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I M.TECH II SEM

REGULAR & SUPPLEMENTARY EXAMINATIONS

JULY 2023



Subject Code: 19MSE2TH01

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**RESEARCH METHODOLOGY**

**(SE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) List and explain the criteria of good research.  
(b) Give a detailed account on various approaches adopted by researchers in solving problems stated by them.
2. (a) List and elaborate various methods of collecting primary data.  
(b) Explain in detail about the various sampling techniques.
3. (a) Describe briefly the importance of simple and multiple correlation and regression in research.  
(b) Discuss the various charts and diagrams used in the data analysis.
4. (a) What is Hypothesis? What is the significance of formulating the hypothesis in research work?  
(b) Discuss in detail about the multivariate techniques.
5. (a) Describe the techniques of interpretation.  
(b) Enumerate the significance of report writing.
6. (a) Which search method is considered the most effective of finding information on the Internet?  
Discuss in detail.  
(b) Which software is best for referencing? Compare Zotero and Mendeley in detail.
7. (a) Explain the meaning and significance of research design.  
(b) Briefly describe the different steps involved in research process.
8. (a) What are the steps in writing good research report? Discuss in detail.  
(b) Explain the guidelines for preparing a good research report.

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Subject Code: 19MSE2TH02

M.Tech - II Semester Regular & Supple Examinations, July-2023

FINITE ELEMENT METHOD

(SE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.  
All questions carry EQUAL marks

1. (a) write about minimization of Energy approach of element formulation. [6]  
(b) Explain the following: [6]  
i) variational approach ii) weighted residual methods.
2. (a) Write the advantages, disadvantages and applications of FEM? [5]  
(b) Determine the expression for deflection and bending moment in a simply supported beam subjected to uniformly distributed load over entire span. [7]
3. (a) Explain in detail about the requirement of convergence in Finite Element Methods. [5]  
(b) In the figure 1 shown, a load  $P = 60 \times 10^3 \text{ N}$  is applied. Determine the displacement field, stress and support reactions in the body. Take  $E = 20 \times 10^3 \text{ N/mm}^2$ . [6]

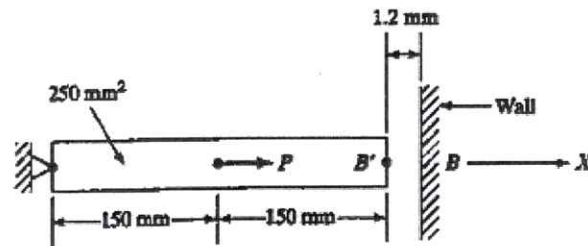


Figure.1

4. (a) For two noded beam element, determine Hermite functions and plot them. Also obtain element stiffness matrix. [8]  
(b) Explain about the Concept of Lagrangian interpolation function. [4]
5. (a) Derive the strain displacement matrix of a constant strain triangle element. [6]  
(b) For the axisymmetric element shown in Figure 2 determine the element stiffness matrix. [6]  
Take  $E=200 \text{ GPa}$ , and  $\nu=0.3$ .

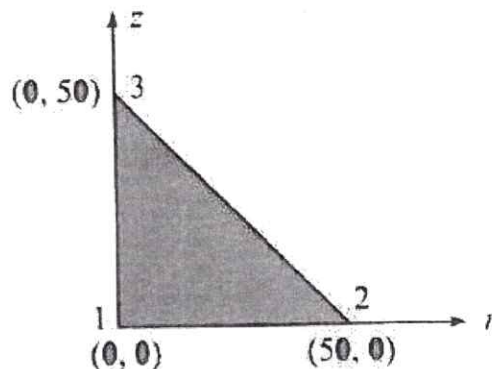


Figure 2

6. (a) Derive the shape functions of one dimensional cubic element. [6]  
(b) Discuss the subparametric and super parametric elements. [6]
7. (a) Explain briefly about mesh refinement vs. higher order elements. [4]  
(b) Formulate the mass matrix for two-dimensional rectangular element depicted in figure. 3. [8]  
The element has uniform thickness 5mm and density  $\rho = 7.83 \times 10^{-6} \text{ kg/mm}^3$ .  
All dimensions are in mm.

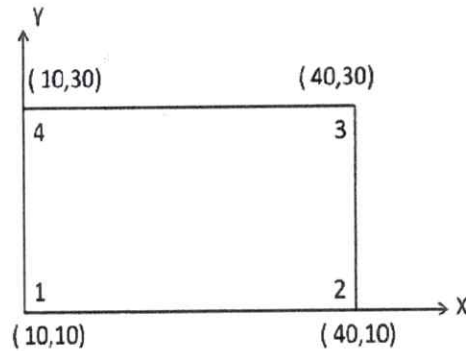


Figure 3

8. (a) Derive stiffness matrix for 1-D heat conduction problem. [6]  
(b) Explain the following (i) Consistent mass matrix (ii) Lumped mass matrix [6]

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**Subject Code: 19MSE2TH03**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**SEISMIC RESISTANT DESIGN**

**(SE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) Discuss the geological and tectonic features of India.  
(b) List the different types of faults and explain briefly.
2. (a) List four main desirable attributes of an earthquake-resistant building.  
(b) Explain the base isolation method? How do base isolators withstand earthquakes?
3. (a) Explain the process to calculate the base shear force for any multi-storeyed building under seismic loading.  
(b) Describe the conditions of Response Spectrum – elastic and inelastic response spectra
4. (a) Discuss the various types of plane irregularity and vertical irregularity.  
(b) Discuss the effects of infilled masonry walls during earthquakes?
5. (a) Discuss the slenderness ratio that affects the compressive strength of concrete.  
(b) List the design steps of Reinforced concrete buildings for earthquake resistance
6. (a) List the different types of loads and their load combinations.  
(b) Briefly discuss the ductile shear wall.
7. (a) Discuss the process of seismic waves causing buildings to collapse.  
(b) Mention the building types and which type is most likely to collapse in an earthquake?
8. (a) Briefly explain the Seismic demand and seismic capacity concepts.  
(b) List the methods of retrofitting structures? Explain any two methods.

