

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)****I M.Tech. I Semester Regular Examinations, Jan/February, 2020****IC ENGINES AND COMBUSTION  
(Thermal Engineering)****Time: 3 Hours****Max Marks:60****Answer any FIVE questions  
All questions carry EQUAL marks**

1. Explain the reason for the change of expansion stroke of real engine cycle when compared to the actual engine cycle 12M
2. a) Explain the factors that effect the flame propagation period. 6M  
b) Define carburetion. Explain the defects of a simple carburetor. 6M
3. a) Explain the effect of light end and heavy end formation in SI engines fuel mixing. 6M  
b) Define GDI. Explain the advantages and disadvantages of GDI over conventional fuel injection. 6M
4. a) Explain various fuel injection systems used in diesel engines. 6M  
b) What is a pintle nozzle? Explain combustion chamber where it can be used. 6M
5. a) Explain variable geometry turbo charging with a neat sketch. 6M  
b) Explain the difference of knock in SI with respect to knock in CI. 6M
6. a) List the factors that effect engine efficiency and power. Discuss briefly. 6M  
b) A single cylinder engine running at 1800 rpm develops a torque of 8 N-m. The indicated power of the engine is 1.8 KW. Find the loss due to friction power as the percentage of brake power. 6M
7. a) Explain the formation of HC emissions in detail. 6M  
b) What is a SCR? Explain in detail with a neat sketch. 6M
8. a) List the advantages and disadvantages of biodiesels as an alternate source for transportation fuel. 6M  
b) List out the advantages of biogas as auto fuel. What is the calorific value octane rating and contents of biogas? 6M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)****I M.Tech. I Semester Regular Examinations, Jan/February, 2020****POWER ELECTRONIC 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 mathematical model of a DC series motor.   | 6M  |
|    | b) | Explain the block diagram and transfer functions of different machines.  | 6M  |
| 2. | a) | Explain the working of single phase semi converter used to feed supply for DC motors, with neat circuit diagram and waveforms.   | 6M  |
|    | b) | Explain the four quadrant characteristics of DC motor drive.   | 6M  |
| 3. |    | Draw and explain the power circuit of single phase semi converter feeding a separately excited dc motor. Explain the operation in both continuous and discontinuous armature current modes with suitable wave forms. | 12M |
| 4. | a) | Explain the steady state operation of a three phase controlled bridge converter with RLE Load and operating as a rectifier.  | 6M  |
|    | b) | Explain two quadrant three phase convertor controlled DC motor drive.  | 6M  |
| 5. | a) | Draw and explain the block schematic diagram of pulse controller of a three phase converter.   | 6M  |
|    | b) | Explain the flowchart for the simulation of a single-quadrant phase-controlled DC motor drive.   | 6M  |
| 6. | a) | Derive the expression for a gain of a closed loop current controller.  | 6M  |
|    | b) | Explain the following<br>(i). input to the chopper (ii) Rating of the chopper  | 6M  |
| 7. |    | Give a detailed steady state analysis of chopper controlled DC motor drive.  | 12M |
| 8. |    | Write short note on the following with necessary equations and block diagrams<br>(a). Modeling of Current controller<br>(b). Design of current controller<br>(c). Applications of choppers                           | 12M |

# AR19

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SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
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I M.Tech. I Semester Regular Examinations, Jan/February, 2020

## DIGITAL DESIGN THROUGH HDL (VLSI System Design)

Time: 3 Hours

Max Marks:60

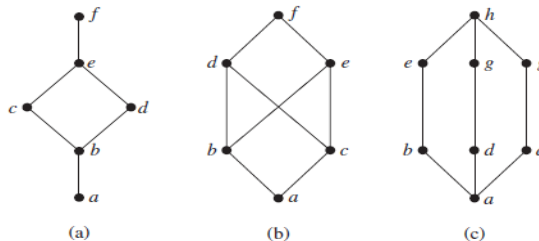
Answer any FIVE questions  
All questions carry EQUAL marks

- |    |    |  |     |
|----|----|--|-----|
| 1. | a) | Compare ASIC design flow and FPGA design flow.                               | 6M  |
|    | b) | Write about white space characters and identifiers with examples.            | 6M  |
| 2. | a) | Explain clocked RS flip-flop Verilog module and test bench.                  | 6M  |
|    | b) | Illustrate the module to demonstrate delays with gates.                      | 6M  |
| 3. | a) | Write a Verilog code for an 8-bit comparator and its test bench.             | 6M  |
|    | b) | Explain wand and wor types of nets with example.                             | 6M  |
| 4. |    | Write short notes on i) functional Bifurcation ii) Intra-assignment delays.  | 12M |
| 5. | a) | Write Verilog code using case statement for any one example.                 | 6M  |
|    | b) | Explain flowchart for the simulation flow.                                   | 6M  |
| 6. | a) | Write a Verilog HDL code for 3 to 8 Decoder.                                 | 6M  |
|    | b) | Explain specify Path Delay parameters, system tasks and functions.           | 6M  |
| 7. | a) | Write about access type and file type of datatypes in HDL programming.       | 6M  |
|    | b) | Explain the concept of conditional signal assignment statement with example. |     |
| 8. | a) | Write a HDL program for decade counter.                                      | 6M  |
|    | b) | Write short notes on configuration specification                             | 6M  |

