AR19

CODE: 19MTE1001 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech I Semester Regular & Supplementary Examinations, August-2021

IC ENGINES AND COMBUSTION
(Thermal Engineering)

Time: 3 Hours **Max Marks:60**

Answer any FIVE questions
All questions carry EQUAL marks

1. Give the classification of IC engines in detail

2. a) Define abnormal combustion. Explain the theories of abnormal combustion.
   b) Explain briefly the different operating conditions and their mixture requirement in SI engines.

3. a) Explain TBI and MPFI in detail with suitable diagrams
   b) Define combustion. Explain the combustion in an SI engine with a P-Θ diagram.

4. a) Explain various combustion chamber designs with neat sketches.
   b) Explain the importance of multiple sprays in CI engine. Name them.

5. a) Differentiate between super charging and turbo charging.
   b) Explain the factors that effect the delay period briefly.

6. a) Explain the method to determine the heat balance of an engine
   b) A large four-stroke cycle diesel engine runs at 2000 rpm. The engine has a displacement of 25 liters and a brake mean effective pressure of 0.6 MPa. It consumes 0.018 kg/s of fuel (calorific value = 42000 kJ/kg). Determine the brake power and brake thermal efficiency.

7. a) Explain the NOx- PM trade off in detail.
   b) Discuss the importance of emission standards and their influence in today's world.

8. a) Explain wankle engine with a neat sketch.
   b) Explain the role of hydrogen as an auto fuel in detail.

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CODE: 19MPE1001 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech I Semester Regular & Supplementary Examinations, August-2021

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 transfer function analysis of a separately excited DC motor.	6M
	b)	Describe the role state space analysis in machine modeling and analysis.	6M
2.	a)	Explain various speed control method for DC machines with applications	6M
	b)	A separately-excited DC motor with the following parameters: R_a = 0.5 Ω, L_a = 0.003 H and K_b = 0.8 V/rad/sec is driving a load of J = 0.0167 kg-m^2, B_1 = 0.01 N-m/rad/sec with a load torque of 100 N-m. Its armature is connected to a DC supply voltage of 220 V and is given the rated field current. Determine the speed of the motor.	6M
3.	a)	Explain the steady state operation of a single phase fully controlled bridge converter with RL Load.	8M
	b)	Briefly explain the effect of source impedance on the operation of a single-phase controlled rectifies in steady state.	4M
4.	a)	Three-phase converters are faster in response than single-phase converters. Compare their speed of response.	6M
	b)	A three phase half controlled bridge rectifier fed from a 300V, 60Hz supply provides a variable voltage supply to the armature of a separately excited dc motor. The specifications of the motor are R_a=0.02Ω, L_a=0.002H, the constant of the motor = 2.25 vs/rad, rated current is 500A. Determine the firing angle α so that the motor runs at a rated speed of 1500 rpm.	6M
5.	a)	What is a current controller? What is its need in electric drives? What are different current controllers available? Discuss the design of current controller for dc motor drives.	6M
	b)	Discuss the need for speed controller in electric drives? List different speed controllers available and compare them.	6M
6.	a)	Explain the four quadrant operation of Dual converters.	8M
	b)	Explain the role of current reference generator and current controller in the design of controller for converters.	4M
7.	a)	What are choppers? What are their applications? Draw and explain the schematic diagram of a four-quadrant chopper.	6M
	b)	Draw and explain the block diagram of speed controlled DC motor chopper drive.	6M
8.		Explain the following (a). Pulse Width Modulated Current Controller (b). Hysteresis current controller	12M

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CODE: 19MCS1001 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech I Semester Regular & Supplementary Examinations, August-2021
MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
(Computer Science and Engineering)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions
All questions carry EQUAL marks

1. a) Define tautology. Show that ((P V Q) → (~Q → P)) is a tautology by constructing a truth table. 6 M

   b) Obtain the principle DNF and the principle CNF of the following propositional formula (P → (Q → R)) → ((P → Q) → R). 6 M

2. a) Let *P(x)*, *Q(x)*, *R(x)*, and *S(x)* be the statements "*x* is a hummingbird," "*x* is large," "*x* lives on honey," and "*x* is richly colored," respectively. Assuming that the domain consists of all birds, express the following argument using quantifiers and *P(x)*, *Q(x)*, *R(x)*, and *S(x)*. Also verify the validity of the argument. 6 M