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Subject Code: 19MSE2TH04

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**STABILITY OF STRUCTURES**

(SE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.  
All questions carry EQUAL marks

1. Derive the differential equation for maximum deflection and maximum bending moment [12]  
in case of beam column with central load?
2. (a) With reference to equilibrium conditions explain the concept of stability of a structure. [6]  
(b) Explain Euler's theory of columns stability, write assumptions and limitations. [6]
3. (a) Briefly discuss buckling of straight bar column. [6]  
(b) Differentiate between elastic buckling & inelastic buckling. [6]
4. a) Explain the differential equation of slope in case of continuous beams with axial loads? [6]  
b) Explain the critical load conditions for a bar on elastic foundation. [6]
5. Derive the crippling load for buckling of:  
a) Bars with intermediate compressive forces [6]  
b) Bars with distributed axial load. [6]
6. (a) Explain non-uniform torsion of thin walled bars of open cross section with neat sketches. [6]  
(b) Derive the expression for pure torsion of thin walled bars of open cross section. [6]
- 7 a) Explain the Tangent Modulus and Reduced Modulus theories. [6]  
b) Show that the reduced modulus of rectangular cross section. [6]
8. Write short notes on  
a) Difference between lateral & longitudinal buckling. [4]  
b) Write expression for one direction of buckling of simply supported plate. [4]  
c) Write expression for two direction of buckling of simply supported plate. [4]

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**Subject Code: 19MSE2PE06**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**THEORY OF PLATES AND SHELLS**

**(SE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) Explain a short note on i) Thin plate ii) Thick plate  
b) Derive the differential equation of a rectangular plate subjected to UDL?
2. Explain about the Strain energy in pure bending of plates in Cartesian and polar co-ordinates.
3. Derive the deflection equation of a simply supported rectangular plate subjected to single concentrated load at any given point of a Navier solution? And also determine deflection equation of a simply supported square plate?
4. A circular plate of radius  $a$  simply supported along the circumference is subjected to UDL with clamped edges of intensity 'q' per unit area? Obtain the expression for deflection 'w' Deduce the value of  $M_r$  and  $M_t$
5. Write about the Governing equation for Bending of plate under the combined action of in-plane loading and lateral loads
6. Derive expressions for deflection, shear force and bending moment for a circular plate with simply supported boundary conditions subjected to uniformly distributed loading
7. (a) classify different types of shells with sketches  
(b) Write about the membrane theory of circular cylindrical shell element
8. Write boundary conditions for simply supported cylindrical shells with the edge conditions.
  - i) Single shell without edge beam
  - ii) single shell with edge beam

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**Subject Code: 19MSE2PE12**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**ALTERNATIVE BUILDING MATERIALS**

**(SE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

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1. (a) Explain the numerous environmental issues concerned to building materials.  
(b) Enumerate the various environmental friendly and cost-effective building technologies for promoting the sustainability in construction sector.
2. (a) Illustrate the manufacturing process of lime-pozzolana cement with neat flowchart.  
(b) Discuss briefly the properties and uses of lime-pozzolana cement.
3. (a) Elaborate the properties and applications of metallic and synthetic fibers.  
(b) Brief the types of agro wastes. Explain its properties and applications.
4. (a) Brief the types of industrial and mine wastes. Explain its properties and applications.  
(b) Describe any two field quality control test methods with neat sketches.
5. (a) Explain any two systems for alternative roofing technologies with neat sketches.  
(b) Illustrate the properties and applications of 'Ferrocement and Ferroconcrete' as an alternative building technologies for construction of wall element.
6. (a) Enumerate the design principles of masonry compression elements as per IS codal provisions.  
(b) Illustrate the various factors affecting the compressive strength of masonry elements.
7. (a) With neat sketch, describe about the equipment used for production of stabilized blocks.  
(b) Explain about the various machines used in the manufacturing process of concrete.
8. (a) With case study, compare the cost analysis in tabular format under different particular for any conventional building materials with alternative building materials.  
(b) Discuss about the concept of cost saving techniques in planning, design and construction of sustainable building projects.

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Subject Code: 19MPI2TH01

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**CONTROL OF DC AND AC DRIVES  
(P&ID)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) Describe the Dynamic simulations of the speed controlled DC motor drives. [6M + 6M]  
(b) Explain the command current generator.
2. (a) Discuss the modes of operation of  $1\Phi$  fully controlled rectifier-fed separately excited motor. [6M + 6M]  
(b) When do we use three phase converters than single phase converters? Why?
3. With a neat circuit diagram and wave forms, illustrate the four quadrant operation of a separately excited dc motor fed from class E chopper [12M]
4. (a) Elucidate Torque production in Induction motor.  
(b) Narrate Induction motor characteristics in constant torque and field weakening regions. [6M + 6M]
5. Explain the operation of  $3\Phi$  VSI fed Induction motor drive with  $180^\circ$  conduction with the help of circuit diagram and wave forms. Also sketch speed torque characteristics? [12M]
6. Discuss different control strategies of synchronous motor with reference to its characteristics. [12M]
7. Explain the operation of a two-quadrant d.c. chopper fed separately excited d.c. motor exhibiting forward motoring and forward regeneration modes with a neat circuit diagram and waveforms. Also give speed-torque characteristics. [12M]
8. A 8 Mw, 3-phase, 6.6kv, 50Hz, 6-pole, star-connected wound field synchronous motor has the following parameters:  $x_m = 8$  ohms,  $x_{sf} = 0.5$  ohms, rated power factor =1,  $R_s = 0.01$  ohms, rated field current = 180A Field winding resistance =1.2 ohms. Calculate the power factor, armature current, efficiency at half the rated torque and at rated field current core, friction and windage loss assumed constant at 9 kW. [12M]