Answer any FIVE questions

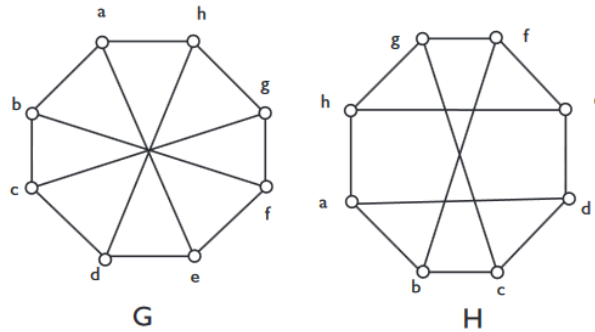
All questions carry EQUAL marks

1. a) State the converse, opposite, and contra positive of the conditional statement "If triangle I and triangle II are similar, then the corresponding sides of triangles I and II are proportional." Show that an implication and its contra positive are logically equivalent. 6 M
- b) Show that  $(\sim P \wedge (\sim Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R)$  is logically equivalent to R, without constructing truth table. 6 M
2. a) Translate the following argument from English to predicate logic by considering the universe of discourse as the set of all living things and using the predicate functions:  
 $P(x)$ : x is a plant;  $A(x)$ : x is an animal;  $H(x)$ : x has a heart; a: David's pet.  
*Every living thing is a plant or an animal.*  
*David's pet is alive and it is not a plant.*  
*All animals have hearts.*  
*Hence, David's pet has a heart.*  
 Prove or disprove the validity of the above argument. 6 M
- b) Define free and bounded variables. Determine the truth or falsity of following sentences. 6 M
  - i)  $\forall x (x^2 \geq x)$  if the domain consists of all real numbers.
  - ii)  $\forall x (x^2 \geq x)$  if the domain consists of all integers.
  - iii)  $\forall x (x^2 - 2 \geq 0)$  if the domain consists of all integers.
  - iv)  $\forall x \exists y (x^2 = y)$  if the domain consists of all integers.
3. a) What is an equivalence relation? Let R be the relation on the set of positive integers such that  $xRy$  if and only if "x is a multiple of y". Is R an equivalence relation? Justify your answer. 6 M
- b) Define lattice. Determine whether the posets represented by each of the Hasse diagrams in the following Figure are lattices. 6 M

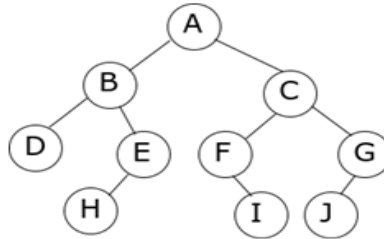


4. a) Construct an example for each of the following 6 M
  - i). Graph isomorphic to complete graph on 4 vertices, i.e.,  $K_4$
  - ii). Hamiltonian graph with 7 vertices and 7 edges
  - iii). Connected undirected graph with 5 vertices and 10 edges
  - iv). Connected, acyclic graph on 5 vertices

- b) Define graph isomorphism. Determine whether the graphs G and H given below are isomorphic. Justify your answer. 6 M



5. a) Explain the following properties with an example. 6 M  
 i) Irreflexive ii) Equivalence iii) Partial ordering.
- b) Define a binary tree. Determine the in order, pre order and post order traversal order of the nodes of the binary tree given below. 6 M



6. a) Solve the recurrence relation  $a_n - a_{n-1} = 2(n-1)$  for  $n \geq 1$  and  $a_0 = 2$  using generating functions. 6 M
- b) Solve the recurrence relation  $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$  for  $n \geq 3$  with the initial conditions  $a_0 = 0, a_1 = 1, a_2 = 10$ . 6 M
7. a) Define the following terms and give an example for each. 6 M  
 i) Kuratowski's theorem  
 ii) Complete bipartite graph  
 iii) Dual of a planar graph
- b) State handshaking theorem. Suppose that  $G$  is an undirected graph with 12 edges. Suppose that  $G$  has 6 vertices of degree 3 and the rest have degree less than 3. Determine the minimum number of vertices  $G$  can have. 6 M
8. a) Illustrate with an example to find minimal spanning tree using Prim's algorithm. 6 M
- b) Explain Hamilton path and circuit with an example. 6 M

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**ADVANCED STRUCTURAL ANALYSIS  
(Structural Engineering)**

