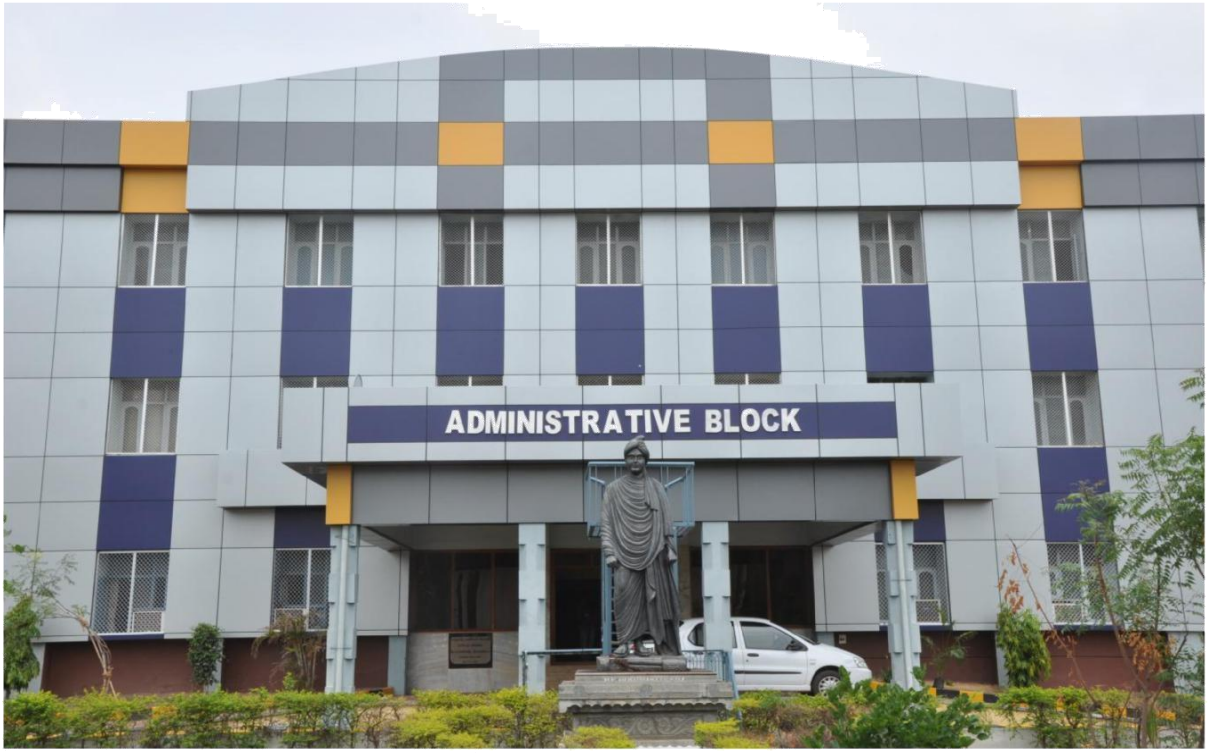

Scheme – 2022

Department of Mechanical Engineering

G. Pulla Reddy Engineering College (Autonomous): Kurnool

Accredited by NBA of AICTE and NAAC of UGC

Affiliated to JNTUA, Anantapuramu

Scheme and Syllabus of TWO YEAR

M.Tech. Degree Course in ADVANCED MANUFACTURING TECHNOLOGY

(With Effect from the Batch Admitted in 2022-23)

DEPARTMENT OF MECHANICAL ENGINEERING

Two Year M.Tech Degree Program

Scheme of Instruction and Examination

(Effective from 2022-23)

M.Tech I SEMESTER Advanced Manufacturing Technology (AMT) **Scheme-2022**

S. No	category	Course Title	L	T	P	Credits	End Exam marks	CIA Marks	Total
I		**Theory**							
1	PC	Advanced Production Technology	3			3	60	40	100
2	PC	Advanced Materials Engineering	3			3	60	40	100
3	PC	Advanced Finite Element Analysis	2	1		3	60	40	100
4	PE	Professional Elective-I	3			3	60	40	100
5	PE	Professional Elective-II	3			3	60	40	100
6	MC	Research Methodology and IPR	2			2		100	100
7	AC	Audit Course-I	2			0			
II		**Practical**							
8	PCL	Computer Aided Engineering Lab			3	2	60	40	100
9	PCL	Material Testing Lab			3	2		100	100
	Total		18	1	6	21	360	440	800

M.Tech II SEMESTER - AMT **Scheme-2022**

S. No	category	Course Title	L	T	P	Credits	End Exam marks	CIA Marks	Total
I		**Theory**							
1	PC	Computer Numerical Control Machines	3			3	60	40	100
2	PC	Additive Manufacturing	3			3	60	40	100
3	PC	Industrial Automation and Robotics	3			3	60	40	100
4	PE	Professional Elective-III	3			3	60	40	100
5	PE	Professional Elective-IV	3			3	60	40	100
6	AC	Audit Course-II	2			0			
II		**Practical**							
7	PCL	Computer Aided Manufacturing Lab			3	2	60	40	100
8	PCL	Manufacturing and Precision Lab			3	2		100	100
	Total		17		6	19	360	340	700

M.Tech III SEMESTER - AMT **Scheme-2022**

S. No	Category	Course Title	L	T	P	Credits	End Exam marks	CIA Marks	Total
1	OE	Open Elective *	2			2			100
3	PR	Technical Seminar & Dissertation Phase-I			20	10		100	100
4	CAA	Co- Academic Activities				2		100	100
	Total		2		20	14		200	300

***** Open elective will be offered through MOOCs

M.Tech IV SEMESTER - AMT **Scheme-2022**

S. No	Course No	Course Title	L	T	P	Credits	End Exam marks	CIA Marks	Total
1	PR	Dissertation Phase-II			32	16	60	40	100

List of Professional Elective Courses

Description	Subject Title
PE-I	(i) Advanced Optimization Techniques.
	(ii) Computer Aided Process Planning
	(iii) Introduction to Composite Materials
PE-II	(i) Design of Advanced Hydraulic and Pneumatic Systems
	(ii) Design for Manufacturing and Assembly.
	(iii) Intelligent Manufacturing systems
PE-III	(i) Advanced Metal Joining Processes
	(ii) Advanced Tool Engineering and Design
	(iii) Advances in Machining Process
PE-IV	(i) Computer Integrated Manufacturing
	(ii) Mechatronics
	(iii) Advanced Materials Characterization

Open Elective

OE	Open elective will be offered through MOOCs

List of Audit Course

AC-I	1. English for Research Paper Writing
	2. Disaster Management
	3. Sanskrit for Technical Knowledge
AC-II	1. Stress Management by Yoga
	2. Pedagogy Studies
	3. Personality Development through Life Enlightenment Skills

