AR20

CODE: 20CAT303 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October-2023

DESIGN ANALYSIS OF ALGORITHMS

CSE (AIML)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Discuss various method of evaluating time complexity of an algorithm by illustrating with examples.	5	1	3
	b)	What are the criteria an algorithm must satisfy? Also discuss various areas need to study and understand for developing an algorithm.	5	1	2
		(OR)			
2.	a)	Explain the various notations used in algorithm design.	5	1	2
	b)	Explain the necessary steps for analyzing the efficiency of recursive algorithms.	5	1	2
		UNIT-II			
3.	a)	Explain Quick Sort algorithm to sort list of elements using Divide and Conquer technique.	5	2	2
	b)	Elaborate the algorithm for binary search with example.	5	2	4
		(OR)			
4.	a)	Explain algorithm for Defective chess board using Divide and Conquer technique and analyse its complexity.	5	2	4
	b)	Distinguish between quick sort and merge sort and arrange the following numbers in sorted order using merge sort. 18, 29, 68, 32, 43, 37, 87, 24, 47, 50.	5	2	4
		UNIT-III			
5.	a)	Write a function to compute lengths of shortest paths for a directed graph using Single source shortest paths and explain with example.	5	3	3
	b)	Explain the control abstraction of Greedy method.	5	3	2
		(OR)			
6.	a)	Define minimum cost spanning trees. Give two different types of finding minimum cost spanning tree for a given graph with an example	5	3	2
	b)	Discuss the use of Greedy method in solving Knapsack problem.	5	3	2
		UNIT-IV			
7.	a)	Briefly argue how principle of optimality holds for 0/1 knapsack problem. Generate the sets S_i, $0 \le i \le 4$ where $(w_1,w_2,w_3,w_4)= (10,15,6,9)$ and $(p_1, p_2,p_3,p_4)= (2,5,8,9)$. State the purging rule used. If the capacity is M=25, What is the optimal solution?	5	4	3
	b)	Write short notes on Optimal Binary Search Trees.	5	4	2
		(OR)			
8.	a)	How do you solve Travelling sales man problem using dynamic programming? Explain with an example.	5	4	3
	b)	Explain about Optimal Binary Search Trees.	5	4	2

UNIT-V

9.	a)	Discuss various constraints involved in many of the problems using Backtracking.	5	5	2
	b)	Draw the state space tree for mColoring when n=4 and m=3.	5	5	3
		(OR)			
10.	a)	Define sum of subsets. Let m=31 and w=(7,11,13,24) draw a portions of state space tree using algorithm sum of subsets. Clearly show the solutions obtains by a state space tree.	5	5	3
	b)	Draw and explain the portion of the state space tree for 4-queens problem that is generated during backtracking.	5	5	3

UNIT-VI

11.	a)	Discuss in detail about Nondeterministic algorithms	5	6	2
	b)	Prove that the 3-SAT Problem is NP-Complete.	5	6	2
		(OR)			
12.	a)	Describe about NP-Hard and NP-Complete problems.	5	6	2
	b)	Briefly explain the Cook's theorem.	5	6	2

AR20

CODE: 20CET309 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular / Supplementary Examinations, October, 2023