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Subject Code: 19MPI2TH02

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**SOFT COMPUTING TECHNIQUES**

**(P&ID)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) What are Supervised learning and Unsupervised learning and also draw the basic model of a Perceptron network. [6M]  
(b) What are the basic learning mechanisms of neural networks? Discuss any two of the methods [6M]
2. What is self organizing map and discuss the algorithm and features of Kohonen's map. [12M]
3. (a) Explain fuzzy versus crisp set operations with an example. [4M]  
(b) Explain different types of defuzzification with suitable examples. [8M]
4. (a) Draw the block diagram of a Fuzzy logic system [5M]  
(b) Discuss in detail about the development of rule base and decision making system with the help of fuzzy logic system [7M]
5. (a) What are the limitations of Back Propagation algorithm? [4M]  
(b) Explain the working of back propagation neural network with neat architecture and flowchart [8M]
6. Illustrate case study about a fusion Approach of Multispectral Images with SAR Image for flood area analysis [12M]
7. State and explain the different selection methods in GA [12M]
8. (a) What do you understand by membership functions? Draw the different membership Functions [6M]  
(b) Explain the working of FLC with a block diagram and mention its advantages. [6M]

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**Subject Code: 19MPI2TH03**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**POWER ELECTRONICS IN RENEWABLE ENERGY SYSTEMS**

**(P&ID)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

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1 Briefly discuss about following and compare their Characteristics

a)MTO b) ETO c) IGCT d) MCT

2. (a) Write about the procedure in Selection of inverter

(b) Explain about maximum power point tracking

3. Briefly discuss about Principle and Operation of line commutated converters (inversion-mode) with neat diagrams

4. (a) Write about the types of PV Systems

(b) How many types of Charge controllers and Explain about any one of the Charge controller.

5. Explain about Wind Energy Conversion System with neat diagrams

6. Briefly discuss about Principle and Operation of doubly fed induction generator

7. Explain about Selection of generators for variable speed wind turbines

8. Briefly discuss about the issues in designing the hybrid energy systems

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**Subject Code: 19MPI2TH04**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**POWER SYSTEM DEREGULATION**

**(P&ID)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) Explain about Load forecasting and system reliability of generation system? (6)  
(b) Write about coordination methods.(6)
2. (a) What is the difference between ISO and TSO as system operators? What are the main objectives of a system operator? (6)  
(b) Write briefly on Transmission Pricing. (6)
3. (a) What are the characteristics of wholesale electricity market? What is Bilateral trading? (6)  
(b) What is congestion management in power system? Explain with an example its impact on power system. How can it be managed? (6)
4. (a) What is OASIS? Explain its structure functions and implementation? (6)  
(b) Define and explain the terms Total Transfer Capability, Available Transfer Capability, Transmission Reliability Margin, Capacity Benefit Margin calculations. (6)
5. (a) Describe the challenges in Electricity Pricing. (6)  
(b) Write about Short-time Price Forecasting. (6)
6. (a) Discuss the operational Planning Activities of ISO. (6)  
(b) Explain the operational Planning Activities of a Genco? (6)
7. (a) Explain single auction and double auction power pool. (12)
8. (a) Explain the Reactive Power as an Ancillary Service and also explain the role of Synchronous generator as Ancillary Service Providers. (12)

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Subject Code: 19MPI2PE05

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**SMART GRID**

**(PID)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) What is smart grid? Explain the features of EPRI's IntelliGrid initiative. [6M]  
(b) What are the enabling technologies must be developed and implemented to fulfil the different requirements of the smart grid. [6M]
2. (a) What is Switching technique? Explain the commonly used switching techniques for data transfer. [6M]  
(b) What is IEC 61850 communication protocol? Explain its structure. [6M]
3. (a) Explain the steps involved in authentication methods based on shared secret key and based on key distribution centre. [6M]  
(b) What is IEC 62351 cyber security standard. Specify the security measures included in it. [6M]
4. (a) What are the key components of smart metering. Discuss the benefits of advanced metering.  
(b) A specification sheet of a smart meter states that its rated current is 100 A and power dissipation is 3 W. It employs a current-sensing resistor of  $200 \mu\Omega$ . When the load current is at the rated value of the meter, calculate
  - (i) The power dissipation in all the other components of the meter,
  - (ii) The voltage across the current-sensing resistor,
  - (iii) The gain of the PGA to match with an ADC having a full scale of 5 V. [6M]
5. (a) What is SCADA? Explain the attributes of SCADA [6M]  
(b) What is outage management system? Explain the function of each part. [6M]
6. (a) What is the role of power quality conditioners for smart grid. [6M]  
(b) Explain the Neighbour hood area network (NAN) and its characteristics [6M]
7. (a) What are the applications of customer information systems in DMS. [6M]  
(b) Explain the difference between conventional metering and smart metering with the help of schematic diagram. [6M]
8. Explain the following
  - (a) Flow Battery [6M]
  - (b) Services provided by Demand-side integration. [6M]

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**Subject Code: 19MPI2PE08**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**CUSTOM POWER DEVICES**