ADVANCED PRODUCTION TECHNOLOGY(APT)							
I Semester : AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME801	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs					**End Exam Duration: 3 Hrs**		
Course Outcomes : At the end of the course the student will be able to							
CO1: Understand the various metal casting process and Foundry Automation.							
CO2: Understand the various welding processes.							
CO3: Understand the Advanced Metal forming							
CO4: Understand the various Advanced Machining processes.							
CO5: Understand the processing of Powders and processing.							
Metal casting:							
Metal casting: Introduction- solidification of metals – fluid flow – fluidity of molten metal Heat transfer- defects- design considerations- Economics of casting- foundry and foundry automation. **Metal casting processes:** Sand casting shell moulding – expandable pattern casting - plaster mould and ceramic mould castings- investment casting – vacuum casting – permanent mould casting – slush casting – squeeze casting and semi solid metal forming.							
Welding Processes:							
Welding Processes: Oxy-fuel gas welding arc welding – thermit welding – electron beam welding – laser beam welding – weld quality – weld ability – testing – weld design and process selection. **Solid state welding processes**: cold welding – ultrasonic welding – friction welding. Resistance welding – explosion welding – diffusion welding – super-plastic forming – adhesive joining – joining plastics, thermal spraying.							
Advanced Metal forming							
Hot and cold deformation processes, high energy rate forming, Explosive forming, hydraulic forming etc.							
Advanced Machining Processes							
Electro Discharge Machining(EDM),Electro Chemical Machining(ECM),Laser Beam Machining(LBM), Electron Beam Machining(EBM),Plasma Arc Machining(PAM), Ultrasonic Machining(USM),Abrasive Jet Machining(AJM) – nanofabrication – micromachining applications.							
Processing of Powders:							
Ceramics and Super conductors: Production, compaction, sintering of powders – design considerations – shaping of ceramics – forming and shaping of glass – processing of super conductors.							
Text Books :							
1. Richard W Heine - Principles of Metal Casting, Tata Mcgraw Hill Education Private Limited.							
2. Dr R.S.Parmer – Welding Processes and Technology, Khanna Publishers.							
2. Surender Kuma - Technology of Metal Forming Processes, Prentice- Hall,							
3.Manufacturing Science- A.Ghosh & A.K. Mallik, EWP.							
4.							

Reference Books :
1. T.R.Vijayaram – Advanced Casting Technology, IntechOpen Publishrs.
2) John Norris - Advanced Welding Processes Technologies and Process Control, WoodHead Publishing Limited.
3. Isaac Chang and Yuyuan Zhao – Advances in Powder Metallurgy, Properties, Processing and Applications, Wood Head Publishing.
Question Paper Pattern:
Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions. **End Exam:** The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

ADVANCED MATERIALS ENGINEERING (AME)							
I Semester : AMT				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME802	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			
Course Outcomes : At the end of the course the student will be able to							
CO1: Understand the various non ferrous metals, high alloy steels and super alloys their composition							
CO2: Understand the classification of composites and their applications.							
CO3: Understand different smart material with their applications.							
CO4: Understand the requirements of biomaterials and suggest a biomaterial for a given application							
CO5: Understand the Specialized materials in specialized applications.							
Nonferrous Alloys, High alloy steels and Super alloys							
Aluminum alloys, Magnesium alloys, Copper alloys , Nickel alloys , Titanium alloys , Zinc alloys, stainless steels, Maraging steels Metallurgical aspects and applications .super alloys(Nickel based super alloys, Cobalt based super alloys) .							
Composites							
Classification of composite materials, Types of Reinforcements, types of Matrix material, Polymer composites, metal matrix composites, ceramic matrix composites. Special kinds of composites for Marine applications, Fire-Resistant Composites, Composite Materials in Alternative Energy Sources.							
Smart materials							
Classification of smart materials (Piezoelectric materials, Electro-rheological fluid, Magneto-rheological fluids),Shape Memory alloys, Shape memory effect, Material Systems of Different Shape Memory Alloys, Applications of Shape Memory Alloys in Different Fields.							
Biomaterials							
Property requirement, biocompatibility, bio functionality, Important bio metallic alloys like: Ni-Ti alloy and Co-Cr-Mo alloys. Applications.							
Special materials in Specialized Applications:							
Materials for Rocket and missile, Materials in Safety System against Explosion and Fire (or Fusible Alloys), Metals and Alloys for Nuclear Industry.							
Text Books :							
1) Engineering Materials Research, Applications and Advances –K.M.Gupta, CRC Press,Taylor & Francis Group.							
2) Engineering materials and Their Applications - Richard A. Flinn, Paul K. Trojan, Houghton Mifflin Company.							
Reference Books :							
1) Advanced Materials An Introduction to Modern Material Science – Ajit Behera, Springer							
2) Foundations of Material Science and Engineering – William Smith, Javad Hashemi, McGraw Hill							
3) Material science and Engineering An Introduction- William D.Callister,Jr.David G.Rethwisch, Wiley Publications.							
Question Paper Pattern:							
Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions. **End Exam:** The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.							

ADVANCED FINITE ELEMENT ANALYSIS(AFEA)							
I Semester : AMT				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME803	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	2	**1**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			

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

CO1: Solve boundary value problems using classical as well as finite element methods.

CO2: Solve problems related one dimensional solid mechanics and heat transfer.

CO3: Solve problems related to two dimensional and axi-symmetric elements.

CO4: Understand various manufacturing processes with the application of finite element techniques.

CO5: Solve simple practical problems using commercial FE analysis packages.

Introduction:

Introduction –Basic of FEM – Initial value and boundary value problems – weighted residual Galerkin and Raleigh –Ritz methods- simple problems – Basics of variational formulation – Polynomial and Nodal approximation.

One Dimensional Analysis

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

Two Dimensional Analysis

Shape functions and higher order formulations – Global and Natural co-ordinates – Shape functions for one and two dimensional elements- three noded triangular and four noded quadrilateral element– Jacobian matrices and transformations – basic of two dimensional axi-symmetric analysis**.**

Analysis of Production Processes

Analysis of production processes-FEA of metal casting-Special considerations, Basic concepts of plasticity-Solid and flow formulation-Small incremental deformation formulation-FEA of metal cutting, chip seperation criteria, incorporation of strain rate dependency - FE analysis of welding.

Computer Implementation in FEA

Computer implementation-Pre-processing, Mesh-generation, element connecting, boundary conditions, input of material and processing characteristics-Solution and post processing-Overview of application packages – ANSYS - Development of code for one dimensional analysis and validation.

Text Books :

1) Reddy, J.N. An Introduction to the Finite Element Method, Mc Graw Hill,1985.

2) Rao, S.S., Finite Element method in engineering, Pergamm onpress,1989.

3) Bathe, K.J., Finite Element procedures in Engineering Analysis,1990.

Reference Books :

1) Kobayashi, S,Soo-ik-Oh and Altan, T,Metal Forming and the Finite Element Methods, Oxford University Press,1989.

2 Lewis R.W.Morgan, K,Thomas, H.R. and Seetharaman, K.N. The Finite Element Method in Heat Transfer Analysis, JohnWiley,1994.

3) Lars-Erik Lindgren., "Computational Weld Mechanics – Thermomechanical and microstructural

simulations", Woodhead Publishing Ltd., Cambridge England, 2007.

4) P Seshu, "Textbook of Finite Element Analysis", PHI Learning Private Limited ,2003

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions.

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

RESEARCH METHODOLOGY AND IPR (RM & IPR)							
I Semester : AMT				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
MC101	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	2	**-**	**-**	**2**	**100**	**-**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration:**			
Course Outcomes : At the end of the course the student will be able to							
CO1: Understand the Meaning, types of research, research problems and research design.							
CO2: To know the basic data collection methods and sampling design.							
CO3: Know the basic concepts intellectual property rights and patent design							
CO4: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.							
CO5: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.							
Chapter-I							
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, scope, and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations							
Chapter-II							
Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee							
Chapter-III							
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.							
Chapter-IV							
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications							
Chapter-V							
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.							
Text Books :							
1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"							
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"							
Reference Books :							

1. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners
2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
3. Mayall, “Industrial Design”, McGraw Hill, 1992.
4. Niebel, “Product Design”, McGraw Hill, 1974.

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions.

