

AR19

CODE: 19MTE1007

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I M.Tech II Semester Regular & Supplementary Examinations, January-2022

ADVANCED HEAT TRANSFER (Thermal Engineering)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) State Newton's law of cooling and write its mathematical equation for convection heat transfer. Describe each parameter with SI units. 4M
b) A hollow steel sphere of thermal conductivity 10 W/m K has its inner and outer radii respectively equal to 10 cm and 20 cm . The inner surface of the sphere is held at a prescribed temperature 230°C , while the outer surface is dissipating heat by convection with a heat transfer coefficient $20 \text{ W/m}^2 \text{ K}$ into the ambient air at 30°C . Calculate the thickness of a layer of asbestos insulation of thermal conductivity 0.5 W/m K needed to be provided to cut down the heat loss by 50% . 8M
2. a) What is lumped system? What are the assumptions under lumped system? 4M
b) A straight rectangular fin of cross-section ' $w \times \delta$ ' and of protruding length ' L ' provided on a primary surface at ' T_w ' and exposed to an ambient at ' T_∞ ' offering a convection heat transfer coefficient ' h ' has thermal conductivity ' k '. The tip of fin found to be at a known uniform temperature ' T_L '. Deduce appropriate expressions for (i) dimensionless temperature distribution along the fin, (ii) rate of heat transfer from fin, (iii) fin efficiency and (iv) fin effectiveness. 8M
3. a) Distinguish between periodic transient conduction and non-periodic transient conduction. 4M
b) At a particular location on a winter day the ground is observed to be covered with snow pack that is at a temperature -10°C and offering very large value of h . This trend is continued for three months' time. The ground soil has $k = 0.4 \text{ W/m K}$ and $\alpha = 0.15 \times 10^{-6} \text{ m}^2/\text{s}$. The soil was initially observed to be at temperature 15°C . Calculate the minimum depth under the ground at which one can provide water pipes so as to avoid their chocking. 8M
4. a) What is the physical interpretation of Fourier number? 4M
b) A cylindrical bar 10 cm in diameter has thermal conductivity 50 W/m K and thermal diffusivity $2 \times 10^{-5} \text{ m}^2/\text{s}$. It is heated in a furnace to a uniform temperature 200°C and is suddenly exposed to a convection medium at 40°C offering a convection heat transfer coefficient $150 \text{ W/m}^2 \text{ K}$. Calculate (i) the time that should lapse in order that the centre of the bar gets down to 50°C and (ii) the temperature of the surface of the bar at the above instant of time. 8M

5. a) What is hydraulic diameter? How is it defined? What is it equal to for a circular tube of diameter? 4M
b) Atmospheric air at a bulk mean temperature 5°C is forced through a 15 m long rectangular duct of cross-sectional dimensions $30\text{ cm} \times 20\text{ cm}$ with the wall of duct maintained at a uniform temperature 15°C . Measurements revealed that mean velocity of air through the duct is 10 m/s . Calculate the net rate of heat transfer by convection. 8M
6. a) What is the difference between pool boiling and flow boiling? 4M
b) Saturated steam at atmospheric pressure is 100°C condenses on a vertical plate of 1 m height and 0.2 m width. The surface temperature of the plate is maintained at 80°C . Calculate (i) the condensing heat transfer coefficient at 0.3 m from the its top surface and (ii) the film thickness at 0.3 m from top. 8M
7. a) Define the properties absorptivity, reflectivity and transmissivity. 4M
b) Two square surfaces each side of 2 m are 4 m apart. The temperatures of these surfaces are measured to be 1000 K and 400 K . The hotter surface has an emissivity 0.4 , while the colder surface has an emissivity 0.2 . Calculate the net radiation heat exchange between the above two surfaces. 8M
8. a) What is the difference between natural convection and forced convection? 4M
b) A six meter long section of an a 8 cm diameter horizontal hot water pipe passes through a large room whose temperature is 20°C . If the outer surface temperature of the pipe is 70°C . Determine the rate of heat loss from the pipe by natural convection. 8M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I M.Tech II Semester Regular & Supplementary Examinations, January-2022****POWER ELECTRONIC CONTROL OF AC DRIVES
(PED)****Time: 3 Hours****Max Marks:60****Answer any FIVE questions****All questions carry EQUAL marks**