TRANSPORTATION ENGINEERING

(CIVIL ENGINEERING)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain about Road Network Patterns.?	5M	CO1	Knowledge
	b)	Discuss Engineering Surveys for Highways?	5M	CO1	Understand
		(OR)			
2.	a)	Classify different types of Roads in india	5M	CO1	Understand
	b)	Explain about Drawings and Reports in Highway Alignment	5M	CO1	Knowledge
		UNIT-II			
3.	a)	Explain Various types of Sight Distances	7M	CO1	Knowledge
	b)	Define Superelevation with equation	3M	CO1	Knowledge
		(OR)			
4.	a)	For a highway with design speed of 120kmph, determine the safe OSD (assume acceleration as 0.50 m/s2 , and reaction time =2.0s)	6 M	CO2	Evaluate
	b)	Explain in detail about stopping sight distance (SSD) and derive an equation for finding the SSD	4 M	CO2	Knowledge & Create
		UNIT-III			
5.	a)	Explain about Flexible Pavements ?	6M	CO1	Knowledge
	b)	Compare the Properties of Tar and Bitumen	4 M	CO2	Analyze
		(OR)			
6.		Illustrate in detail about Modified Hubbard Field method of mix design	10M	CO3	analyze
		UNIT-IV			
7.		Explain the Procedure of Construction of Roads with neat Cross Section diagram	10M	CO4	analyze
		(OR)			
8.	a)	Explain about the concept of Highway drainage ?	6M	CO4	analyze
	b)	Summarize about Rigid Pavements	4 M	CO4	Understand
		UNIT-V			
9.	a)	Explain about Elements of Traffic Engineering	6M	CO5	analyze
	b)	Explain about Origin and destination Studies	4M	CO5	analyze
		(OR)			
10.	a)	Explain Characteristics of Vehicle & Road User	6M	CO5	analyze
	b)	Explain any one method of Traffic Volume Studies	4M	CO5	Understand
		UNIT-VI			
11.	a)	Explain the concept of Highway capacity and level of service (LOS)	6M	CO6	analyze
	b)	Explain the necessity of Parking Studies	4M	CO6	Understand
		(OR)			
12.	a)	Explain the limitations of PCU	5M	CO6	Knowledge
	b)	Explain the measures to be taken to control the Accidents	5M	CO6	Knowledge

AR20

CODE: 20CST309 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October-2023

Software Engineering

(COMPUTER SCIENCE AND ENGINEERING)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	How can you differentiate between User and System Requirements? Explain in detail.	6	CO1	K3
	b)	Write about the following. (i). Software myths (ii). Requirements Validation	4	CO1	K2
		(OR)			
2.	a)	Explain about Functional and Non-Functional Requirements in detail.	6	CO1	K1
	b)	Write about Requirements Elicitation and Analysis.	4	CO1	K2
		UNIT-II			
3.	a)	Explain about Incremental Process Model with suitable examples.	5	CO2	K2
	b)	Write about the Unified Process Model with suitable examples.	5	CO2	K2
		(OR)			
4.	a)	Explain about Evolutionary Process Model with suitable examples.	5	CO2	K2
	b)	Explain in detail about the Agile Process Model (Scrum).	5	CO2	K1
		UNIT-III			
5.	a)	Explain different elements of the design model	5	CO3	K1
	b)	What is architecture? Explain the importance of architecture in Software Engineering.	5	CO3	K2
		(OR)			
6.	a)	Explain how to apply user interface design steps with suitable examples.	5	CO3	K3
	b)	List and explain the golden rules of user interface design	5	CO3	K2
		UNIT-IV			
7.	a)	What is Unit Testing? Explain the unit testing considerations and procedures with suitable examples.	5	CO4	K2
	b)	What is Integration Testing? Explain Top-Down and Bottom-Up Integration Testing.	5	CO4	K2
		(OR)			
8.	a)	Differentiate between White Box and Black Box Testing	5	CO4	K2
	b)	Explain boundary value analysis with suitable examples.	5	CO4	K2
		UNIT-V			
9.	a)	What is a Metric? Write about the different Metrics for the Analysis Models.	5	CO5	K3
	b)	Explain about the Architectural Design Metrics.	5	CO5	K2
		(OR)			
10.	a)	What is the COCOMO-I model? And explain in detail	7	CO5	K2
	b)	What is Software Quality and Why it is important?	3	CO5	K2
		UNIT-VI			
11.	a)	What is Software Maintenance and why it is important?	4	CO6	K2
	b)	Explain about the Quick Fix Maintenance Process Model in detail.	6	CO6	K2
		(OR)			
12.	a)	What is Maintenance Cost and Why it is important?	4	CO6	K3
	b)	Explain about IEEE 1219 Model.	6	CO6	K2