COMPUTER AIDED ENGINEERING LAB (CAEP)							
I Semester : A M T					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME804	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	-	**-**	**3**	**2**	**40**	**60**	**100**
Internal Exam Duration : 3 Hrs				**End Exam Duration: 3 Hrs**			

LIST OF EXPERIMENTS

1. Truss analysis using FEA software.
2. .Beam analysis using FEA software.
3. .Buckling analysis of columns using FEA software.
4. Harmonic analysis using FEA software.
5. Fracture analysis using FEA software.
6. Analysis of laminated composites using FEA software.
7. Couple - field analysis using FEA software.
8. Transient dynamic analysis.
9. Modal analysis to obtain natural frequencies.
10. Elasto - Plastic analysis.

MATERIAL TESTING LAB (MTP)							
I Semester: AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME805	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	-	**-**	**3**	**2**	**40**	**60**	**100**
Internal Exam Duration : 3 Hrs				**End Exam Duration: 3 Hrs**			

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

CO1: Understand the Preparation of specimen for Wear Testing.

CO2: Evaluate the hardness and Impact strength of different materials.

CO3: Evaluate the Tensile, Compression and Flexural strength of Comoposite material.

CO4: Evaluate the wear rate Under various Loads.

CO5: Understand the wear rate by varying Time.

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

LIST OF EXPERIMENTS

1.Preparation of Specimen to ASTM standards for Wear testing.

2.Hardness Test: Estimating the Hardness of different Engineering materials using Rockwell Hardness Tester.

3. Impact Test: Determining the impact strength of a given material using IZOD impact testing Machine.

4. Tension Tests using Universal Testing Machine: Tension test on the given specimens (at least 2 materials for comparison) and to plot the stress strain graphs.

5. Compression Tests using Universal Testing Machine: Compression test on the given specimens and to plot the stress strain graphs.

6. Flexural Test using Universal Testing Machine: Bending test, on the given specimens and to plot the stress strain graphs

7. Wear test using Du-Con wear Testing Machine: Dry Wear test, on the given specimen and to plot the Wear rate verses Load graphs time constant.

8.Wear test using Du-Con wear Testing Machine: Dry Wear test, on the given specimen and to plot the Wear rate verses Time graphs Load constant.

9. Wear test using Du-Con wear Testing Machine: Wear test with Lubrication, on the given specimen and to plot the Wear rate verses Load graphs time constant.

10. Wear test using Du-Con wear Testing Machine: Dry Wear test on the given specimens and to Determine Wear rate with varying disc speeds.

COMPUTER NUMERICAL CONTROL MACHINES (CNCM)							
II Semester :AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME806	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			

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

CO1:: Understand the principle of CNC machine tools, describe constructional features of CNC machine tools

CO2: Understand the control systems in CNC Machines.

CO3: Understand the various types of Drives and control systems.

CO4: Understand the concepts of APT Language statements.

CO5: Understand the Features of DNC system.

Introduction to CNC Machines

Working principles of typical CNC lathes, turning centers, machining centers. Constructional Features of CNC Machine tools - Design Considerations, Spindle drives, Slide ways- Lead Screw, Accessories of Machining Centers, Automated Tool changer, maintenance of CNC machines

System Devices and Control Systems

Drives- Hydraulic systems, direct current motors, stepper motors, alternate current motors, Feed back devices-encoders, resolvers, tachometers, Counting devices-flip-flops, counters, decoders, digital to analog converters.

Control Systems and Interfacing- Open loop and closed loop systems, block diagram of a typical CNC system, description of hardware and software interpolation systems.

Manual Part Programming

Introduction, Nomenclature of CNC Machines, Reference Points, Absolute, Incremental programming, G and M codes, custom macros, part programming examples for CNC Turning and Milling.

Computer Aided Part Programming

Introduction, Languages for computer Aided part Programming, APT Language, Geometric Statements, Motion Statements, Post processing statements, Auxiliary statements, Simple problems using APT language.

Concept Of Distributed Numerical Control

DNC system- communication between DNC computer & machine control unit- hierarchical processing of data in DNC system – features of DNC system.

Text Books :

1.Pabla, B.S. &Adithan, M. ―CNC Machines‖, New Age Publishers, New Delhi.

2.YoramKoren, Computer control of manufacturing systems, Mc-Graw Hill

Reference Books :

1.Radhakrishnan P, ―Computer Numerical control (CNC) Machines‖, New Central Book Agency.

2.PM Agarwal and VJ Patel, CNC Fundamentals and Programming, Charotar Publishing house, 2014.

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions.

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

ADDITIVE MANUFACTURING (ADM)							
II Semester : AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME807	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs					**End Exam Duration: 3 Hrs**		

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

CO1: Understand the classification of AM processes, steps in AM processes.

CO2: Discuss the Vat Photo polymerization AM Process and their applications.

CO3: Illustrate the Extrusion-Based AM Processes, Sheet Lamination AM Processes suitable material and process for fabricating a given product.

CO4: Understand the Powder Bed Fusion AM Processes and applications

CO5: Understand Directed Energy Deposition AM Processes

Introduction to Additive Manufacturing

Introduction to AM, AM evolution, Distinction between AM & CNC machining, Steps in AM, Classification of AM processes, Advantages of AM and Types of materials for AM. Guidelines for Process Selection: Introduction, Selection Methods for a Part, Challenges of Selection, Example System for Preliminary Selection, Process Planning and Control.

Vat Photo polymerization AM Processes

Vat Photo polymerization AM Processes: Stereo lithography (SL), Materials, Process Modeling, SL resin curing process, SL scan patterns, Micro-stereolithography, Mask Projection Processes, Two-Photon vat photo polymerization, Process Benefits and Drawbacks, Applications of Vat Photo polymerization, Material Jetting and Binder Jetting AM Processes.

Extrusion-Based AM Processes

Extrusion-Based AM Processes: Fused Deposition Modelling (FDM), Principles, Materials, Process Modelling, Plotting and path control, BioExtrusion, Contour Crafting, Process Benefits and Drawbacks, Applications of Extrusion-Based Processes. Sheet Lamination AM Processes: Bonding Mechanisms, Materials, Laminated Object Manufacturing (LOM), Ultrasonic Consolidation (UC), Gluing, Thermal bonding, LOM and UC applications.

Powder Bed Fusion AM Processes

Powder Bed Fusion AM Processes: Selective laser Sintering (SLS), Materials, Powder fusion mechanism and powder handling, Process Modelling, SLS Metal and ceramic part creation, Electron Beam melting (EBM), Process Benefits and Drawbacks, Applications of Powder Bed Fusion Processes.

Directed Energy Deposition AM Processes

Directed Energy Deposition AM Processes: Process Description, Material Delivery, Laser Engineered Net Shaping (LENS), Direct Metal Deposition (DMD), Electron Beam Based Metal Deposition, Processing-structureproperties, relationships, Benefits and drawbacks, Applications of Directed Energy Deposition Processes.

Text Books :

1) Ian Gibson, David w Rosen, Brent Stucker., "Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing", 2nd Edition, Springer, 2015.

2) Chua C.K., Leong.K.F, and Lim C,C.S., Rapid Prototyping Principles and Applications, World Scientific Publishing Co. Pte. Ltd.

Reference Books :
1.D.T.Pham and S.S.Dimov, Rapid manufacturing The technologies and applications of rapid Prototyping and rapid tooling. Springer Publications
2.Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.
3.Terry Wholers, Wholers report, Wholers Associates
Question Paper Pattern:
Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions. **End Exam:** The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

INDUSTRIAL AUTOMATION AND ROBOTICS (IAR)							
II Semester: AMT				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME808	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			

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

CO1: Understand the various fundamental and advanced concepts of automation in industry.

CO2: Understand the line balancing and flow lines in automated industry.

CO3: Demonstrate the basic components, types of end effectors and sensors in robots.