**(P&ID)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) Define flicker, impulse, spike and swell. [4 M]  
(b) What are harmonics in a power system? How to calculate harmonic distortion? Briefly explain the effect of harmonic distortion on electrical machines. [8 M]
2. (a) Briefly explain Super Conducting Magnetic Energy Storage systems. Mention its applications [6 M]  
(b) List different types of multilevel inverters. Explain merits and demerits multilevel inverters. Draw the output voltage waveform of a five level multi-level inverter. [6 M]
3. (a) What is the purpose of static VAR compensator? Discuss the operation of static shunt Compensator. [8 M]  
(b) Differentiate between DSTATCOM and STATCOM [4 M]
4. (a) Explain the operation of Hybrid source transfer switch. [6 M]  
(b) Explain the operation of solid state breaker with a neat sketch and its characteristics [6 M]
5. (a) Explain briefly about PQ theory [6 M]  
(b) How UPQC protects the load from harmonic voltages? Discuss. [6 M]
6. (a) What is the difference between earthing and grounding? List the different earthing and grounding problems and their solutions. [8 M]  
(b) What is Distributed Generation? Where it is required? [4 M]
7. (a) Explain how voltage source converter is used for compensation of voltage sag [6 M]  
(b) Explain the recent advances of custom power devices. [6 M]
8. (a) Explain the flywheel storage systems [6 M]  
(b) Define power quality and list out the power quality issues [6 M]

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Subject Code: 19MMD2TH01

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**FINITE ELEMENT METHODS AND APPLICATIONS**

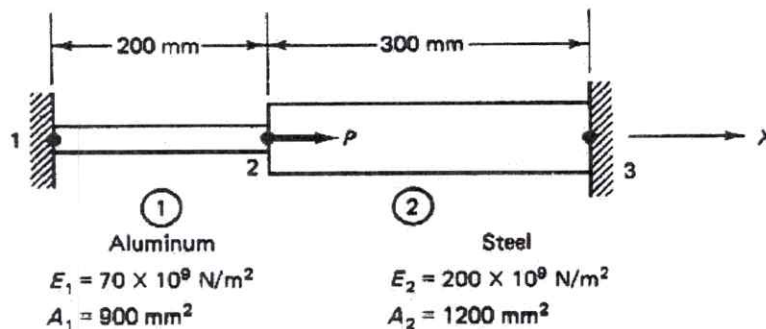
(MD)

Time: 3 hours

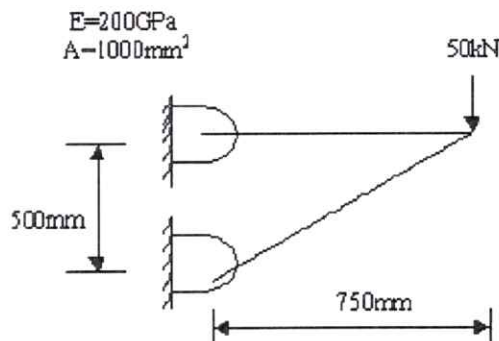
Max Marks: 60

Answer any FIVE questions.  
All questions carry EQUAL marks

- (a) Explain the concept of Plane stress and Plane strain condition w.r.t FE Analysis 6M  
(b) Derive the material matrix for 3D conditions from the generalized Hooke's law. 6M
- Determine the displacements and the support reactions for the uniform bar shown in Figure Given  $P=300\text{KN}$  12M



- Determine the stiffness matrix, stresses and reactions in the truss structure shown in Figure. 12M



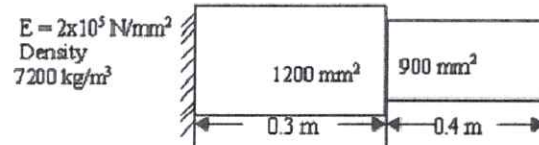
- (a) Define and derive the Hermite shape functions for a two noded beam element? 6M  
(b) What are the different governing equations for a plane axisymmetric problem? 6M
- (a) Derive the strain-displacement matrix of a CST element 8M  
(b) The nodes of a CST element are 1 (1,1), 2 (4,2) and 3 (3,9). If the shape functions  $N_1$  and  $N_2$  at a point are 0.15 and 0.25 respectively determine the coordinates of the point. 4M
- (a) Derive the shape functions for a Quadrilateral element. 6M  
(b) Use of Gaussian 2-point formula and Gaussian 1-point Formula. 6M

$$I = \int_0^1 (2x^2 + 3x + 7) dx$$

7. Consider a pin fin having a diameter 8 mm and length 125 mm. At the root, the temperature is 150 °C. The ambient temperature is 80 °C and  $h = 25 \text{ W/m}^2 \text{ } ^\circ\text{C}$ . Take  $k = 54 \text{ W/m } ^\circ\text{C}$ . Assume that the tip of the fin is insulated. Using a three element model determine the temperature of the fin. 12M

8. Consider the axial vibrations of a steel bar shown in figure. 12M

- (a) Develop global stiffness and mass matrices,
- (b) Determine the natural frequencies.



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Subject Code: 19MMD2TH02

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**GEOMETRICAL MODELING**

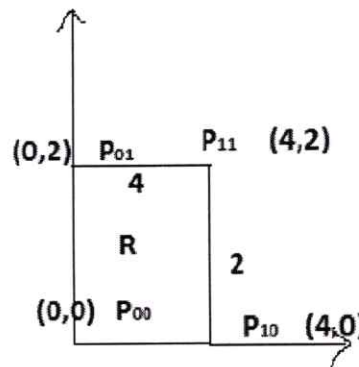
(MD)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.  
All questions carry EQUAL marks

1. (a) What are the properties of parametric curves. 4M  
(b) Explain analytic surface with suitable examples. 8M
  
2. (a) Derive the geometric form of hermit's cubic spline. 12M
  
3. Consider the four dimensional position vectors  $P_1[0 \ 0]$ ,  $P_2[1 \ 1]$ ,  $P_3[2 \ -1]$ ,  $P_4[3 \ 0]$ . Determine the piecewise cubic spline curve through them using chord approximation for the  $t_k$  's. the tangent vectors at the end are  $P_1'[1 \ 1]$  and  $P_4'[1 \ 1]$ . Calculate intermediate points at  $\tau = 1/3, 2/3$  for each segment. 12M
  
4. (a) Explain bezier surface. 4M  
(b) Find the equation of the bezier surface that covers the region R. Also find the surface vectors and its mid point. 8M



