

DESIGN OF HEAT EXCHANGERS**Thermal Engineering**

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

- 1 a) Define heat exchangers effectiveness and explain its significance. 5M
b) An air cooler is used to cool lubricating oil from 70°C to 40°C. The cooling water enters the exchanger at 15°C and leaves at 25°C. The specific heat capacities of the oil and water are 2 and 4.2 kJ/kgK respectively and oil flow rate is 4kg/s. 7M
 - a) Calculate the water flow rate required.
 - b) Calculate the mean temperature difference for two shell pass and four tube passes.
 - c) Find the effectiveness of heat exchanger.
- 2 a) Classify the heat exchangers according to constructional features and explain. 5M
b) 5000 kg/hr of water will be heated from 20oC to 35oC by hot water at 140oC. A 15oC hot water temperature drop is allowed. A number of double pipe heat exchangers with annuli and pipes, each connected in series will be used. Hot water flows through the inner tube. The thermal conductivity of material is 50 W/mK. $R_{fi} = 0.000176 \text{ m}^2 \text{ K/W}$, $R_{fo} = 0.000352 \text{ m}^2 \text{ K/W}$. $d_i = 0.0525 \text{ m}$, $d_o = 0.0603 \text{ m}$, $D_i = 0.0777 \text{ m}$, $D_o = 0.0889 \text{ m}$. The heat transfer coefficients in inner tube and in the annulus are 4620 W/m²K and 1600 W/m²K respectively. Calculate the overall heat transfer coefficient and the surface area of the heat exchanger. 7M
- 3 The heat transfer coefficient of a steel ($k = 43 \text{ W/mK}$) tube (1.9 cm ID & 2.3 cm OD) in a shell and tube heat exchanger is 500 W/m²K on the inside and 120 W/m²K on the shell side, and it has a deposit with a total fouling factor of 0.000176 m². K/W calculate 12M
 - (i) the overall heat transfer coefficient
 - (ii) the cleanliness factor, and percent over surface.
- 4 a) Derive an expression for effectiveness of a parallel flow heat exchanger. 6M
b) Explain the aspects of fouling. 6M
- 5 Derive LMTD analysis for heat exchangers i) parallel flow 12M
ii) counter flow heat exchanger.
- 6 What would be the effectiveness of counter flow heat exchanger if $C_{min}/C_{max} = 0$ and $C_{min}/C_{max} = 1$ 12M
- 7 a) Explain in detail the condensation on surface with help of Nusselt's Theory 7M
b) Write short notes on vaporizing exchangers 5M
- 8 Classify the cooling towers and explain in detail with neat sketch 12M

AR19

CODE: 19MPE1015

SET-1

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

I M.Tech. II Semester Regular Examinations, December, 2020

**NON-CONVENTIONAL ENERGY SOURCES AND APPLICATIONS
(PED)**

Time: 3 Hours

Max Marks:60

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

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|----|----|--|----|
| 1. | a) | Classify different types of solar thermal collectors in detail | 6M |
| | b) | Define efficiency of solar PV, also mention the reasons why module efficiency is less than cell efficiency | 6M |
| 2. | a) | Enumerate the different types of concentrating type collectors? | 6M |
| | b) | Mention various components of Photo-Voltaic systems | 6M |
| 3. | a) | List any four advantages of OTEC plants | 6M |
| | b) | Explain horizontal axis wind turbine with neat sketch. | 6M |
| 4. | a) | Discuss the different types of Biomass conversion Technologies with required diagrams | 6M |
| | b) | Explain the principle of operation of Tidal power Generation | 6M |
| 5. | a) | Explain the principle of operation of MHD power generation | 6M |
| | b) | What are the advantages and disadvantages of bio-mass energy | 6M |
| 6. | a) | What are the different applications of fuel cells. | 6M |
| | b) | What are the factors affecting on the performance of biogas digester? | 6M |
| 7. | a) | Explain diesel generator and photo voltaic hybrid system. | 6M |
| | b) | Explain various methods of harnessing geothermal energy | 6M |
| 8. | a) | Discuss the status of Power generation in India in geothermal energy sector | 6M |
| | b) | What are environmental impacts of geothermal energy | 6M |