CO4: Understand the robot manipulators and solve simple problems on kinematics of robots

CO5: Explain about robot programming and applications.

Introduction to automation

Basic elements of an automated system, advanced automation functions, levels of automation, process industries versus discrete manufacturing industries, continuous versus discrete control, computer process control. Hardware components for automation and process control, sensors, actuators, analog to digital converters, digital to analog converters, input/output devices for discrete data.

Automated production lines and assembly line balancing

Automated flow lines: Work part transport – Storage buffers – Control of the production line – Applications of flow line in machining system – System design consideration of flow lines.

Assembly line balancing: Line balancing methods – Ways of improving line balance and flexible assembly lines – Automated assembly system and configuration – Parts delivery at work station and applications.

Industrial Robotics and Drive Systems

Introduction – Robot anatomy – Robot configuration and motions – Robot specifications – Pitch, yaw, roll, joint notations, speed of motion, pay load – Work volume. Robot Drive System: Pneumatic, hydraulic drives, mechanical and electrical drives – Servo motors and stepper motor. Grippers: Mechanical, pneumatic and hydraulic grippers, magnetic grippers and vacuum grippers – Two fingered and three fingered grippers – Internal and external grippers. Robot Sensors: Position and velocity sensor – Tactile sensor – Proximity and range sensor – Touch sensor – Force and torque sensor – Uses of sensors in robotics.

Robot Motion Analysis and Control

Robot Kinematics: Manipulator kinematics – Position representation – Forward and reverse transformation – Adding orientation – Homogeneous transformations – D-H notation – Forward and inverse kinematics. Basics of Robot Dynamics, Trajectory Planning: Trajectory planning and avoidance of obstacles – Path planning – Skew motion – Joint integrated motion – Straight line motion.

Robot programming and applications

Robot Programming: Lead through programming – Robot language structure – Motion commands of move, speed control, workplace, path, frames, end effecter operation, sensor operation and react statement – Program sequence and subroutine – Teach pendant programming – VAL II programming. Robot Applications: Material transfer and machine loading / unloading – Processing applications in spray coating, spot and arc welding – Assembly and inspection automation – Selection of robots in industry applications.

Text Books :
1.Mikell P.Groover - Automation, Production systems, and computer integrated manufacturing, Pearson Education.
2.Nicholas Odrey, Mitchell Weiss , Mikell Groover , Roger Nagel -Industrial Robotics-Technology, Programming and Applications. McGraw Hill Education.
Reference Books :
1. S.R.Deb , Sankha Deb -Robotics Technology and Flexible Automation, McGraw Hill Education.
2. Saeed B.Niku- Introduction to Robotics: Analysis, Control, Applications, Wiley Publisher.
3. John J. Craig- Introduction to Robotics: Mechanics and Control, Pearson Education India.
Question Paper Pattern:
Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions. **End Exam:**The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

COMPUTER AIDED MANUFACTURING LAB (CAMP)							
II Semester : AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME809	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	-	**-**	**3**	**2**	**40**	**60**	**100**
Internal Exam Duration : 3 Hrs				**End Exam Duration: 3 Hrs**			

LIST OF EXPERIMENTS
1. Turning Simulation on ESPIRIT CAM.
2. Milling Simulation on ESPIRIT CAM.
3. Turning Simulation on MASTER CAM LATHE.
4. Milling Simulation on MASTER CAM MILLING.
5. Turning Simulation on EDGECAM.
6. Milling Simulation on EDGECAM.
7. Producing Work piece on HITECH CNC LATHE(model-1)
8. Producing Work piece on HITECH CNC LATHE (model-2).
9. Producing Work piece on HITECH CNC LATHE (model-3)
10. Producing Work piece on HITECH CNC MILLING (Model-1)
11. Producing Work piece on HITECH CNC MILLING (Model-2)
12. Producing a simple model using 3D Printing.

MANUFACTURING AND PRECISION LAB (MPP)							
II Semester: AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME810	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	-	**-**	**3**	**2**	**40**	**60**	**100**
Internal Exam Duration : 3 Hrs					**End Exam Duration: 3 Hrs**		

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

CO1: Determine the temperature of Tool face during Turning.

CO2: Evaluate the Surface roughness on Turned cylindrical specimen

CO3: Evaluate the Tool wear on single point cutting tool.

CO4: Determine the cutting Forces during turning and drilling.

CO5: Understand the preparation of composite material.

LIST OF EXPERIMENTS

1. To find tool face temperature with IR Thermometer during turning with different tool material combinations
2. To measure Surface roughness on turned specimen Using Surface Roughness tester SJ-210.
3. To find Tool wear with Tool Makers Microscope after turning operation.
4. To find cutting forces using Lathe tool dynamometer during turning operation.
5. To find cutting forces using Drilling tool dynamometer during drilling operation.
6. Preparation of Aluminum Metal Matrix composite material using friction stir casting
7. Preparation of Polymer composite material using hand lay-up technique.
8. Preparation of Polymer composite material using vacuum bag
9. Preparation of Composite Film from Polymers using Cooling Centrifuge equipment.
10. To study the specimen surface characterization of different materials using optical microscope.

ADVANCED OPTIMIZATION TECHNIQUES (AOT)

I Semester : AMT Elective-I				Scheme : 2022			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME811	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	2	**1**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			

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

CO1: Understand the concepts of Optimization, Linear programming, Integer programming.

CO2: Apply the classical optimization techniques to multi variable optimization

CO3: Understand and apply the Dynamic programming to applications.

CO4: Understand the concepts of Genetic algorithms.

CO5: Understand and apply the Evolutionary Algorithms.

Optimization

Introduction: Historical Development, Engineering Applications of Optimization, Classification of Optimization problems.

Linear Programming: Simplex method, Big-M method, Sensitivity Analysis, Duality, Dual simplex method, Interpretation.

Integer Programming: Simple applications of integer programming, solution methods of integer programming- Branch and Bound Algorithm, Cutting Plane Algorithm

Classical Optimization Techniques

Single variable optimization with and without constraints, multi – variable optimization with and without constraints, methods of Lagrange multipliers, Kuhn-Tucker conditions

Dynamic programming

Elements of dynamic programming model, Back ward recursive equation, Applications of Dynamic Programming to Linear programming and Capital budgeting.

Genetic Algorithm

Introduction, Difference between Genetic Algorithm and Traditional Methods, Simple Genetic Algorithms, Similarity Templates (Schemata), Genetic algorithm operators –selection, crossover and mutation. Simple applications of GA.

Evolutionary Algorithms

Evolutionary Algorithms: Ant colony algorithm, Tabu search algorithm and Particle swam optimization algorithum.

Text Books :

1. S.S.Rao – Engineering Optimization Theory and Practice,John Wiley& Sons.
2. S.D.Sarma, –Operations Research, Kedarnath Publishrs.
3. David E.Goldberg, –Genetic Algorithms, Pearson Education India.

Reference Books :

1. Hamdy A.Taha, — Operations Research:An Introduction, Pearson Publications.
2. Kalyanmoy Deb –Optimization for Engineering Design :Algorithms and examples, Prentice Hall,India

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions.

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

COMPUTER AIDED PROCESS PLANNING (CAPP)							
I Semester : AMT Elective-I				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME812	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**		**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			

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

CO1: Understand the scope and requirements of process planning.

CO2: Understand the Computer Aided Process planning.

CO3: Understand the various types of Process Planning

CO4: Understand the Alternative manufacturing processes and qualitative methods.

CO5: Select and Apply the CAPP system.

Introduction

Definition, Scope of Process planning, Information requirement for process planning system, Role of process planning in CAD/CAM

CAPP

Computer aided Process planning, advantages of CAPP over conventional process planning, Structure of Automated process planning system, feature recognition, methods.

