base sands.

RELIABILITY ENGINEERING

MMP – 214

L T P 3 0 0

Reliability Engineering: System reliability - series, parallel and mixed configuration, Block diagram, r-out-of-n structure, Solving problems using mathematical models. Reliability improvement and allocation- Difficulty in achieving reliability, Method of improving reliability during design, different techniques available to improve reliability, Reliability – Cost trade off, Prediction and analysis, Problems.

Maintainability, Availability & Failure Analysis: Introduction, Techniques available to improve maintainability & availability, trade off among reliability, maintainability & availability and analysis. Defect generation – Types of failures, defects reporting and recording, Defect analysis, Failure analysis, Equipment down time analysis, Breakdown analysis, TA, FMEA, FMECA.

Maintenance Planning and Replacement: Maintenance planning – Overhaul and repair; Meaning and difference, Optimal overhaul/Repair/Replace maintenance policy for equipment subject to breakdown, Replacement decisions – Optimal interval between preventive replacements of equipment subject to breakdown, group replacement.

Maintenance Systems: Fixed time maintenance, Condition based maintenance, Opportunity maintenance, design out maintenance, Total productive maintenance, Inspection decision – Optimal inspection frequency, non-destructive inspection, PERT & CPM in maintenance, Concept of terrotechnology.

Condition Monitoring: Techniques-visual monitoring, temperature monitoring, vibration monitoring, lubricant monitoring, Crack monitoring, Thickness monitoring, Noise and sound monitoring, concept of S/N ratio, Condition monitoring of hydraulic system, Machine diagnostics - Objectives, Monitoring strategies, Examples of monitoring and diagnosis.

Safety Aspects: Importance of safety, Factors affecting safety, Safety aspects of site and plant, Instruments for safe operation, Safety education and training, Personnel safety, Disaster planning and measuring safety effectiveness, Future trends in industrial safety.

Books: 1. Concepts in Reliability Engineering L.S. Srinath Affiliated East West Press

2. Maintainability and Reliability Handbook Editors: Ireson W.A. and C.F. Coombs McGraw Hill Inc.

3. Failure Diagnosis and Performance Monitoring L.F. Pau Marcel Dekker

4. Industrial Maintenance Management S.K. Srivastava S. Chand & Co Ltd.

5. Management of Industrial Maintenance Kelly and M.J. Harris Butterworth and Co.

6. Maintenance, Replacement and Reliability A.K.S. Jardine Pitman Publishing

7. Engineering Maintainability: How to Design for Reliability and Easy Maintenance B.S. Dhillon Prentice Hall of India

DISSATER MANAGEMENT

METC-112/212

L-T-P- 2-0-0

UNIT-1

Disaster: Definition, Factors and Significance ; Difference Between Hazard And Disaster ; Natural And Manmade Disasters: Difference, Nature Types And Magnitude.

UNIT-1I

Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem, Natural Disasters: Earthquakes, Volcanisms Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster, Nuclear Reactor Meltdown, Industrial Accidents Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT-1II

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches, Areas Prone to Cyclonic Coastal Hazards With Special Reference To Tsunami Post-Disaster Diseases And Epidemics.

UNIT-1V

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard, Evaluation Of Risk: Application Of Remote Sensing Data From Meteorological And Other Agencies Media Reports, Governmental And Community Preparedness.

UNIT-V

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation, Techniques Of Risk Assessment, Global Co- Operation In Risk Assessment And Warning, People's Participation In Risk Assessment Strategies for Survival.

Books: 1. Environmental Hazards by Smith, K., Routledge, London,1992. 2. Geological Hazards by Bell, F.G., Routledge, London,1999.

Reference books: 1. Principles of Engineering Geology by Krynine, D.S. and Judd, W.R., CBS, New Delhi, 1998.

2. Natural Hazards by Bryant, E., Cambridge University Press. London, 1985.
3. Landslide Disaster – Assessment and Monitoring Nagarajan, R., Anmol Publications, New Delhi, 2001.
4. Environmental risks and hazards by Cutter, Susan L., Prentice Hall of India, New Delhi.1999.
5. Bill Mc Juire, Ian Mason and C. Killburn (2002) Natural hazards and Environmental change, Oxford University Press, New York.
6. Gupta, Harsh K. (2003) Disaster Management, Universities Press (India) Pvt. Ltd
7. Coppola, Damon P. (2006) Introduction to International Disaster Management,
8. Butterworth -Heinemann
9. Jha, Madan Kumar (2010) Natural and Anthropogenic Disasters: Vulnerability,
10. Preparedness and Mitigation, Springer
11. Glade, Thomas, Malcolm G. Anderson, Michael J. Crozier (2005) Landslide Hazard and
12. Risk, edited Springer
13. Singh, Surendra, Leszek Starkel, Hiambok Jones Syiemlieh (2008) Environmental Changes and Geomorphic Hazards, Bookwell.