   "All hummingbirds are richly colored." "No large birds live on honey."
   "Birds that do not live on honey are dull in color." "Therefore, hummingbirds are small."

   b) What is proof by contradiction? Consider the following proof of the statement "$\sqrt{4}$ is irrational. " 6 M

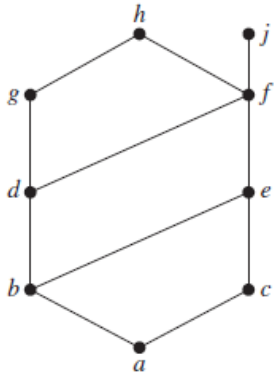
   Proof: Assume for the sake of contradiction that $\sqrt{4}$ is rational. Then there must exist integers p and q ($\neq 0$), where $p / q = \sqrt{4}$, and where p and q have no common factors other than 1 and -1.

   Starting with $p / q = \sqrt{4}$ and squaring both sides tells us that $p^2 / q^2 = 4$. We can then cross-multiply by q2 to see that $p^2 = 4q^2$. Since q^2 is an integer and $p^2 = 4q^2$, we see that p^2 is a multiple of four, and therefore that p is a multiple of four. This tells us that p = 4n for some integer n. Since $4q^2 =$ p2 and p = 4n, we can use some algebraic substitutions to show that $4q^2 = (4n)^2 = 16n^2$, so $q^2 = 4n^2$. Since n^2 is an integer and $q^2 = 4n^2$, we see that q^2 is a multiple of four, so q is a multiple of four as well. But since both p and q are multiples of four, we see that p and q share a common divisor other than ±1, contradicting our initial assumption. We have reached a contradiction, so our assumption must have been incorrect. Thus $\sqrt{4}$ is irrational.

   This proof has to be wrong, because $\sqrt{4} = 2 = 2/1$, so it is indeed rational! What error does this proof make that lets it conclude $\sqrt{4}$ is irrational? Be specific with your answer.

3. a) What is an equivalence relation? Let X = {1, 2, 3, 4, 5, 6, 7} and R={(x,y) | x-y is divisible by 3}. Show that R is an equivalence relation. 6 M

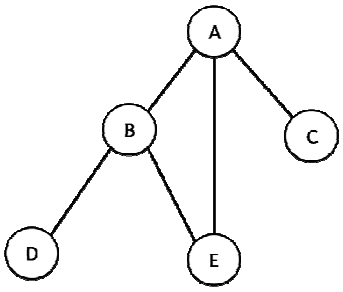
   b) Define poset. Find the lower and upper bounds of the subsets {a, b, c}, {j, h}, and {a, c, d, f } in the poset with the Hasse diagram shown in the Figure given below. 6 M



4. a) Define the following terms and give an example for each. 6 M

i). Complete bipartite graph ii). Euler graph iii).Hamiltonian graph

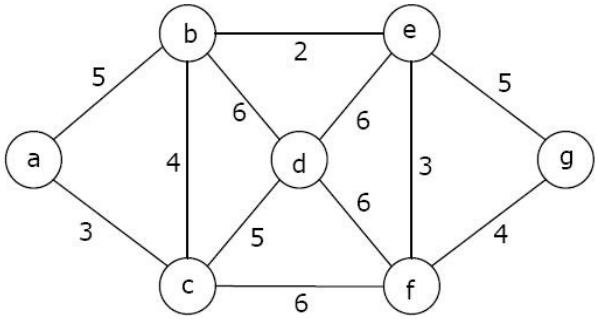
b) What are different ways of representing graphs? Represent the following graph using two different representations. 6 M



How would you determine whether or not an adjacency matrix represents a complete graph? Justify your answer.

5. a) Explain graph isomorphism and verify following graphs are isomorphic or not? 6 M

b) Define a Minimum Spanning Tree (MST). Apply Prim's algorithm to find an MST of the following graph G. 6 M



Let H be the graph obtained from G by incereasing the weight of each edge of G by 5. Then determine an MST of the graph H.