Types Process Planning

Manual approach, Variant or Retrieval approach and Generative approach, CAM-I automated process planning (CAPP), DCLASS, CMPP

Alternative Manufacturing processes

Significance, alternative manufacturing processes, reduction of total set-up cost for a particular sequence, quantitative methods for optimal selection, examples.

Implementation Techniques for CAPP

Criteria for selecting a CAPP system and benefits of CAPP. Computer integrated planning systems, and Capacity planning system.

Text Books :

1. Mikell Groover- Automation, production systems and computer integrated manufacturing, Pearson

2.Tien-Chien Chang, Richard A.Wysk, An Introduction to automate process planning systems, Prentice Hall International series.

Reference Books :

1. David D.Bed worth, Mark R.Henderson, Philip M.Wolfe, —Computer aided design and manufacturing, Mc GrawHill Publishers.

2. P.N.Rao, N.K.Tiwari,T.N.Kundra- Computer Aided Manufacturing, McGraw Hill Education.

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions andhas to answer any **Four** questions.

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

INTRODUCTION TO COMPOSITE MATERIALS (ICM)

I Semester : AMT Elective-I				Scheme : 2022			
Course Code	Hours/Week			Credits	Maximum Marks		
ME813	L	T/D	P	C	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	60	100
Sessional Exam Duration : 2 Hrs				End Exam Duration: 3 Hrs			

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

CO1:. Understand the types of composites, types of reinforcements and matrix materials.

CO2: Understand the various manufacturing methods of composites.

CO3: Understand the Mechanical properties of composites

CO4: Analyse the stress and stiffness of Laminates.

CO5: Understand the Joining methods and Failure Theories of composites.

Introduction

Definitions, Composites, Reinforcements and matrices, Types of reinforcements, Types of matrices, Types of composites, Carbon Fibre composites, Properties of composites in comparison with standard materials, Applications of metal, ceramic and polymer matrix composites.

Manufacturing methods

Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs. Fibre/Matrix Interface, mechanical. Measurement of interface strength. Characterization of systems; carbon fibre/epoxy, glass fibre/polyester, etc.

Mechanical Properties -Stiffness and Strength

Geometrical aspects – volume and weight fraction. Unidirectional continuous fibre, discontinuous fibers, Short fiber systems, woven reinforcements –Mechanical Testing: Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

Laminates

Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Plate Stiffness and Compliance, Computation of Stresses, Types of Laminates -, Symmetric Laminates, Antisymmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Cross-ply Laminate, Angleply Laminate. Orthotropic Laminate, Laminate Moduli, Hygrothermal.

Joining Methods and Failure Theories

Joining –Advantages and disadvantages of adhesive and mechanically fastened joints. Typical bond strengths and test procedures**.**

Text Books :

1) Krishan K. Chawla - Composite Materials: Science and Engineering, Springer.

2)Autar K.Kaw – Mechanics of composite materials, CRC press, Taylor&Francis.

Reference Books :

1) Ever J. Barbero - Introduction to Composite Materials Design, CRC press, Taylor&Francis.

2) T.W.Clyne,D.Hull- An Introduction to composite Materials, Materials Research Society, Cambridge University Press.

3)Daniel Gay,Suong V.Hoa, Stephen W.Tsai – Composite Materials Design and Applications, CRC press

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions.

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

DESIGN OF ADVANCED HYDRAULIC AND PNEUMATIC SYSTEMS (DAHPS)							
I Semester : AMT Elective-II				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME814	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			

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

CO1: Recognise the Importance of Hydraulics and Pneumatics Controls

CO2: Explore the control of various types of valves.

CO3: Understand the concepts of Hydraulic Actuators.

CO4: Understand the design of hydraulic circuits and applications.

CO5: Understand the concepts and functioning of pneumatic systems.

Introduction

Power hydraulics & its applications, Hydraulic symbols,
Positive displacement Pumps: Gear, Vane, Piston and other special types of pumps.

Control Valves

Pressure Control: relief valve, Unloaded valve, Pressure reducing valve, Counter balance valve, sequence valve, Flow Control: Meter in Meter out, Bleed off, Pressure and Temperature, compensated flow control valve, Direction Control: Check valve, Open centre, closed centre, Tandem centre and others, Cartridge valves, Flow forces on valve spools.

Hydraulic Actuators

Linear and rotary, Design of Hydraulic actuators, Accessories in hydraulic systems: Accumulator, Air-breathe valve, Pressure switches etc. Hydraulic power packs.
Servo valves: Torque motor, electro-hydraulic Servo valves: Types and principles of operations.

Design of Hydraulic circuits and its application

Regeneration, Pre-fill, Twin Pump and others. Maintenance of hydraulic systems and working fluid:

Pneumatics

Air Filter, Lubricators and Regulators, Pneumatic control elements: Air Cylinders and their Design, Pneumatic safety circuits, Pneumatic Logic control.

Text Books :

1) H.E. Merritt, “Hydraulic Control Systems”, John Wiley & Sons, New York.

2) D. Mc Cloy and H. R. Martin, “Control of Fluid Power, Analysis, Design and Control”, John Wiley & Sons.

Reference Books :

1) Andrew Parr, Hydraulics and Pneumatics, Jaico Publishers.

2) Esposito, Fluid Power by Esposito, Pearson Education.

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

DESIGN FOR MANUFACTURING AND ASSEMBLY (DFMA)							
I Semester :AMT Elective - II					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME815	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs					**End Exam Duration: 3 Hrs**		

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

CO1: Understand the general design principles for manufacturability.

CO2: Understand the form design of weld, forgings and casting members.

CO3: Understand the design feature for machinability, for Assembly.

CO4: Understand the redesign of castings and computer applications of DFMA

CO5: Understand the issues for the environmental design.

Introduction

General design principles for manufacturability - strength and mechanical factors, mechanisms selection, evaluation method, Process capability - Feature tolerances Geometric tolerances - Assembly limits -Datum features - Tolerance stacks.

Factors Influencing Form Design

Working principle, Material, Manufacture, Design- Possible solutions - Materials choice - Influence of materials on form design - form design of welded members, forgings and castings.

Component Design - Machining Consideration

Design features to facilitate machining - drills - milling cutters - keyways - Doweling procedures, counter sunk screws - Reduction of machined area- simplification by separation - simplification by amalgamation - Design for machinability - Design for economy - Design for clampability – Design for accessibility - Design for assembly.

Component Design – Casting Consideration

Redesign of castings based on Parting line considerations - Minimizing core requirements, machined holes, redesign of cast members to obviate cores. Identification of uneconomical design - Modifying the design - group technology - Computer Applications for DFMA

Design For The Environment

Introduction – Environmental objectives – Global issues – Regional and local issues – Basic DFE methods – Design guide lines – Example application – Lifecycle assessment – Basic method – AT&T‟s environmentally responsible product assessment - Weighted sum assessment method – Lifecycle assessment method – Techniques to reduce environmental impact – Design to minimize material usage – Design for disassembly – Design for recyclability – Design for remanufacture – Design for energy efficiency – Design to regulations and standards.

Text Books :

1. Boothroyd, G, Design for Assembly Automation and Product Design. New York, Marcel Dekker.

2. John Dixon, Corroda Poli - Engineering Design& Design for Manufacturing: A Structural Approach,

3.Joseph Fiksel - Design for the Environment, McGraw Hill.,

Reference Books :

1.Boothroyd, G, Heartz and Nike, Product Design for Manufacture, Marcel Dekker.

2.T.E.Graedel, Braden R. Allenby.- Design for the Environment, Pearson.