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| 1. | a) | Illustrate how a voltage source inverter fed induction motor is operated in Open loop volts/Hz control-Speed control. | 6 Marks |
| | b) | Explain about torque and flux control in voltage fed inverter drive. | 6 Marks |
| 2. | | Discuss the working of three phase slip-ring induction motor when static Scheribus scheme is employed for its speed control. Draw a neat circuit, speed-torque characteristics and bring out salient features of this drive. | 12 Marks |
| 3. | a) | Differentiate Direct vector control and indirect vector control of an induction motor. | 6 Marks |
| | b) | Explain the implementation of the indirect vector controlled induction motor drive with neat block diagram. | 6 Marks |
| 4. | a) | Explain in detail about operation of synchronous motor with neat diagram and also elaborate its characteristics. | 6 Marks |
| | b) | Describe self-controlled and a load commutated inverter controlled synchronous motor drives in detail and compare them | 6 Marks |
| 5. | | Explain about power factor control of synchronous motor drive. | 12 Marks |
| 6. | | Explain the operation and Modeling of drive scheme of PMBLDC motor. Also discuss about Three-phase full wave Brushless dc motor | 12 Marks |
| 7. | | Discuss the working principle of sinusoidal type of BLDC motor drive | 12 Marks |
| 8. | | Explain the operation of variable reluctance motor drive with inverter circuit with the help of neat circuit diagram. Also discuss various characteristics and control principles of the drive | 12 Marks |

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CODE: 19MCS1009

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I M.Tech II Semester Regular & Supplementary Examinations, January-2022

**MACHINE LEARNING
(Computer Science Engineering)**

Time: 3 Hours

Max Marks: 60

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

1. a) Propose and explain an algorithm that can be applied when the hypothesis space H is finite. Can we have an infinite hypothesis space for real time applications. 6M
b) What do you understand by machine learning? Can you specify an example to Find S algorithm to identify a specific hypothesis that fits the positive samples in the training set? 6M
2. a) What is a Tree. How it is viewed by a computer system. Give algorithm for decision trees. 6M
b) What the advantages and drawbacks of decision trees for a ML problem. 6M
3. a) Explain the convergence algorithm with an example. 6M
b) Explain and apply the random forest algorithm with a real time example. 6M
4. a) How can you train a neural network using error back propagation algorithm? 6M
b) Specify the cost function of a neural network and explain each component of cost function with respect to its architecture. 6M
5. a) What are different evaluating methods in ML. 6M
b) How ensemble methods are helpful in the performance of a neural network. 6M
6. a) What is the basic underlying foundation of Bayesian learning model and provide the training procedures. 6M
b) Can K – Nearest neighbors learning algorithm can be applied to solve clustering problems. If so how? If Not why? 6M
7. a) Explain the locally weighted algorithm. 6M
b) Explain the Genetic algorithm and its underlying principles for training and testing. 6M
8. a) What is reinforcement learning and how it is implemented in ML. 6M
b) Which is better learning format, supervised learning or reinforcement learning? Explain based on the concept of generalization of example space. 6M

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SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I M.Tech II Semester Regular & Supplementary Examinations, January-2022