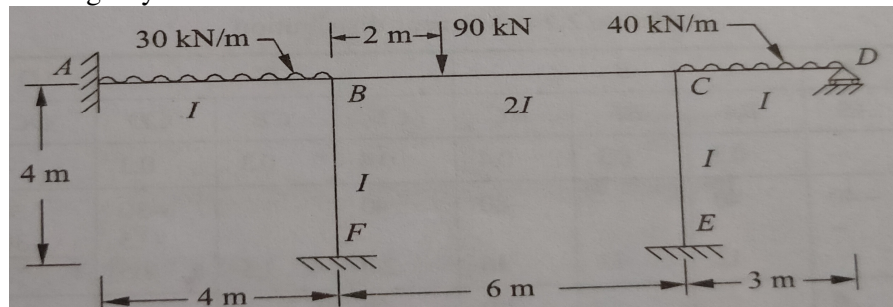
**Time: 3 Hours**

**Max Marks:60**

**Answer any FIVE questions  
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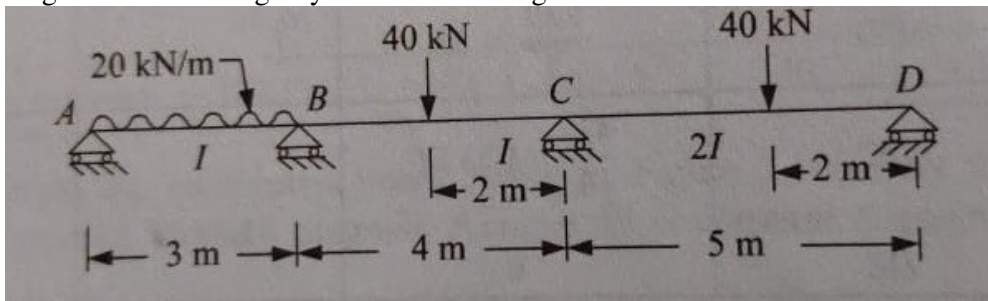
1. a) Explain the applications of displacement-based and force-based energy principles? 6 M  
b) Write the relations of equilibrium, compatibility and force displacement. 6 M

2. Analyse the frame by slope deflection method and draw bending moment diagram. Flexural Rigidity is same for all members



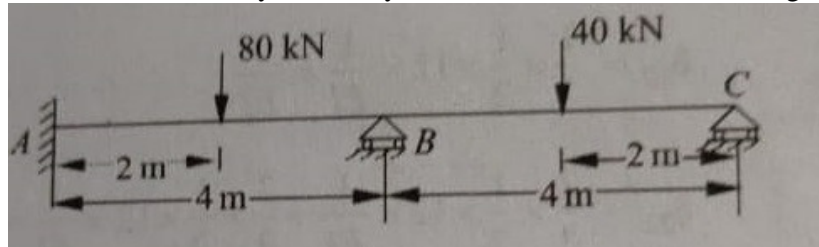
12 M

3. Analyse the continuous beam by moment distribution method and draw bending moment diagram. Flexural Rigidity is constant throughout.



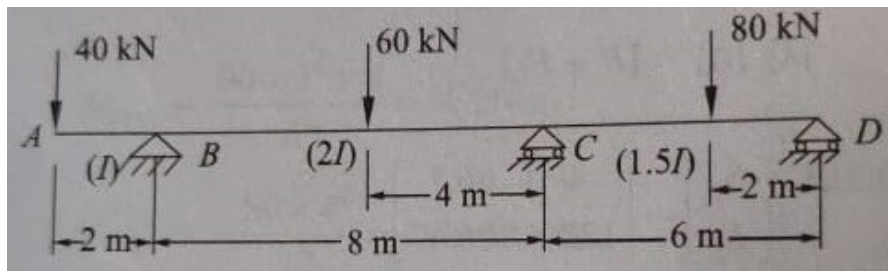
12 M

4. Analyse the continuous beam by flexibility method. Take  $EI$  constant throughout.



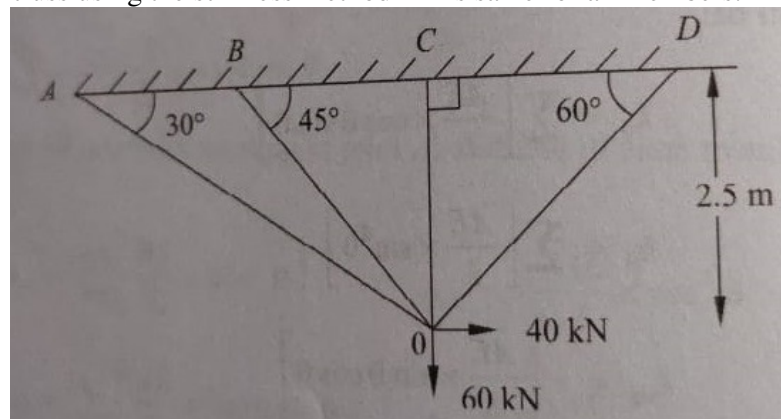
12 M

5. Analyse the continuous beam by stiffness matrix method



12 M

6. Analyse the truss using the stiffness method  $AE$  is same for all members.



12 M

7. Explain about Axial Displacement, Transverse Displacement, Bending or Flexural Displacement and Torsional or Twist Displacement.

12 M

8. Explain about the Force method and Displacement method with examples.

12 M