5. (a) What is Bilinear surface write its applications. 4M  
(b) Determine the point on the bilinear surface defined by  $P(0,0) = [0 \ 0 \ 1]$ ,  $P(0, 1)=[1 \ 1 \ 1]$ ,  $P(1,0) = [1 \ 0 \ 0]$ ,  $P(1,1) = [0 \ 1 \ 0]$  i.e., the ends of opposite diagonals on opposite faces of a unit cube in the object space, corresponding to  $u = w = 0.5$  in parametric space. 8M
  
6. (a) Explain about tricubic solid in detail. 6M  
(b) Discuss with the help of neat sketches, the most commonly used solid entities. 6M
  
7. Fit a B-spline curve with the following control points  $P_1(0,0)$ ,  $P_2(2,2)$ ,  $P_3(4,4)$ ,  $P_4(6,6)$ . 12M
  
8. What is boundary representation? What are the basic entities for B rep? Validate the B rep model using Euler's law. 12M

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Subject Code: 19MMD2TH04

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**FATIGUE, CREEP AND FRACTURE MECHANICS**

(MD)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.  
All questions carry EQUAL marks

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1. Explain the different conditions that can cause the failure of a structural component?
2. Explain Griffith's theory and also compare this theory to Irwin- Orwin extension?
3. Explain in detail the effect of thickness on fracture toughness and also give examples as to how this value would be useful in industry scenario?
4. Determine the J-Integral for a component loaded in mode I, with a far field stress of 200MPa and an edge crack of 40mm length. The geometrical factors are  $\beta^2= 1.12$  and  $H = 7$ ; the material follows the Ramberg-Osgood relation with the material constants given as:  $E = 207$  GPa,  $n = 6.8$ , and  $F = 1 \times 10^{18}$  (MPa)
5. Explain with sketch "GOODMAN" method for combination of stresses and how it is useful in design?
6. Discuss in detail the following
  - (a) Creep – fatigue interaction
  - (b) Explain about Ashby Creep Deformation maps.
7. (a) Write a short notes on fracture at elevated temperature  
(b) What is Fracture mechanics? Explain about Cleavage and Micro ductility.
8. (a) Explain the following concepts i) Crack tip plasticity ii) Critical stress intensity factor.  
(b) Describe about mean stress ratio, strain and load control.

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# Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: 19MMD2TH03

M.Tech - II Semester Regular & Supple Examinations, July-2023

EXPERIMENTAL STRESS ANALYSIS

(MD)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.  
All questions carry EQUAL marks

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1. (a) What do you understand by principle stresses ? Explain.  
(b) The stress components at a point are given by the following array

$$\begin{bmatrix} 20 & 10 & 12 \\ 10 & 16 & 20 \\ 12 & 20 & 12 \end{bmatrix} \text{ Mpa}$$

Calculate the principle stresses

2. (a) What are the basic characteristics of a Strain gauge? Write a brief note in Electrical resistance Strain gauges  
(b) What are the recording instruments for strain gauges? Explain how dynamic recording of high frequencies are measured?
3. (a) What are isoclinics? Discuss the significance of isoclinics?  
(b) Describe in detail about the photo-elasticity materials?
4. (a) what is meant by polarization? Explain the methods of producing plane and circularly polarized light  
(b) Derive an expression for intensity of light coming out of light polariscope when a Loaded photo electric model is placed
5. (a) Explain shear difference method for the separation of stresses?  
(b) List out the applications of the frozen stress method and explain each one of them?
6. (a) what is brittle coating technique? How it is useful for stress analysis?  
(b) Discuss the crack patterns which can be obtained in brittle coating under various combination of stresses
7. (a) Explain the principle of Geometrical approach to moiré fringe analysis?  
(b) Explain the mechanism of formation of Moire fringes?
8. (a) What is meant by coating sensitivity also write its any two practical applications?  
(b) Explain the use of Birefringence coating for stress analysis?

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**Subject Code: 19MMD2PE07**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**CONDITION MONITORING**

**(MD)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

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1. (a) Write down any four uses of condition monitoring. 6M  
(b) With a neat sketch explain reverse dial indicator method for machine alignment. What are the demerits of this method. 6M
  2. With a neat sketch describe the various components involved in an active vibration control system. 12M
  3. Explain how shock Pulse Method (SPM) can be used for the condition monitoring of rolling-element bearing. 12M
  4. What is meant by overall vibration level monitoring? Explain the significance deciding the action required level and lead time in connection with overall level monitoring. 12M
  5. What is meant by field balancing? What are the advantages of field balancing over shop balancing. 12M
  6. What is 'Thermography'? Why is thermography used in visual inspection techniques for condition monitoring. 12M
  7. What is meant by Ferrography? How is Ferrography different from wear debris analysis? Explain the application of ferrography in condition monitoring. 12M
  8. What are the different types of transducers used in ultrasonic examination. Give their merits and demerits. 12M

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1. (a) List and briefly explain the characteristics of composite materials. [6]  
(b) Explain in detail the role of matrix and reinforcement in composite. [6]
2. (a) Discuss in detail about Tsai-Hill failure theory and also specify its advantages. [6]  
(b) Explain the concept of Hooks law for a two dimensional angle lamina. [6]
3. (a) What are the assumptions made in macro mechanics? [6]  
(b) Find the following for a  $60^\circ$  angle lamina of glass/epoxy whose engineering elastic constants of the unidirectional graphite/epoxy lamina are:  $E_1=181\text{GPa}$ ;  $E_2=E_3=10.3\text{GPa}$ ;  $\nu_{12}=0.28$  ;  $G_{12}=7.17\text{ GPa}$ . [6]
  1. Compliance matrix
  2. Minor Poisson's ratio
  3. Reduced stiffness matrix
  4. Strains in the 1-2 coordinate system (if applied stress are  $\sigma_1= 2\text{MPa}$ ,  $\sigma_2= -3\text{MPa}$  and  $\tau_{12}= 4\text{ MPa}$ )
4. (a) Explain about the Major and Minor Poisson's ratios. [6]  
(b) A glass/epoxy lamina consists of a 70% fiber volume fraction. Use the following properties of glass and epoxy as, [6]