AR19

CODE: 19MVL1016

SET-1

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

I M. Tech II Semester Regular Examinations, December-2020

**CPLD AND FPGA ARCHITECTURE AND APPLICATIONS
(VLSI System Design)**

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

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|----|----|--|-----|
| 1. | a) | Differentiate between PLA, PAL with neat block diagram and example. | 6M |
| | b) | Implement Full Adder using PROM logic. | 6M |
| 2. | a) | With the help of neat diagram, explain the architecture of Macrocell of Altera MAX 7000. | 8M |
| | b) | Explain the main features of Lattice pLSI's CPLD. | 4M |
| 3. | a) | With the help of flow chart, explain about FPGA Design flow. | 6M |
| | b) | Describe about Routing Architecture in FPGA. | 6M |
| 4. | | Explain the architecture of Xilinx XC 4000 Configurable logic Block. | 12M |
| 5. | a) | Describe the concept and properties of petrinets for state machines. | 6M |
| | b) | With an example explain about One-Hot design method using ASMs. | 6M |
| 6. | a) | With an example, describe the state machine design approach centered around shift registers. | 6M |
| | b) | Illustrate about state machine chart using micro programming. | 6M |
| 7. | a) | Describe about Metastability and synchronization in FSM's? | 6M |
| | b) | Write a short note on Speed Performances of different CPLDs? | 6M |
| 8. | a) | Explain about Controller and data path of an FSM Level design. | 6M |
| | b) | Design a Multiplexer using FPGA. | 6M |

AR19

CODE: 19MCS1013

SET-1

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

I M.Tech II Semester Regular Examinations, December-2020

**COMPUTER VISION AND IMAGE PROCESSING
Computer Science and Engineering**

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) What are various consumer level applications? On what type of media, they can be applied, explain advantage? 6M
b) Describe about image acquisition method using sensors with a neat diagram. 6M
2. a) Find out the final coordinates of a figure bounded by the coordinates (1, 1) (3, 4) (5, 7) and (10,3) that is rotated about (8, 8) by an angle 30 degrees in anti-clock wise 6M
b) What Discrete Fourier Transform? Explain any 4 of it's properties along with their transforms. 6M
3. a) Explain Piece wise Linear transformation techniques, with proper diagram. 6M
b) Explain the following:
i) Noise cancellation using Image Averaging method 6M
ii) Comparison of images using Image Subtraction method
4. a) Explain the techniques of Log and Power law transformations. 8M
b) How order static filter can be a smoothing spatial filter? Explain with an example. 4M
5. a) Explain, How the coding, spatial and temporal redundancies are applicable as Image compression methods? 6M
b) Explain LZW compression coding method. 6M
6. a) How the opening and closing functions can be implemented for the morphological operations for an Image? Explain with an example. 6M
b) Explain the following with examples:
i) Extraction of Connected Components 6M
ii) Convex Hull
7. a) How the Hit or Miss functions can be implemented for the morphological operations for an Image? Explain with an example. 6M
b) Explain about thinning and thickening processes. 6M
8. a) Explain about different types of thresholding techniques. 6M
b) Explain, how to achieve Image segmentation using Region Splitting and Merging 6M

AR19

CODE: 19MSE1008

SET-1

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

I M.Tech II Semester Regular Examinations, December-2020

DESIGN OF ADVANCED CONCRETE STRUCTURES

Structural Engineering

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) Define the following: (i) Partial load factor and material safety factors (ii) Limiting moment of resistance. 6M
b) What is the difference between characteristic loads and characteristic strength? 6M
2. a) What are serviceability limit-states in beams design ? 2M
b) A rectangular cantilever beam of span 3.5 m is 300mm x 500mm in cross section, bending moment at the support due to UDL service loads is 100kNm. Out of which 40% moment is due to permanent loads. Check the beam for deflection. It carries 3-20mm bars in tension at an effective cover of 50mm. Assume M25 and Fe415 steel. 10M
3. a) A reinforced concrete beam of size 250 x 500mm is provided with 4 bars of 20mm with an effective cover of 40mm. The section has to resist a bending moment of 60 kN.m. Determine the crack width at the midpoint of tension edge. Use M20 grade concrete and Fe415 grade steel. 9M
b) Discuss about the options available with regard to control of cracking in flexural members. 3M
4. Explain in detail moment curvature or moment rotation relationship of a flexural member. Also explain redistribution of moments. What are the IS code provisions for the limit analysis of RC structures 12M
5. a) Explain the design procedure for continuous deep beams 5M
b) Design a single span deep beam for effective span of 6m, overall depth of 6m. Width of supports is 600mm. Total load on beam including self weight is 400 kN/m. 7M
6. Define shear wall. Classify different types of shear walls with sketches. Explain the design principles of rectangular and flanged shear walls. 12M
7. Draw the detailing of reinforcement in slabs, beams and columns as per codal provisions. 12M
8. Design isotropically reinforced square slab of size 5m to carry a service load of 3kN/m². Use M20 concrete and Fe415 steel 12M