**MIXED SIGNAL IC DESIGN
(VLSI System Design)**

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) What is switched capacitor? What is its significance in the CMOS technology? 6M
b) For the above circuit if clock frequency is 100kHz, find the capacitor value that will emulate 1M ohm resistor. 6M
2. a) Explain about the basic PLL with a neat block diagram. 6M
b) Explain the Jitter in PLLs and delay locked loops. 6M
3. a) What are the dynamic characteristics that influence the performance of DACs? 6M
b) Design a decoder based DAC with a detailed explanation. 6M
4. a) Give the classification of ADC architectures based on the conversion rate. 6M
b) Give the classification of a D-A converters. 6M
5. a) What is a flash converter? Explain the function of a 3 bit flash ADC 6M
b) Design a 3-bit Flash ADC with quantization error centered about zero LSBs. 6M
6. a) What are biquad filters? Explain about the two switched capacitor biquad realizations. 6M
b) Design a switched capacitor realization for a first order, high pass circuit with a high frequency gain of -10 and a -3dB frequency of 1 kHz using a clock of 100kHz 6M
7. Explain noise shaped delta sigma modulator with neat diagram. 12M
8. Explain about successive approximation type ADC with neat diagram. 12M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
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I M.Tech II Semester Regular & Supplementary Examinations, January-2022

FINITE ELEMENT ANALYSIS (Structural Engineering)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) Specify the equations of equilibrium and strain displacement relations. 6 M
b) Explain the steps followed in the analysis of structural elements using Direct Stiffness method. 6 M
2. a) Explain the formulation of element stiffness matrix of axial element. 6 M
b) Explain the general steps followed in the Finite Element Method. 6 M
3. a) Explain about Galerkin Method. 6M
b) Explain compatibility of finite element solutions. 6M
4. a) Specify the expressions for linear and quadratic polynomial form of interpolation functions for the following cases 6M
i) One-dimensional Case
ii) Two -dimensional case
b) Illustrate different types of Three- dimensional elements. 6M
5. a) Explain the term 'Interpolation Functions' and also specify why polynomial terms are preferred for Interpolation functions in finite element method. 6M
b) Formulate the shape functions for rectangular element. 6M
6. a) Explain the variation of strains and stresses in CST element. 6M
b) Evaluate the strain displacement matrix and constitutive matrix for the elements shown in Figure.1. Assume plane strain conditions. Take $E=200\text{GPa}$ and $\nu=0.3$. The coordinates shown in figure are in mm. 6M

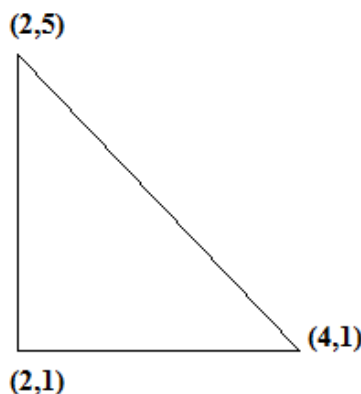


Figure.1

7. Explain the Isoparametric formulation of quadrilateral elements. 12M
8. a) Define an axisymmetric element and mention its characteristics. 4M
b) For the axisymmetric element shown in Figure.2 ,determine the strain displacement matrix and stress-strain matrix /constitutive matrix. Take $E=200$ GPa and $\nu = 0.3$. The coordinates shown in figure are in mm. 8M

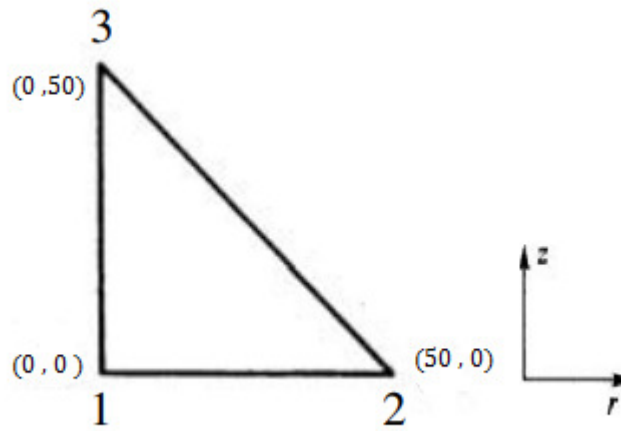


Figure. 2