3.Kevien Otto and Kristin Wood, Product Design. Pearson Publication, 2004.

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions.

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

INTELLIGENT MANUFACTURING SYSTEMS (IMS)							
I Semester : AMT Elective-II				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME816	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			
Course Outcomes : At the end of the course the student will be able to							
CO1: Understand the parts of Intelligent Manufacturing Systems.							
CO2: Understand the techniques and simple programs of Artificial Intelligence.							
CO3: Exemplifying the concepts and neural networks in Machine learning.							
CO4: Understand the working and characteristics of various sensors.							
CO5: Understanding the concepts of Artificial Intelligence and implementing in an industries.							
Introduction:							
Intelligent manufacturing systems: components systems, architecture and data flow-system operation. **Knowledge Based Systems/Expert Systems:** Expert system process, characteristics and components of expert systems, **Components of Knowledge Based Systems** –Introduction , Knowledge Representation- First-order logic, Production rules, Semantic Networks; Comparison of Knowledge Representation Schemes, Interference Engine, Knowledge acquisition- Protocol Analysis.							
Artificial Intelligence							
Introduction, Research goals, techniques-knowledge representation, search techniques, programming language-LISP and problems.							
Machine Learning							
Introduction, Conceptual Learning-examples of learning, computational complexity of learning; learning and Neural networks- Neural networks, learning in neural networks.							
Sensors for Intelligent Manufacturing:							
Principles, classifications and characteristics of sensors – Electrical, magnetic, optical, acoustic, pneumatic, magnetic, electro-optical and vision sensors, role of sensors in intelligent manufacturing.							
Industrial Applications of AI							
Intelligent system for design, equipment selection, scheduling, material selection, maintenance, facility planning and process control							
Text Books :							
1) Andrew Kusiak, “Intelligent Manufacturing Systems”, Prentice Hall Publications.							
2) H.K Tonshoff and I.Inasaki, Sensor Applications Vol 1: Sensors in Manufacturing, Wiley-VCH Publications.							
3) Ramachandran Nagarajan, “Introduction to Industrial Robotics”, pearson publications.							
Reference Books :							
1) Simons, G.L. “Introducing artificial intelligence.” NCC publications.							
2 B.Vegnanarayana , “Artificial neural networks” , PHI publications.							
Question Paper Pattern:							
Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions. **End Exam:** The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.							

ADVANCED METAL JOINING PROCESSES(AMJP)							
II Semester : AMT Elective-III					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
	L	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
ME817							
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			

CO1: Understand the principles and applications of welding processes of Radiant energy Welding

CO2: Understand the principles and applications of welding processes of Diffusion welding

CO3: Understand the principles and applications of welding processes of Explosive welding

CO4: Understand the principles and applications of welding processes of plasma arc welding

CO5: Understand the principles and applications of welding processes of friction welding

Radiant energy welding

Radiant energy welding: Electron Beam Welding- Background of the Process, Guns, Weld Environment, Welding in Different Degrees of Vacuum, Equipment and Safety, Joint Design, Applications, Laser Beam Welding, Physics of Lasers, Types of Lasers, Process Parameters, Applications and Limitations

Diffusion Welding

Diffusion Welding- theory and Principle of Process, Key Variables, Intermediate Materials, Deformation Welding, Equipment and Tooling, Joint Design, Economics, Advantages and Limitations, Materials and Applications, Cold Pressure Welding- Process, Equipment and Setup, Applications

Explosive Welding

Explosive Welding- theory and Key Variables, Parameters, Weld Quality, Equipment and Tooling, Advantages and Limitations, Joint Design, Materials and Applications, Adhesive Bonding- theory and Key Parameters, Physical Characteristics, Metal Adhesive, Equipment, Design, Economics of Process, Materials and Applications.

Plasma arc welding

Plasma arc welding: Plasma Arc Welding- theory and Principles, Transferred arc and Non-Transferred arc Techniques, Equipment and Tooling, Joint Design Advantages, Disadvantages, Economics, Materials and Applications, Needle Arc Micro Plasma Welding - Characteristics of Process, Operating Characteristics, Fixturing and Joint Design, Shielding, Weld Penetration and Shape, Applications, Magnetically impelled arc butt (MIAB) welding, Under Water Welding- Wet and Dry Under Water Welding

Friction Welding

Basic Principles, Process Variants, Different Stages of Friction Welding, Mechanism of Bonding, Influence of Process Parameters, Weld Quality and Process Control, Joining of Dissimilar Materials, Advantages, Limitations and Applications, Friction Stir Welding-Metal flow phenomena, tools, process variables and applications, Friction Stir Processing- Process, Application

Text Books :

1.Parmar R.S., “Welding Processes and Technology”, Khanna Publishers, Delhi, 1998.

2. Engineering materials and Their Applications - Richard A. Flinn, Paul K. Trojan, Houghton Miffli Company.

Reference Books :
1. Rossi, Welding Engineering, Mc Graw Hill.
2.Schwartz M.M., “Metals Joining Manual”, McGraw-Hill Inc., 1979.
3.Udin et al., Welding for Engineers, John Wiley & Sons, New York, 1967.
Question Paper Pattern:
Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions. **End Exam:** The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

ADVANCED TOOL ENGINEERING AND DESIGN(ATED)							
II Semester : AMT Elective-III				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME818	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			
Course Outcomes : At the end of the course the student will be able to							
CO1: Solve the problems related to the metal cutting mechanics, the tool wear concept, tool life estimation, significance of cutting parameters on tool life							
CO2: Understand the properties of cutting tool materials, cutting fluids and economics of metal Cutting							
CO3: Understand the design concepts of cutting tools in manufacturing							
CO4: Understand the press working terminology, sheet metal operations including shearing and forming, design principles of press tools, centre of pressure, scrap strip layout and press Tonnage capacity							
CO5: Understand the design concepts of jigs, fixtures							
Mechanism of Chip Formation and Types of Chips							
Mechanism of chip formation, Types of chip, techniques for the study of chip form formation, chip tool interface, built - up edge, chip breakers etc - problems.							
Forces in Metal Cutting							
Stress on the shear plane, Shear angle relationship in thin plane analysis. Minimum energy theory - stresses on the tool. Measurement of tool Forces - virtual tool dynamometers - evaluation of cutting forces, tool failures, work piece failure etc. with various real time problems							
Thermal Aspects of Metal Cutting							
Heat in metal cutting, Flow of heat, Methods of tool temperature measurement, significance of cutting tool temperature. Cutting fluids - Types and selection - evaluation of heat flow in both the tool and work piece.							
Cutting Tool Material and Tool Wear							
Cutting tool materials - classification, application, heat treatment. Mechanisms of tool wear, Tool failure, Methods of tool wear Measurement. Tool life, Machinability index, Tool life equations, Universal machinability index, Economics of turning. Introduction to CFD - various tools and techniques in CFD - various features of CFD - Applications of CFD - Comparison of CFD with ANYSY and NISA - CFD in thermal analysis of metal cutting.							
Jigs & Fixtures							
Fundamental ideas and principles of Jigs and Fixtures. Design of drill jigs and fixtures for turning, drilling, milling, broaching and grinding operations. Locating and clamping devices of jigs and fixtures. Indexing devices and types. Different types of jigs & fixtures. Design of a jig and fixtures for the given component by using Computer Aided Design (CAD) Dies, punches, types of presses, clearances, types of dies, strip layout, calculation of press capacity, center of pressure. Design consideration for die elements. Economics of tooling - Tool selection and tool replacement with respect to small tools.							
Text Books :							
Text Books: 1. P. C. Sharma, Production Engineering, S. Chand Publishers, New Delhi							
1. Amitabha Ghose and Mallik , Manufacturing Science, EWP Publishers, New Deihi							
2. R.K. Jain, Production Technology, Khanna Publishers, New Delhi 5. G.R. Nagpal, Metal Forming Processes, Khanna Publishers, New Delhi							

Reference Books :
1. ASTME "Fundamentals of Tool design: Prentice Hall of India Pvt. Ltd., New Delhi.
2. Sharma. P.C., "A Text Book of Production Engineerig" S.Chand & Co. Ltd., New Delhi,
3 "P.S.G Design Data Book", DPV printers, Coimbatore.
Question Paper Pattern:
Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions. **End Exam:** The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

ADVANCES IN MACHINING PROCESSES (AMP)							
II Semester : AMT Elective-III				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME819	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			

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

CO1: Understand the features and applications of non-traditional machining.