Density of Glass fiber ( $\rho_f$ ) =  $2500\text{ kg/m}^3$   
Density of Matrix (Epoxy)( $\rho_m$ ) =  $1200\text{ kg/m}^3$

Determine the followings,
  1. Density of lamina
  2. Mass fractions of the glass and epoxy
  3. Volume of composite lamina if the mass of the lamina is 4 kg
  4. Volume and mass of glass and epoxy in part (3)
5. (a) Explain in detail about Warpage of Laminates. [6]  
(b) Find the coefficient of thermal expansion for a  $60^\circ$  angle lamina of glass/epoxy whose longitudinal and transverse coefficient of thermal expansion are  $8.6 \times 10^{-6}\text{ m/m}^\circ\text{C}$  and  $22.1 \times 10^{-6}\text{ m/m}^\circ\text{C}$  respectively. [6]

- 6 Write a short note on the followings
- Antisymmetric Laminates
  - Balanced Laminate
  - Quasi-Isotropic Laminates
  - Sandwich composites
7. (a) Explain about the assumptions taken in a typical micromechanical analysis. [6]
- (b) Calculate the modulus of elasticity of a composite material consisting of 60% by volume of continuous E-glass fiber and 40% epoxy resin for the matrix when stressed under iso-stress conditions. Take modulus of elasticity of the E-glass as 72.4GPa and that of the epoxy resin as 3.1GPa. [6]
8. Find the following for a  $60^\circ$  angle lamina of glass/epoxy whose longitudinal and transverse coefficient of thermal expansion are  $8.6 \times 10^{-6} \text{ m/m}^\circ\text{C}$  and  $22.1 \times 10^{-6} \text{ m/m}^\circ\text{C}$  and longitudinal and transverse coefficient of moisture are 0.0 m/m/kg/ kg and 0.6 m/m/kg/ kg respectively. [12]
- Coefficients of thermal expansion
  - Coefficients of moisture expansion
  3. Strains under a temperature change of  $-100^\circ\text{C}$  and a moisture absorption of 0.02 kg/kg.

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Subject Code: 19MEC2TH01

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**CODING THEORY AND APPLICATIONS**  
**(DE&CS)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.**  
**All questions carry EQUAL marks**

1. (a) Explain in detail about Maximum Likelihood Decoding.  
(b) Write notes on logarithmic measure of information with an example. [8+4]
2. Describe in detail the error detecting and error correcting capabilities of a Block code [12]
3. (a) When is a code called Cyclic code? How are cyclic codes encoded? Explain.  
(b) Write in detail about Golay Code. [6+6]
4. (a) Explain the structural and distance properties of Convolutional codes.  
(b) Give a brief account of Sequential decoding of Convolutional codes. [6+6]
5. Explain the following in detail  
(a) Interleaved codes  
(b) Phased Burst-error-correcting codes [6+6]
6. (a) Explain the iterative algorithm for finding error location in BCH codes.  
(b) How is error correction implemented in BCH codes? Discuss. [6+6]
7. (a) What are the different error control strategies used? Elaborate.  
(b) Explain in detail about Hamming codes. [6+6]
8. Write short notes on the following:  
(a) Average and Mutual information  
(b) Quasi-cyclic codes  
(c) Minimum distance and BCH bounds [4+4+4]

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**Subject Code: 19MEC2TH02**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**  
**DSP PROCESSORS AND ARCHITECTURES**  
**(DE&CS)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.**  
**All questions carry EQUAL marks**

1. (a) Explain the significance of Fast Transform techniques. What are the advantages over DFT? [6M]  
(b) Find DFT of a sequence  $x(n) = \{ 0,1,1,-1,-1,0,-1,1 \}$  using DIFFFT algorithm [6M]
2. (a) Explain the Sources of error in DSP implementations [6M]  
(b) Explain about Hardware processing Unit [6M]
3. (a) Explain with neat sketch explain the computational building blocks of DSP [6M]  
(b) Explain the features for external interfacing [6M]
4. (a) Explain the Data Addressing modes of TMS320C54XX DSPs. [6M]  
(b) Explain the Interrupts of TMS320C54XX Processors [6M]
5. (a) How the shifters are useful in DSP? Explain the functionality of barrel shifter? [8m]  
(b) Explain the base architecture of ADSP 2181 [4M]
6. (a) What is the significance of interfacing? Explain the procedure to interface memory and I/O peripherals to programmable DSP devices. [6M]  
(b) Briefly explain parallel I/O interface [6M]
7. (a) Explain the Bus Architecture of Black fin Processor [6M]  
(b) Explain the significance of External bus interfacing signals [6M]
8. Write short notes on the following [6+6]  
(i) D/A Conversion Errors (ii) On-Chip Peripherals

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**Subject Code: 19MEC2TH03**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**CMOS ANALOG AND DIGITAL IC DESIGN**

**(DE&CS)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) Derive the expression for the Threshold voltage of n-MOS with a neat sketch. (6M)  
(b) Define the relationship between MOS current  $I_D$  vs Voltage  $V_{DS}$  at linear and saturation region. (6M)
2. (a) Design and Compare 2 input NAND and NOR Gate using Static CMOS logic. (6M)  
(b) Explain the concept of Small-Signal Model for the MOS Transistor. (6M)
3. (a) Explain the basic principles involved in Dynamic Logic Design. (6M)  
(b) Describe about the Pass Transistor logic with an example. (6M)
4. (a) Draw the CMOS clocked SR flip-flop and explain its operation. (6M)  
(b) Construct SR flip-flop using NAND Gates and draw the truth table and excitation table. (6M)
5. (a) Explain about the Schmitt Trigger and CMOS Implementation. (6M)  
(b) Describe about the optimization using Pipelining with an example. (6M)
6. (a) Explain about the Common Source stage using resistive load with neat sketches (6M)  
(b) Draw the small signal equivalent and voltage transfer characteristics of Source follower. (6M)
7. (a) Discuss the SRAM operation Leakage currents in SRAM cells. (6M)  
(b) Explain about the Cascode current Mirror and Wilson Current Mirror. (6M)
8. (a) Discuss the design procedure for the Two stage CMOS Op-amp. (6M)  
(b) Explain about the Simulation and measurement techniques of Op-amp. (6M)

