

Answer any FIVE questions**All questions carry equal marks****NOTE: 1) Heat and Mass Transfer Data Books & Steam Tables are permitted**

1. One end of the copper rod ($K=380 \text{ W/m}^\circ\text{C}$) 300 mm long is connected to wall which is maintained at 300°C . The other end is firmly connected to a wall which is maintained at 100°C . Air is blown across the rod so that heat transfer coefficient of $20 \text{ W/m}^2\text{C}$ is maintained. The diameter of the rod is 15 mm and temperature of air is 40°C . Determine i) The net heat transferred to the air in watts. ii) The heat conducted to the other end which is at 100°C . 12
2. (a) A thermocouple junction is in the form of 8 mm diameter sphere. The properties of the material are $c = 420 \text{ J/Kg}^\circ\text{C}$, $\rho = 8000 \text{ Kg/m}^3$, $K = 40 \text{ W/m}^\circ\text{C}$, $h = 40 \text{ W/m}^2\text{C}$. This junction is initially at 40°C and inserted in a stream of hot air at 300°C . Find i) Time constant of thermocouple ii) The thermocouple is taken out from the hot air after 10 seconds and kept in still air at 30°C . Assuming the heat transfer coefficient in air 10 W/m^2 , find the temperature attained by the junction 20 seconds after removing from hot air. 8
(b) Explain in detail various features of Heisler and Groober charts. 4
3. (a) A square plate maintained at 95°C experiences a force of 10.5 N when forced air at 25°C flows over it at a velocity of 30 m/s. Assuming the flow to be turbulent and using Colburn analogy calculate i) The heat transfer coefficient ii) The heat loss from the plate surface. 8
(b) Derive equation for Reynolds Analogy for a flat plate. 4
4. A steam condenser consisting of a square array of 625 horizontal tubes, each 6 mm in diameter, is installed at the exhaust hood of a steam turbine. The tubes are exposed to saturated steam at a pressure of 15KPa. If the tube surface temperature is maintained at 25°C . Calculate i) The heat transfer coefficient ii) The rate at which steam is condensed per unit length of the tubes. Assume film condensation on the tubes and absence of non-condensate gases. 12
5. A hot plate $1 \text{ m} \times 0.5 \text{ m}$ at 130°C is kept vertically in still air at 20°C . Find i) Heat transfer coefficient ii) Initial rate of cooling the plate in $^\circ\text{C/min}$ iii) Time required for cooling plate from 180°C if the heat transfer is due to convection only. Mass of the plate is 20 Kg and $C_p = 400 \text{ J/KgK}$. Assume 0.5 m side is vertical and that the heat transfer coefficient in question (i) above remains constant and convection takes place from both sides of the plate. 12
6. A long cylindrical heater 25mm in diameter is maintained at 660°C and has surface resistivity of 0.8. The heater is located in a large room whose walls are at 27°C . How much will the radiant heat transfer from the heater be reduced if its surrounded by a 300 mm diameter radiation shield of aluminium having an emissivity of 0.2. What is the temperature of the shield. 12
7. Explain boiling curve for water with neat sketch and explain various zones involved in it. 12
8. a A 30 mm deep pan is filled with water to a level of 15mm and is exposed to dry air at 40°C . Assuming the mass diffusivity as $0.25 \times 10^{-4} \text{ m}^2/\text{s}$. Calculate the time required for all the water to evaporate. 8
b Explain Ficks law of diffusion in detail. 4

AR16

CODE: 16MDE1001

SET-1

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

I M.Tech I Semester Regular Examinations, January- 2017

**DIGITAL DATA COMMUNICATIONS
Digital Electronics and Communication Systems**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

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|--------|--|---|
| 1. (a) | Derive the expression for the probability of error for QPSK modulation scheme | 8 |
| (b) | Determine the maximum bit rate for an FSK signal with a mark frequency of 102KHz, space frequency of 104 KHz, and an available Bandwidth of 8kHz | 4 |
| 2. (a) | Explain different Transmission modes | 6 |
| (b) | Explain the role of error control synchronization in data communications | 6 |
| 3. (a) | Describe the functions of Data link protocol | 6 |
| (b) | Explain Synchronous protocols | 6 |
| 4. (a) | Draw the circuit diagram of CODEC and explain its operation | 6 |
| (b) | Write short notes on Wave division multiplexing | 6 |
| 5. (a) | Describe the type of topology used by Ethernet networks | 4 |
| (b) | Explain the token ring topology with a neat diagram | 8 |
| 6. (a) | Describe any one audio compression technique | 8 |
| (b) | Explain the operation of VOIP | 4 |
| 7. (a) | Explain IEEE 802.11 architecture layers | 6 |
| (b) | Write short notes on clock recovery and carrier recovery | 6 |
| 8. (a) | Explain about RS-232 interface | 6 |
| (b) | Comparison of Synchronous and Asynchronous protocols | 6 |

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SET 1

Code No: 16MPE1003

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I M.Tech I Semester Regular Examinations, January-2017

POWER ELECTRONICS CONTROL OF DC DRIVES

(Power Electronics and Drives)