CO2: Understand the principle, working and performance characteristics of LBM & PAM.

CO3: Understand the principle, working and performance characteristics of EBM & ECM.

CO4: Understand the fabrication of microelectronic devices and e-manufacturing.

CO5: Understand the surface treatment process.

Non-Traditional Machining:

Introduction, need, AJM, Parametric Analysis, Process capabilities, USM – Mechanics of cutting, models, Parametric Analysis, WJM – principle, equipment, process characteristics, performance, EDM – principles, equipment, generators, analysis of R-C circuits, MRR, Surface finish, WEDM.

LBM & PAM

Laser Beam Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.

Plasma Arc Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.

EBM & ECM

Electron Beam Machining - Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.

Electro Chemical Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.

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 microelectronics, surface mount technology, Integrated circuit economics.

E-Manufacturing, nanotechnology, micromachining and High-speed Machining, basic principles, working, applications, advantages.

Surface Treatment:

Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

Text Books :

1) Manufacturing Engineering and Technology by Kalpakijian, Addison Wesley, 1995.

2) Foundation of MEMS by Chang Liu, Pearson, 2012.

3) Advanced Machining Processes by V. K. Jain, Allied Publications.

Reference Books :

1) Process and Materials of Manufacturing by R. A. Lindburg, 4th edition, PHI 1990.

2) Micro Machining of Engineering Materials by J. Mc Geough, CRC Press.

3) Non-Traditional Manufacturing Processes by Gary F Benedict, CRC Press.

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions.

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

COMPUTER INTEGRATED MANUFACTURING (CIM)							
II Semester :AMT Elective-IV				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME820	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			
Course Outcomes : At the end of the course the student will be able to							
CO1: Understand the basics of CIM and application of group technology.							
CO2: Develop CAPP systems and select the CAPP system.							
CO3: Understand the concept of production control ,MRP and cellular Manufacturing							
CO4: Apply concept of quality control and AS/RS .							
CO5: Explain the concepts of flexible manufacturing system (FMS) and automated guided vehicle systems							
Introduction to CIM and Group technology							
Scope of computer integrated manufacturing, Product cycle, Production automation. Role of group technology in CAD/CAM integration, methods for developing part families, classification and coding, Examples of coding systems, Facility design using group technology.							
Computer Aided Process Planning							
Approaches to process planning- Manual, variant, Generative approach, Process planning systems—CAPP, DCLASS, CMPP, Criteria for selecting a CAPP system, Part feature recognition.							
Integrative Manufacturing Planning and Control							
Role of integrative manufacturing in CAD/CAM integration, over view of production control—Forecasting , Master production schedule, rough cut capacity planning , M.R.P., order release, shop floor control, Quality assurance , Planning and control systems, Cellular manufacturing.							
Computer Aided Quality control and Computer Integrated Manufacturing systems							
Terminology in quality control, contact inspection methods, Non- Contact inspection methods, Computer Aided Testing, Integration of CAQC with CAD/CAM Types of manufacturing systems, Machine tools and related equipment, Automated Material handling systems, AS/RS, Computer control Systems							
Flexible Manufacturing Systems							
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.							
Text Books :							
1.Mikell Groover- Automation, production systems and computer integrated manufacturing, Pearson Publishers							
2.David D. Bed worth, Mark R.Henderson, Philip M.Wolfe, - Computer aided design and manufacturing, Mc GrawHill Publishers.							
Reference Books :							
1.K.Lalit Narayan,K.Malli karjuna Rao,M.M.M.Sarkar,- Computer Aided Design and Manufacturing, Prentice Hall India.							
2.Flexible Manufacturing Systems, Shivanand H. K., Benal M. M., Koti V., New Age International (P) Limited, New Delhi 2006 5.							
3.Computer Aided Process Planning, Elsevier Science & Technology, H. P. Wang & J. K. Li, 1st Edition, 1991							
Question Paper Pattern:							
Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions.							

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

MECHATRONICS (MCT)							
II Semester : AMT Elective- IV				**Scheme : 2022**			
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
ME821	**L**	**T/D**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs				**End Exam Duration: 3 Hrs**			
Course Outcomes : At the end of the course the student will be able to							
CO1: Understand the features of Mechatronics system and sensors.							
CO2: Understand the fabrication and functioning of MEMS.							
CO3: Understand the concepts of Mechatronics elements used in CNC machines.							
CO4: Understand the modeling in mechanical, electrical, fluid and thermal systems.							
CO5: Understand the drives, sensors and range finders used in robotics.							
Introduction to Mechatronics							
Introduction to Mechatronics: Structure of Mechatronics system. Sensors - Characteristics - Temperature, flow, pressure sensors. Displacement, position and proximity sensing by magnetic, optical, ultrasonic, inductive, capacitive and eddy current methods. Encoders: incremental and absolute, gray coded encoder. Resolvers and synchros. Piezoelectric sensors. Acoustic Emission sensors. Principle and types of vibration sensors.							
Micro Electro Mechanical Systems (MEMS):							
Fabrication: Deposition, Lithography, Micromachining methods for MEMS, Deep Reactive Ion Etching (DRIE) and LIGA processes. Principle, fabrication and working of MEMS based pressure sensor.							
Mechatronics in Computer Numerical Control (CNC) machines:							
Mechatronics elements - Machine structure: guide ways, drives. Bearings: anti-friction bearings, hydrostatic bearing and hydrodynamic bearing. Re-circulating ball screws, pre-loading methods. Re-circulating roller screws. Adaptive controllers for machine tools. Programmable Logic Controllers (PLC) –Basic structure, input/ output processing. Programming: Timers, Internal Relays, Counters and Shift registers. Development of simple ladder programs for specific purposes.							
System Modeling							
Mathematical models and basic building blocks of general mechanical, electrical, fluid and thermal systems.							
Mechatronics in Robotics							
Electrical drives: DC, AC, brushless, servo and stepper motors. Harmonic drive. Force and tactile sensors. Range finders: ultrasonic and light based range finders.							
Text Books :							
1) Bolton W., Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, Person Education Limited, New Delhi, 2007							
2) Ramachandran K. P., G. K. Vijayaraghavan, M. S. Balasundaram, Mechatronics: Integrated Mechanical Electronic Systems, Wiley India Pvt. Ltd., New Delhi, 2008.							
3) Saeed B. Niku, Introduction to Robotics: Analysis, Systems, Applications, Person Education, Inc., New Delhi, 2006.							
Reference Books :							
1) David G. Aldatore, Michael B. Histand, Introduction to Mechatronics and Measurement Systems, McGraw-Hill Inc., USA, 2003.							
2) Gordon M. Mair, Industrial Robotics, Prentice Hall International, UK, 1998.							
3) Vijay K. Varadan, K. J. Vinoy, S. Gopalakrishnan, Smart Material Systems and MEMS: Design and Development Methodologies, John Wiley & Sons Ltd., England, 2006.							
Question Paper Pattern:							
Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions **End Exam:** The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.							