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Subject Code: 19MDE2TH05

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**ADVANCED COMPUTER ARCHITECTURE**

**(DE&CS)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

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1. (a) List and explain the functional requirements of an Computer Architecture.  
(b) Explain Amdahl's Law with an example.
2. (a) Discuss about the Classic five stage pipe lined RISC processor.  
(b) What is virtual memory and how does it works.
3. (a) Define pipelining with example and explain its need.  
(b) Explain the Basic performance issues in pipelining.
4. (a) How to overcome Data Hazards with Dynamic Scheduling? Explain.  
(b) Discuss Tomasulo's Algorithm with a Loop Based Example.
5. (a) Discuss about static branch prediction.  
(b) Write and explain about Compiler Techniques for Exposing ILP.
6. (a) What is SRAM and DRAM Technologies and list out the differences between them.  
(b) Explain in detail the symmetric shared memory architectures and explain the cache coherence problem in detail.
7. (a) Describe Synchronization and explain with an example.  
(b) Explain about IA-64 with a neat sketch.
8. (a) What is Interconnecting network? Why is it important?  
(b) List and explain some examples of inter connected networks

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**Subject Code: 19MDE2TH04**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**  
**DETECTION AND ESTIMATION THEORY**

**(DE&CS)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.**  
**All questions carry EQUAL marks**

1. (a) Derive the likelihood ratio test (LRT), under the Neyman Pearson (NP) criterion for a binary hypothesis problem [8]  
(b) Distinguish between Point Processes and Gaussian processes [4]
2. (a) Derive the decision metric used in Bayes detector for the binary hypothesis testing problem. [8]  
(b) Discuss about the procedure in detection of random signals in Noise [4]
3. (a) Explain the operation of a matched filter? Derive an expression for its impulse response. [8]  
(b) Explain any one of the procedure for the estimation of mean and variance [4]
4. (a) Illustrate the Kalman filter with suitable diagram and summarize how it can be used for state estimation [8]  
(b) Explain the various applications of Digital Wiener Filters? [4]
5. (a) Explain how Maximum Likelihood estimate is used to estimate a parameter from various Exponential families [8]  
(b) Compare Gaussian, Bernoulli and Poisson Distributions [4]
6. Discuss in brief about uniformly minimum variance unbiased estimation [12]
7. Explain the estimation of signal in presence of Gaussian noise with linear observations [12]
8. (a) Compare Probability distribution and density functions. List out their properties. [6]  
(b) Discuss in detail Bayes Risk criterion [6]

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**Subject Code: 19MDE2TH11**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**ADVANCED DIGITAL COMMUNICATION**

**(DE&CS)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) Briefly explain Gram-Schmidt orthogonalization procedure. [6]  
(b) Discuss the concept of matched filter receiver with necessary block diagrams and equations. [6]
2. (a) Explain the generation and detection Coherent Minimum Shift Keying-Phase trellis [6]  
(b) Briefly explain the coherent binary PSK method. [6]
3. Compare and contrast Binary and Quaternary modulation Schemes with examples [12]
4. (a) Explain Trellis-Coded Modulation scheme with example [6]  
(b) Draw and explain Correlation Receiver in each block. [6]
5. A convolutional code is described by  
 $g_1 = [1\ 0\ 0]$        $g_2 = [1\ 0\ 1]$        $g_3 = [1\ 1\ 1]$   
This convolutional code is used for transmission over an AWGN channel with hard-decision decoding. The output of the demodulator detector is (10100101111011.....). Using the Viterbi algorithm, find the transmitted sequence. [12]
6. (a) How can ISI be reduced by pulse shaping? [6]  
(b) (a) A total of 30 equal-power users are to share a common communication channel by CDMA. Each user transmits information at a rate of 10kbps/s via DS spread spectrum and binary PSK. Determine the minimum chip rate to obtain a bit error probability of  $10^{-3}$ . Additive noise at the receiver may be ignored in this computation. [6]
7. (a) Differentiate slow frequency hopping and fast frequency hopping. [6]  
(b) Discuss the various effects of spreading and interference. [6]
8. Answer the following  
(a) Concept of modulation and coding for band limited channels. [4]  
(b) Discuss jamming considerations [4]  
(c) Generation and detection of QPSK signals. [4]

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Subject Code: 19MCS2TH01

**M.Tech - II Semester Regular & Supple Examinations, July-2023**  
**BLOCK CHAIN TECHNOLOGIES**  
**(CSE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.**  
**All questions carry EQUAL marks**

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1. a) Discuss in detail about Bitcoin uses and the process to get a first bitcoin. [6M]  
b) Illustrate the process of constructing the transactions and adding them into a ledger. [6M]
  2. a) Explain about advanced keys and addresses. [6M]  
b) Illustrate various types of bitcoin addresses. [6M]
  3. a) Explain in detail about transaction lifecycle. [6M]  
b) Describe about the transaction scripts and script languages. [6M]
  4. a) Explain the extended bitcoin network. [6M]  
b) Explain in detail about the components and functioning of Peer to peer Network architecture. [6M]
  5. a) Explain development of a secure bitcoin system [6M]  
b) Explain the structure of a blockchain. [6M]
  6. a) Illustrate Aggregating Transactions into Blocks process. [6M]  
b) Explain mining and hashing race in block chain transaction [6M]
  7. a) Explain Blockchain Forks and consensus attacks. [6M]  
b) Explain Transaction Chaining and Orphan Transactions. [6M]
  8. Explain in detail about Mining the Block and proof of algorithm. [6M]