AR20

CODE: 20ECT309 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October-2023

LINEAR AND DIGITAL IC APPLICATIONS

(ELECTRONICS AND COMMUNICATION ENGINEERING)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain why open-loop configuration is not used in linear applications	5M	CO1	L2
	b)	Draw the circuit of practical Active differentiator and explain its operation.	5M	CO1	L2
		(OR)			
2.	a)	Draw the block diagram of OP-AMP and explain.	5M	CO1	L1
	b)	Draw the circuit diagram of an OP-AMP integrator and derive its output equation.	5M	CO1	L1
		UNIT-II			
3.	a)	Explain the operation of Schmitt trigger circuit with input and output waveforms.	5M	CO2	L1
	b)	Draw the circuit of Monostable multivibrator using 555 timer and explain its operation.	5M	CO	L2
		(OR)			
4.	a)	Draw the circuit diagram of a practical log amplifier and obtain an expression for its output voltage?	5M	CO2	L2
	b)	Draw the circuit of Astable multivibrator using 555 timer and explain its operations.	5M	CO2	L1
		UNIT-III			
5.	a)	Demonstrate the circuit diagram of first order high pass filter and its frequency response. Derive the expression for output voltage.	5M	CO3	L2
	b)	With neat block diagram, explain successive approximation type A/D converter in detail	5M	CO3	L1
		(OR)			
6.	a)	Explain the operation of an all pass filter using a neat schematic.	5M	CO3	L1
	b)	In an inverted R-2R ladder type Digital to Analog Converter R=10 kΩ, VREF = +20Volts. Find the current in each 20 kΩ resistor and the maximum current passing into the feedback resistor of the op-amp.	5M	CO3	L3
		UNIT-IV			
7.	a)	Draw a neat diagram of TTL open collector NAND gate and explain its operation.	5M	CO4	L1
	b)	How the CMOS family is advantage over TTL family.	5M	CO4	L2
		(OR)			
8.	a)	Draw the circuit for CMOS NOR gate and explain its function to realize the logic truth table.	5M	CO4	L1
	b)	Explain the basic ECL OR/NOR gate with neat circuit diagram.	5M	CO4	L1

UNIT-V

9.	a)	Illustrate the internal logic diagram of Priority 8 to 3 encoder using IC 74X148.	5M	CO5	L3
	b)	Explain the carry look-ahead adder using IC 74X182 with neat diagrams.	5M	CO5	L1
		(OR)			
10.	a)	How to build the logic function $F = \Sigma_{X,Y,Z}(2,4,7)$ using 4-to-1 multiplexer and additional gates?	5M	CO5	L3
	b)	Design the logic function $F = \Sigma_{W,X,Y}(1,3,5,6)$ and $G = \Sigma_{W,X,Y}(2,3,4,7)$ using one or more 74x138 binary decoders and NAND gates.	5M	CO5	L2

UNIT-VI

11.	a)	Explain the Universal shift register using IC 74LS194.	5M	CO6	L1
	b)	Design a 4-bit binary synchronous counter using 74X163 ICs and explain its working with neat timing waveforms.	5M	CO6	L3
		(OR)			
12.	a)	Design a Mod-6 counter using T Flip-Flop.	5M	CO6	L2
	b)	Design excess-3 counter using IC 74x163.	5M	CO6	L1

AR20

CODE: 20EET309 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

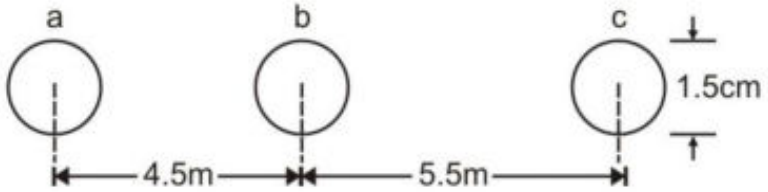
III B.Tech I Semester Regular/Supplementary Examinations, October-2023