Time: 3 hours

Max. Marks: 60

Answer any FIVE questions
All questions carry equal marks

1. a) Explain the theory of operation of DC machine with neat sketch. [6M]
b) Derive the expressions for dynamic equations of DC machine state-space form. [6M]
2. Explain the principle of operation of single phase half controlled bridge rectifier fed separately excited DC motor with circuit diagram and waveforms of voltage and current. Also derive the expression for the relation between speed and torque and draw speed – torque characteristics. [12M]
3. Explain the operation of 3-phase full converter for the speed control of a separately excited d.c motor for discontinuous conduction mode? Sketch the waveforms of relevant voltage and current for firing angle $(\alpha) = 60^\circ$ [12M]
4. a) Draw the control schematic of a two quadrant three phase converter controlled DC motor [6M]
b) Discuss the control modeling of three phase converter? [6M]
5. Draw the block diagram for closed loop system of DC motor drive and derive the design considerations of each block. [12M]
6. a) Explain the Design of current controller for DC motor drive [6M]
b) Explain the operation of DC - DC chopper [6M]
7. Explain the modes of operation of four-quadrant operation of chopper circuit with neat diagrams [12M]
8. Explain the following current control schemes used for D.C. motor speed control [12M]
(i) Pulse-width modulation controller (ii) Hysteresis controller

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CODE: 16MVL1003 **SET-1**
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech I Semester Regular Examinations, January-2017

ANALOG IC DESIGN **(VLSI System Design)**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

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|----|---|-----|
| 1. | Draw and explain briefly CMOS two-stage opamp | 12M |
| 2. | (a) Explain in detail the operation of current mirror with beta helper, identify the limitations and suggest the remedies | 8M |
| | (b) Briefly explain the terms i) Thermal Noise and ii) Flicker Noise | 4M |
| 3. | (a) Explain about folded cascade operational amplifier | 6M |
| | (b) Explain about charge injection error. Explain how it will be eliminated? | 6M |
| 4. | (a) Derive the expressions for the lock-in and capture ranges of IC 565 PLL | 7M |
| | (b) What are the applications of PLL? Briefly explain any one application | 5M |
| 5. | (a) Give the design procedure of first order switch capacitor filter | 6M |
| | (b) Explain the operation of switched capacitor gain circuit | 6M |
| 6. | (a) Explain successive approximation A/D converter with a neat circuit diagram | 6M |
| | (b) Draw and explain the Nyquist rate D/A converter using binary scaled converter | 6M |
| 7. | (a) Explain briefly about charge pump phase comparator | 6M |
| | (b) Brief out PSRR and slew rate of opamp | 6M |
| 8. | (a) Explain thermometer code converter | 8M |
| | (b) Compare the performance of various opamp topologies | 4M |

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CODE: 16MCS1003

SET-2

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

I M.Tech I Semester Regular Examinations, January-2017

COMPUTER NETWORKS Computer Science Engineering

Time: 3 Hours

Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

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|----|--|-----|
| 1. | Explain in detail about the layers present in OSI reference model | 12M |
| 2. | (a) Explain in detail about the Simplex protocol for Noisy channel | 6M |
| | (b) Explain Go back N protocol with an example. | 6M |
| 3. | (a) Explain Hierarchical routing with an example | 6M |
| | (b) Explain Dijkstra's shortest path routing algorithm. | 6M |
| 4. | Explain the architecture of IPv6 in detail. | 12M |
| 5. | (a) Differentiate between reliable and unreliable services | 6M |
| | (b) What is Flow control? Explain in detail. | 6M |
| 6. | (a) Write short notes on DNS. | 6M |
| | (b) Describe briefly about the HTTP Operational Model | 6M |
| 7. | (a) With an example, explain Mesh topology | 6M |
| | (b) Write short notes on collision free protocols | 6M |
| 8. | (a) Differentiate between Virtual Circuit and Datagram subnets. | 6M |
| | (b) Explain error detection codes with example. | 6M |

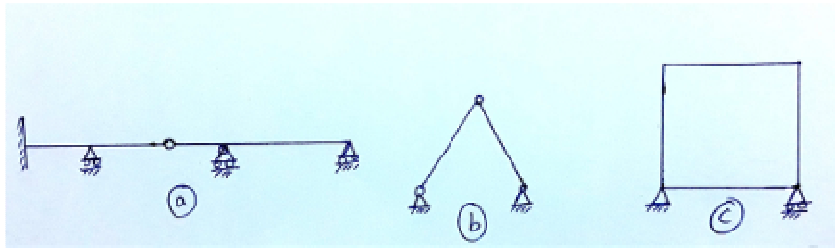
MATRIX ANALYSIS OF STRUCTURES
(Structural Engineering)