6. a) Give a recurrence for finding the n^{th} Fibonacci number. Solve the recurrence using generating functions and find an explicit formula for the n^{th} Fibonacci number. 6 M

b) Solve the recurrence relation: $a_n - 5a_{n-1} + 6a_{n-2} = 0$ for $n \geq 2$ with the initial conditions 6 M

$a_0 = 1$, $a_1 = -2$.

7. a) Define the following terms and give an example for each. 6 M
i) Planar graph ii) Euler`s theorem iii) Chromatic number

b) What is a connected component? How would you determine whether a graph is connected or not by applying DFS algorithm? Explain with an example. 6 M

8. a) Define the functions: one-to-one, onto and bijection. List out all possible functions from X = {a,b,c} to Y = {0,1} and indicate in each case whether the function is one-to-one, is onto, and is a bijection. 6 M

b) Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises $P \vee Q$, $Q \rightarrow R$, $P \rightarrow M$ and $\sim M$. 6 M

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CODE: 19MVL1001 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech I Semester Regular & Supplementary Examinations, August-2021

DIGITAL DESIGN THROUGH HDL
(VLSI System Design)

Time: 3 Hours **Max Marks:60**

Answer any FIVE questions
All questions carry EQUAL marks

1.	a)	Explain the major activities in ASIC design.	6M
	b)	Explain with examples about: i) Display tasks ii) Monitor tasks.	6M
2.	a)	Write a Verilog code for 2-4 Decoder.	6M
	b)	Illustrate the test bench module for net delay.	6M
3.	a)	Write a Verilog code and test bench for full-adder.	6M
	b)	Explain about primitive gates.	6M
4.		Write the syntax for the following construct and give one example for each relevant to behavioral Verilog HDL modeling i) initial construct ii) always construct and iii)wait construct.	12M
5.	a)	Explain the concept of multiple always blocks.	6M
	b)	Write a Verilog code for 2-to-4 decoder using case statement.	6M
6.	a)	Illustrate the functioning of data types of VHDL.	6M
	b)	Explain about module paths of path delays.	6M
7.	a)	Explain different types of operators in HDL programming.	6M
	b)	Write a HDL program using If statement.	6M
8.	a)	write a HDL program for 3-bit up-down counter.	6M
	b)	Write short notes on package body and design file.	6M

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CODE: 19MSE1001 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech I Semester Regular & Supplementary Examinations, August-2021

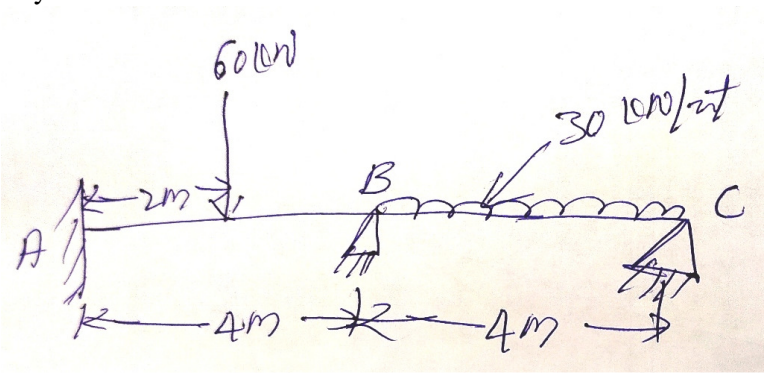
ADVANCED STRUCTURAL ANALYSIS
(Structural Engineering)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions
All questions carry EQUAL marks

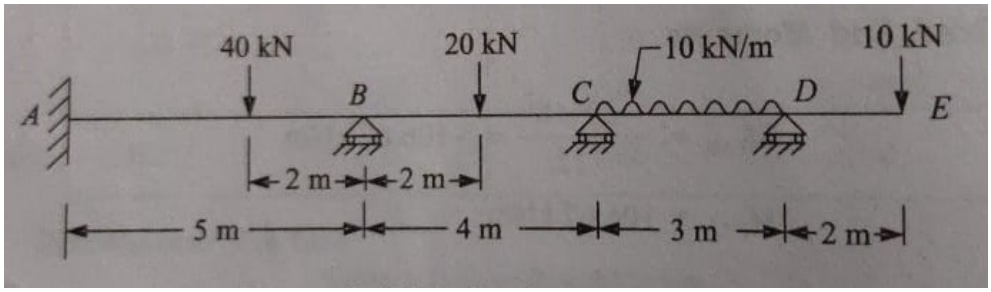
1. a) What is the Difference between kinematic determinacy and Indeterminacy? Explain with Examples. 6 M
   b) Explain the Applications of principle of virtual work? 6 M