ELECTRIC POWER TRANSMISSION

(ELECTRICAL AND ELECRONICS ENGINEERING)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Deduce an expression for line to neutral capacitance for a 3-phase overhead transmission line when the conductors are symmetrically placed A three-phase, three-wire, 132 kV, 50 Hz overhead line conductor is placed in horizontal plane as shown in the figure. The conductor diameter is 1.5 cm. If the length of the line is 120 km, calculate (i) capacitance per phase per meter, (ii) charging current per phase.	5M	1	2
	b)		5M	1	3
		(OR)			
2.	a)	What do you understand transposition in overhead lines? Explain why transposition is done in such a line.	5M	1	2
	b)	Find the inductance per km per phase of a 3-phase overhead transmission line using 2 cm diameter conductor when these are placed at the corners of an equilateral triangle of side 4 metres	5M	1	2
		UNIT-II			
3.	a)	Derive the expression for regulation and transmission efficiency of a medium transmission line using nominal T-method	5M	2	2
	b)	A single phase overhead transmission line delivers 1100 kW at 33 kV at 0·8 p.f. lagging. The total resistance and inductive reactance of the line are 10 Ω and 15 Ω respectively. Determine (i) sending end voltage (ii) sending end power factor and (iii) transmission efficiency.	5M	2	3
		(OR)			
4.	a)	Explain how transmission lines are classified into short, medium and long lines and explain their characteristics.	5M	2	2
	b)	A 3-phase, 50Hz, 150 km line has a resistance, inductive reactance and capacitive shunt admittance of 0·1 Ω, 0·5 Ω and 3×10^{-6} semens/km/ph. If the line delivers 50 MW at 110 kV and 0·8 p.f. lagging, determine the sending end voltage and current. Assume a nominal π circuit for the line.	5M	2	3
		UNIT-III			
5.		Starting from first principles derive an expression for the sending end voltage and current of a long transmission line in terms of the line parameters and receiving end voltage and current.	10M	3	2

(OR)

6.	a)	What do you understand by generalized circuit constants of a transmission line? What is their importance?	5M	3	2
	b)	A three-phase, 50 Hz and 200 km long line whose resistance per km is 0.02Ω and inductance per km is 0.6 mH and capacitance per km is 0.03μF. Determine the network constants of a long transmission line while neglecting the conductance of the line.	5M	3	2

UNIT-IV

7.	a)	Derive reflection and refraction coefficient of transmission line when terminated through a resistance.	5M	4	2
	b)	Explain Skin and Ferranti effects.	5M	4	2

(OR)

8.	a)	What is a travelling wave? Explain the development of such a wave along an overhead transmission line	5M	4	2
	b)	A 220 kV surge travels on a transmission line of 410 ohms surge impedance and reaches a junction where two branch lines of surge impedances of 600 ohms and 350 ohms respectively are connected with the transmission line. Find the surge voltage and current transmitted into each branch line. Also find the reflected voltage and current.	5M	4	3

UNIT-V

9.		A three phase over head transmission line is suspended by a suspension type insulator which consists of three units. The potential across top unit and middle unit are 8 kV and 12 kV respectively. Calculate (i) The ratio of capacitance between pin and earth to the self capacitance of the each unit (ii) line voltage and (iii) string efficiency	10M	5	3

(OR)

10.		Show that for the same dimensions of a cable with an intersheath can withstand a working voltage of 33% higher than a non-intersheath cable. Assume same homogeneous dielectric and most economical designs for both cables.	10M	5	3

UNIT-VI

11.	a)	What do you mean by corona? Discuss the factors that affect corona loss.	5M	6	2
	b)	Define string efficiency. Explain any one method of improving string efficiency.	5M	6	2

(OR)

12.	a)	Explain the importance of conductor spacing and ground clearance of overhead transmission lines	5M	6	2
	b)	An overhead line consists of 7 strands of copper, having a cross sectional area of 2.2 cm^2, weight of conductor =1.4kg/m, ultimate strength =8000kg/cm^2, wind pressure =40 kg/m^2 of projected area. Calculate the vertical sag of the time for a span of 300 m, assuming a factor of safety of 3.	5M	6	3

AR20

CODE: 20ITT302 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October-2023

Theory of Computation

(INFORMATION TECHNOLOGY)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Define Deterministic and Non-deterministic finite automaton	5	CO-1	K6
	b)	Design an NFA with ∑ = {0, 1} accepts all string in which the third symbol from the right end is always 0.	5	CO-1	K6
		(OR)			
2.	a)	Convert the given NFA to equivalent DFA.	5	CO-2	K2