Time: 3 Hours

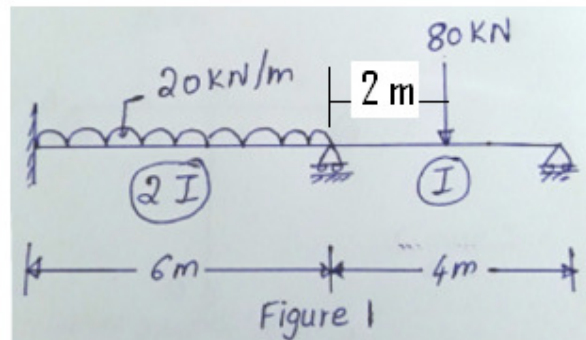
Max Marks: 60

Answer any FIVE questions
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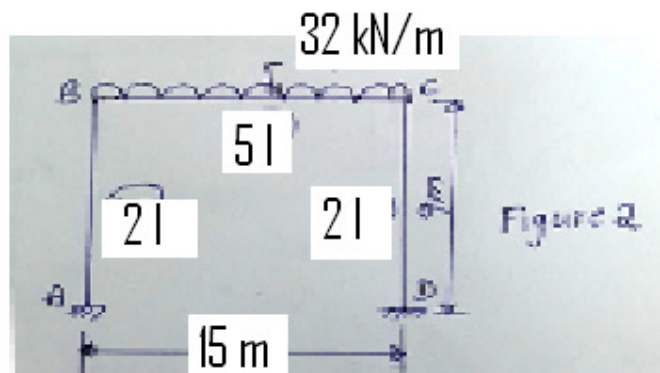
1. (a) Compare between force method and displacement method. 6
(b) Derive element stiffness matrix for a truss element. 6
2. (a) Define degree of static indeterminacy and degree of kinematic determinacy with one example. 6
(b) Which of the following beams, pin-jointed plane frames, plane frames are statically indeterminate. Determine the degrees of static and kinematic indeterminacies. 6



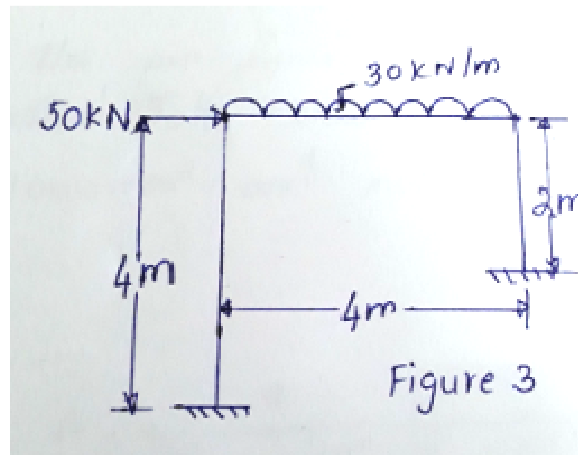
3. Analyse the continuous beam shown in Figure 1 by flexibility matrix method. 12



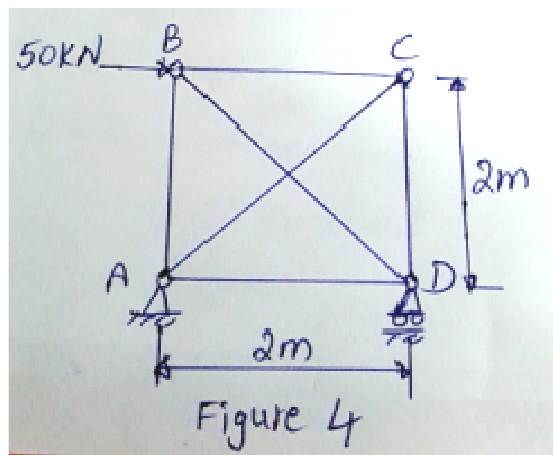
4. Analyse the frame shown in Figure 2 by flexibility matrix method. 12



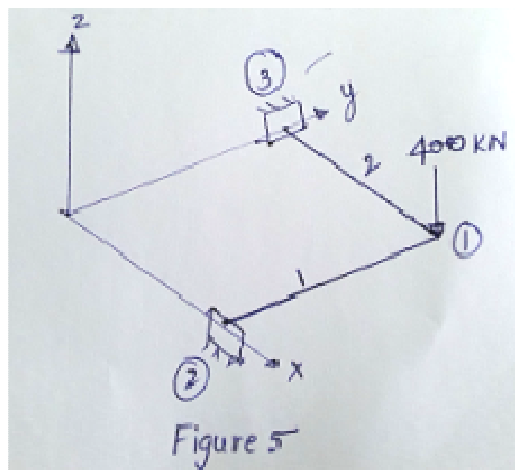
5. Analyse the frame shown in Figure 3 by stiffness matrix method 12



6. Analyse the pin-jointed frame of Figure 4 by stiffness method. Determine the force in member AC. All the members have the same cross-sectional area. 12



7. Consider the grid structure shown in Figure 5. The grid consists of two members (1 and 2). For all members take $E=19.99 \times 10^7 \text{ kN/m}^2$; $G=7.72 \times 10^7 \text{ kN/m}^2$, $I=4.99 \times 10^8 \text{ mm}^4$; $J=1.66 \times 10^8 \text{ mm}^4$. The lengths of member 1 and 2 are 4.5m and 4.5m. Find the elemental forces. Note that nodes 2 and 3 are fixed. 12



8. (a) What is the main purpose of providing a shear wall in a building? Explain. 6
 (b) Briefly explain the procedure for approximate analysis of shear walls. 6