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



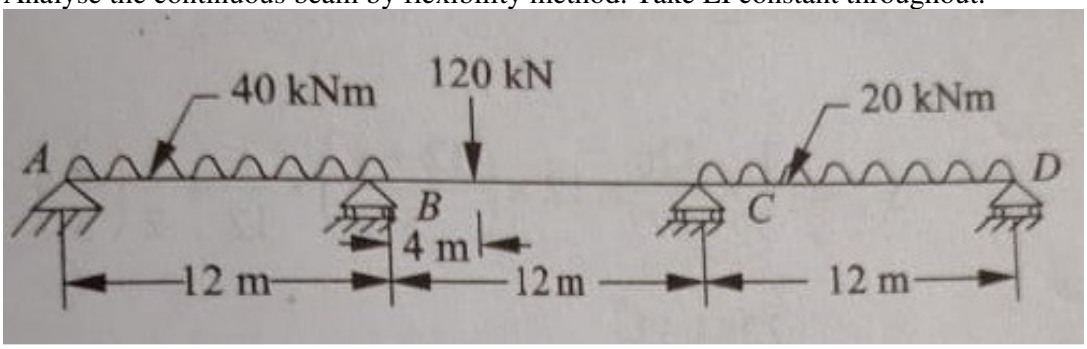
12 M

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

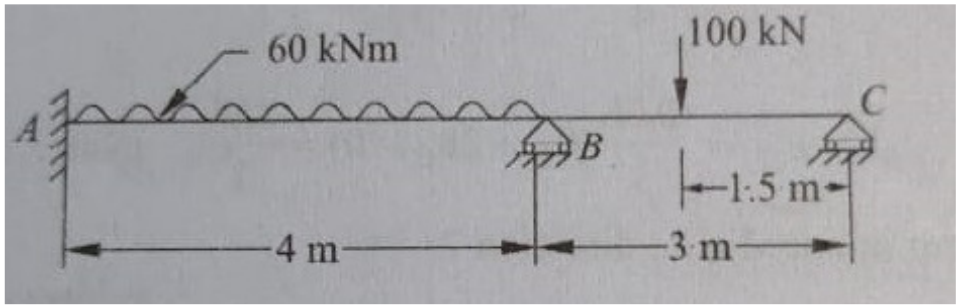


12 M

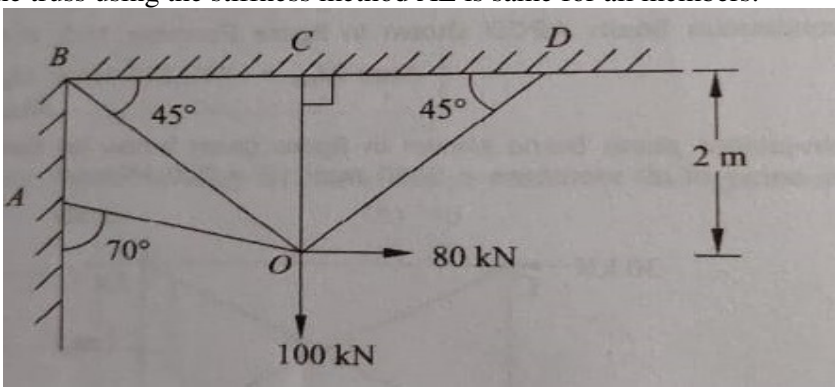
4. Analyse the continuous beam by flexibility method. Take EI constant throughout. 12 M



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. a) Explain the different approaches to matrix method. 6M
   b) Explain the general coordinate system with example. 6M

8. a) Explain the relationship between flexibility and stiffness matrices. 6M
   b) Flexibility and stiffness matrices are inverse of each other. Justify 6M