States/input	0	1
->q0	q0	q1
q1	{q1,q2}	q1
*q2	q2	{q0,q1}

	b)	Construct a Moore machine that determines whether an input string contains an even or odd number of 1's. The machine should give 1 as output if an even number of 1's are in the string and 0 otherwise.	5	CO-2	K3
		UNIT-II			
3.	a)	Write the regular expression for the language L over ∑ = {0, 1} such that all the strings i) do not contain the substring 01. ii) Should have at least one 0 and at least one 1.	5	CO-2	K2
	b)	Prove that the language L = $\{a^{2n} b^{3n} a^n \mid n \geq 0\}$ is not regular.	5	CO-2	K5
		(OR)			
4.	a)	Write the regular expression for the language L over ∑ = {a, b} such that all the strings i) contains the substring ab. ii) should have at least one a and at least two b's	5	CO-2	K2
	b)	Construct a Regular expression corresponding to the following finite automata.	5	CO-2	K3

States/input	a	b
->A	B	C
B	C	B
*C	C	C

		UNIT-III			
5.		Consider the CFG with {S,A,B) as the non-terminal alphabet, {0,1) as the terminal alphabet, S as the start symbol and the following set of production rules S → A1B A → 0A / ∈ B → 0B / 1B / ∈ For the string w = 00101, find the Leftmost derivation, Rightmost derivation, and Parse Tree.	10	CO-3	K5

(OR)

6.	a)	Define Context Free Grammar. State and Explain the closure properties of CFG.	5	CO-3	K2
	b)	Consider the CFG with {S,A,B) as the non-terminal alphabet, {a,b, ε) as the terminal alphabet, S as the start symbol and the following set of production rules $S \rightarrow ASA \mid aB \mid b$ $A \rightarrow B$ $B \rightarrow b \mid \in$ Convert the given grammar into CNF	5	CO-3	K2

UNIT-IV

7.	a)	Describe the components of Push Down Automata	5	CO-3	K3
	b)	Construct a PDA from the following CFG. G = ({S, X}, {a, b}, P, S) where the productions are given below. $S \rightarrow XS \mid \in$ $A \rightarrow aXb \mid Ab \mid ab$	5	CO-3	K5

(OR)

8.	a)	Design a PDA for accepting a language $\{a^n b^{2n} \mid n>=1\}$.	5	CO-3	K6
	b)	Is a push-down automaton with two stacks equivalent to a turning machine? Justify your answer with proper explanation.	5	CO-3	K5

UNIT-V

9.	a)	Construct Turing machine for $L = \{a^n b^n / n>=1 \}$	5	CO-4	K3
	b)	Explain types of turing machine.	5	CO-4	K2

(OR)

10.	a)	Describe the closure properties of recursive and recursively enumerable langauges.	5	CO-4	K2
	b)	What is the Turing test and why is it important?	5	CO-4	K1

UNIT-VI

11.	a)	Explain Context Sensitive languages and Non Recursive Enumerable languages	5	CO-5	K2
	b)	Explain the Post Correspondence Problem with example.	5	CO-5	K3

(OR)

12.	a)	Discuss about Undecidable problems with Regular Expressions	5	CO-5	K3
	b)	Explain the class P and NP.	5	CO-5	K2

CODE: 20MET309 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October-2023

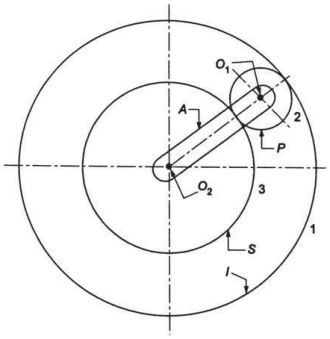
KINEMATICS & DYNAMICS OF MACHINERY

(MECHANICAL ENGINEERING)