ADVANCED MATERIALS CHARACTERIZATION (AMC)

I I Semester : AMT Elective-IV				Scheme : 2022			
Course Code	Hours/Week			Credits	Maximum Marks		
ME822	L	T/D	P	C	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	60	100
Sessional Exam Duration : 2 Hrs				End Exam Duration: 3 Hrs			

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

CO1: Understand the need of material characterization.

CO2: Understand the principle of Optical Microscopy.

CO3: Understand the Electron microscopy, Scanning Electron microscopy and Transmission electron Microscopy.

CO4: Understand the concepts of Spectroscopy.

CO5: Understand the Diffraction methods and surface analysis.

Introduction to Materials Characterization& Microscopy

Need of materials characterization and available techniques, Relevance of advanced characterization to materials development, scientific understanding of phenomena in materials technology, Introduction to microscopy: Basic principles of image formation, General concepts of microscopy: Resolution. Magnification, Depth of field, Depth of focus, etc.,

Optical Microscopy

Optical microscope - Basic principles and components, Different examination modes (Bright field illumination, Oblique illumination, Dark field illumination, Phase contrast, Polarized light, Hot stage, Interference techniques), Stereomicroscopy, Photo microscopy, Color metallography, Specimen preparation, Applications.

Electron Microscopy

Basic components of the electron microscope (electron gun, electromagnetic lenses, etc.), Aberrations (chromatic, spherical, astigmatism, etc.) and their corrections, Electron-materials interaction (elastic vs. inelastic scattering, coherent vs. incoherent scattering, interaction volume)

Scanning electron microscopy (SEM): Working principle in scanning mode, Signal generation: Inelastic scattering (Secondary vs. backscattered electron, Auger electrons, characteristic X-ray emission, etc.), Detectors: SE (E-T detector), BSE (scintillator vs. solid-state), in-lens detector, Optics of SEM (magnification, pixel, resolution, depth of field),Resolution in SEM (minimum probe size, beam current, etc.), Chemical analysis in SEM, Imaging and contrast generation in SEM.

Transmission Electron Microscopy(TEM): Handling the Electron Beam in TEM, TEM Specimen Preparation. Applications of TEM.

Spectroscopy

Spectroscopy concepts, Energy dispersive spectroscopy, Wavelength dispersive spectroscopy, X-ray photoelectron spectroscopy, Atomic absorption spectroscopy, UV/Visible spectroscopy, Fourier transform infrared spectroscopy, Raman spectroscopy.

Diffraction Methods & Surface Analysis

Fundamental crystallography, Generation and detection of X-rays, Diffraction of X-rays, X-ray diffraction techniques, Electron diffraction, *Surface analysis*: Introduction, Atomic force microscopy, scanning tunneling microscopy.

Text Books :

1) A.K. Tyagi, Mainak Roy, S.K. Kulshreshtha, S. Banerjee, A.K. Tyagi, Mainak Roy, S.K. Kulshreshtha, S. Banerjee - Advanced Techniques for Materials Characterization, Trans Tech Publications Limited.

2) Sam Zhang, Lin Li, Ashok Kumar, Sam Zhang, Lin Li, Ashok Kumar - Materials Characterization Techniques, CRC Press.

3) K.Sharma, D.S. Verma, L. U. Khan, S. Kumar, S. B. Khan - Handbook of Materials Characterization Springer

Reference Books :

1) Elton N. Kaufmann - Characterization of Materials, 3 Volume Set, Wiley-Interscience.

2) P. R. Khangaonkar - An Introduction to Material Characterization, Penram International Publishers.

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and has to answer any **Four** questions.

End Exam: The question paper for end examination shall consist of **Eight** questions and has to answer any **Five** questions.

ENGLISH FOR RESEARCH PAPER WRITING							
I Semester : AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
AU 101	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	2	**-**	**-**	**0**	**-**	**-**	**-**

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

CO1: Understand that how to improve your writing skills and level of readability

CO2: Learn about what to write in each section

CO3: Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

Paragraph Basics, Logical Order and Transitions

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

Paraphrasing Plagiarism and Basic of Paper Writing

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Structure of Research Paper

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

Essential Key Skills Required-I

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,

Essential Key Skills Required-II

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, and skills are needed when writing the Conclusions. useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Text Books :

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

Reference Books :

1. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
2. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

DISASTER MANAGEMENT							
I Semester : AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
AU 102	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	2	**-**	**-**	**0**	**-**	**-**	**-**

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

CO1: Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.

CO2: Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

CO3: Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO4: Critically understand the strengths and weaknesses of disaster management approaches,

CO5: Planning and programming in different countries, particularly their home country or the countries they work in

Introduction:

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

Disaster Prone Areas in India:

Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

Repercussions of Disasters and Hazards:

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.

Disaster Preparedness and Management:

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.

Risk Assessment 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.

Disaster Mitigation:

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Text Books :

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'NewRoyal book Company.

Reference Books :

1. Sahni, Pardeep Et. Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice

Hall ofIndia, New Delhi.
2. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep &DeepPublication Pvt. Ltd., w Delhi.

SANSKRIT FOR TECHNICAL KNOWLEDGE							
I Semester : AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
AU 103	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	2	**-**	**-**	**0**	**-**	**-**	**-**

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

CO1: Understanding basic Sanskrit language

CO2: Ancient Sanskrit literature about science & technology can be understood

CO3: Being a logical language will help to develop logic in students

Alphabets

Alphabets in Sanskrit,

Tenses

Past/Present/Future Tense, Simple Sentences

Roots

Order, Introduction of roots,

Sanskrit Literature

Technical information about Sanskrit Literature

Technical Concepts of Engineering

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Text Books :

1. “Abhyaspustakam” – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi

Reference Books :

1. “Teach Yourself Sanskrit” Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

2. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi.

STRESS MANAGEMENT BY YOGA (SMY)							
II Semester : AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
AU 201	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	2	**-**	**-**	**0**	**-**	**-**	**-**

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

CO1: Develop healthy mind in a healthy body thus improving social health also

CO2: Improve efficiency

- Definitions of Eight parts of Yog. (Ashtanga)
- Yam and Niyam.
- Do`s and Don't's in life.
  i) Ahinsa, satya, astheya, bramhacharya and aparigraha
  ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan
- Asan and Pranayam
  i) Various yog poses and their benefits for mind & body
  ii) Regularization of breathing techniques and its effects-Types of pranayam

Text Books :

1. 'Yogic Asanas for Group Tarining-Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur

Reference Books :

1. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department) , Kolkata

PEDAGOGY STUDIES (PS)							
II Semester : AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
AU 202	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	2	**-**	**-**	**0**	**-**	**-**	**-**

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

CO1: What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?

CO2: What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?

CO3: How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Introduction and Methodology

Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

Thematic Overview

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Pedagogical Practices and Methodology

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Professional Development

Alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes

Research Gaps and Future Directions

Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Text Books :

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31(2): 245-261.
2. Agrawal M (2004) curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.

Reference Books :

1. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
2. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS (PDTLES)

II Semester : AMT					**Scheme : 2022**		
Course Code	**Hours/Week**			**Credits**	**Maximum Marks**		
AU 203	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
	2	**-**	**-**	**0**	**-**	**-**	**-**

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

CO1: Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life

CO2: The person who has studied Geeta will lead the nation and mankind to peace and prosperity

CO3: Study of Neetishatakam will help in developing versatile personality of students

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)

Neetisatakam-Holistic development of personality

- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

Approach to day to day work and duties.

- Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:

- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

Text Books :

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.

Reference Books :

1. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.