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Subject Code: 19MCS2TH02

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**FOUNDATIONS OF DATA SCIENCE**

**(CSE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

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1. (a) Describe the role of data scientists in the process of data science.  
(b) Illustrate data types of ndarrays with proper example.
2. (a) Explain the features and applications of pandas.  
(b) Illustrate essential functionalities involved in pandas
3. (a) Describe the process of writing data in text format with proper example.  
(b) Demonstrate the process of storing and loading data in MongoDB.
4. (a) Explain the process involved in combining data with overlap.  
(b) What is data transformation? Explain how it can be used in the process of data science.
5. (a) Explain the bar plot with an example.  
(b) Describe annotations and drawing on a subplot with an example.
6. (a) Describe data aggregation with an example.  
(b) Demonstrate group operations with example.
7. Explain basic indexing and its types with example.
8. (a) Explain the concept of data processing using arrays.  
(b) Explain the concept of combining and merging datasets.

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**Subject Code: 19MCS2TH03**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**

**(CSE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) What are the applications of Artificial Intelligence. Explain Tic-Tac-Toe problem with techniques of artificial intelligence.  
(b) What are the different issues in the design of search problems? Explain with an example.
2. (a) Describe the heuristic search technique applied to a Best-First Search problem with an example?  
(b) Define problem reduction? Explain about problem reduction with AND-OR graphs.
3. (a) Define predicate logic? How to represent the instance and ISA relationship with suitable example?  
(b) Consider the following set of sentences:  
    Marcus was a man  
    Marcus was a Pompeian  
    All Pompeians were Romans.  
How to represent as a set of wff's in predicate logic.
4. (a) Explain the indexing scheme with chess example.  
(b) Explain the logic programming using predicate logic.
5. (a) Explain any two techniques to design a learning system.  
(b) Define machine learning? What are the issues in machine learning? Give some of application of machine learning.
6. (a) What is decision tree? With an example briefly describe the algorithm for generating decision tree? What are the advantages and disadvantages?  
(b) Explain briefly Hypothesis Space Search and Learning Inductive Bias in decision tree.
7. (a) Explain briefly Procedural versus Declarative Knowledge with an example  
(b) List out appropriate problems for neural network learning
8. (a) Describe the back propagation algorithm in Artificial Neural Networks with an example?  
(b) Explain perceptrons in artificial neural network? Explain Multi-Layer Networks with an example.

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Subject Code: 19MCS2TH04

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**SERVICE ORIENTED ARCHITECTURE**

**(CSE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

1. (a) Define SOA. List the primary characteristics of contemporary SOA. [6M]  
(b) Explain the common tangible benefits and pitfalls of adopting SOA. [6M]
2. (a) Explain the process of evolution of SOA. [6M]  
(b) What is service orientation? Outline the common principles of service orientation [6M]
3. (a) What are the principles of SOA are not being automatically provided by web service. Justify your answer [6M]  
(b) What is WSDL? Explain the WSDL document structure with an example [6M]
4. (a) Explain the logical components of web service frame work [6M]  
(b) Explain metadata. Write its importance in WSDL. [6M]
5. (a) Describe the structure of SOAP message [6M]  
(b) Compare SOA Vs Hybrid web service architecture [6M]
6. (a) What are the coordination types and coordination protocols available [6M]  
(b) What is atomic transaction? How is it related with other parts of SOA? Explain with a neat diagram. [6M]
7. (a) Explain briefly about technical requirements for Orchestration and Choreography [6M]  
(b) With suitable diagram explain reliable messaging model [6M]
8. (a) Describe the web service requirements in detail. [6M]  
(b) Discuss about notification and eventing [6M]

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**Subject Code: 19MCS2PE05**

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**MOBILE COMPUTING**

**(CSE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

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1. Explain the architecture of Mobile Computing.
  2. Explain the Radio Interface with neat sketch.
  3. Explain the following
    - a) MACA
    - b) Comparison of SDMA, FDMA and TDMA
  4. Explain the different types of Encapsulation.
  5. Explain the following
    - a) I-TCP
    - b) M-TCP
  6. Compare and Contrast DSR and AODV.
  7. Discuss the features of Mobile Operating Systems.
  8. Explain the following
    - a) DHCP
    - b) MANET applications.

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Subject Code: 19MCS2PE09

**M.Tech - II Semester Regular & Supple Examinations, July-2023**

**CLOUD COMPUTING**

**(CSE)**

**Time: 3 hours**

**Max Marks: 60**

**Answer any FIVE questions.  
All questions carry EQUAL marks**

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1. (a) What is virtualization? What are its benefits?  
(b) List and discuss various types of virtualizations.
2. (a) What are the main characteristics of platform-as-a-service solution?  
(b) What does the acronym SaaS mean? How does it relate to cloud computing?
3. (a) Explain some of the grid application and their usage patterns.
4. (a) Write short notes on. a) Schedulers b) Resource broker c) Load balancing d) Grid portals  
(b) Discuss about Data Security in the cloud and its challenges.
5. (a) Compare Storage-as-a-Service and Database-as-a-Service in cloud context.  
(b) How Integration-as-a-Service and Security-as-a-Service is useful for the Enterprise.
6. (a) List the steps taken for Disaster Recovery Planning,  
(b) Outline various types of Clouds.
7. (a) Explain Virtual LAN (VLAN) and Virtual SAN. Give their benefits.  
(b) Explain the concept of Map reduce.
8. (a) What is AWS? What types of services does it provide?  
(b) Describe the working of Hadoop.

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