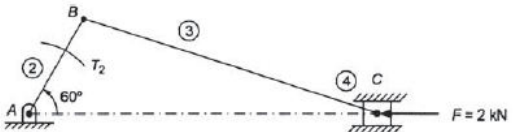
Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.		What do you understand by inversion of a mechanism? Explain various inversions of a four-bar chain with applications	10	1	2
		(OR)			
2.	a)	Discuss various types of constrained motions.	4	1	2
	b)	How do you classify Kinematic pairs? Explain each kinematic pair with an example?	6	1	2
		UNIT-II			
3.		In a Four bar mechanism ABCD. AD is fixed and is 150 mm long. The crank AB is 40mm long and rotates at 120 rpm clockwise, while the link CD=80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60^0.	10	2	4
		(OR)			
4.		In a slider-crank mechanism, the crank is 480 mm long and rotates uniformly at 20 rad/S in the counter clockwise direction. The length of the connecting rod is 1.6 m. When the crank turns 60^0 from IDC, determine (i) The velocity of the slider (ii)The angular velocity of the connecting rod.	10	2	4
		UNIT-III			
5.		The pressure angle of two gears in mesh is 20° and have a module of 10 mm. The number of teeth on pinion are 24 and on gear 60. The addendum of pinion and gear is same and equal to one module. Determine (a) the number of pairs of teeth in contact, (b) the angle of action of pinion and gear, and (c) the ratio of sliding to rolling velocity at the beginning of contact, at pitch point and at the end of contact.	10	3	3
		(OR)			
6.		An epicyclic gear train consists of three gears 1, 2 and 3 as shown in Fig. The internal gear 1 has 72 teeth and gear 3 has 32 teeth. The gear 2 meshes with both gear 1 and gear 3 and is carried on an arm A which rotates about the centre O_2 at 20 rpm. If the gear 1 is fixed, determine the speed of gears 2 and 3.	10	3	3



		UNIT-IV			
7.		In the slider crank mechanism shown in **Fig**. the value of force applied to slider is 2 kN. The dimensions of the various links are: AB = 80 mm, BC = 240 mm, θ = 60° Determine the forces on various links and the driving torque T_2.	10	4	3



(OR)

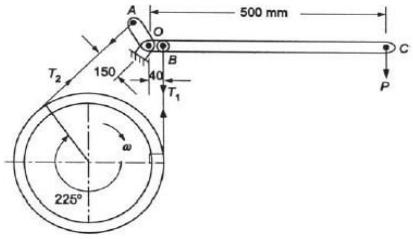
8.	The turning moment diagram for a multi cylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows : + 52, – 124, + 92, – 140, + 85, – 72 and + 107 mm^2 , when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessary mass of the flywheel of radius 0.5 m.	10	4	3

UNIT-V

9.	The arms of a Porter governor are each 200 mm long. The weight of each ball is 40 N and that of the sleeve is 200 N. The radius of rotation of the balls is 125 mm when the sleeve begins to rise and reaches a value of 150 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent to 20 N of load at the sleeve, determine how the speed range is modified.	10	5	3

(OR)

10.	A differential band brake shown in Fig. has an angle of contact of 225°. The band has a lining whose coefficient of frictions is 0.3 and the drum diameter is 400 mm. The brake is to sustain a torque of 375 Nm. Find (a) the necessary force for the clockwise and counter-clockwise rotation of the drum and (b) the value of OA for the brake to be self-locking, when the drum rotates clockwise.	10	5	3



UNIT-VI

11.	A ship is propelled by a turbine rotor having a mass of 6 tonnes and a speed of 2400 r.p.m. The rotor has a radius of gyration of 0.45 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic effects in the following conditions: 1. The ship sails at a speed of 33.48 km/h and steers to the left in a curve having 60 m radius. 2. The ship pitches 7.5 degrees above and 7.5 degrees below the normal position and the bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 18 seconds. 3. The ship rolls and at a certain instant it has an angular velocity of 0.035 rad/s counter clockwise when viewed from the stern. Determine also the maximum angular acceleration during pitching.	10	6	3

(OR)

12.	A motor car negotiates a curve of 40 m radius at a speed of 60 km/h. Determine the magnitudes of the centrifugal and gyroscopic couples acting on the motor car and state the effect of each of these on the road reactions on the wheels. Assume the following: (a) Each road wheel has a moment of inertia of 4 $kg.m^2$ and an effective wheel radius of 0.5 m. (b) The rotating parts of the engine and transmission are equivalent to a flywheel of mass 80 kg with a radius of gyration of 0.1 m. The engine turns in a clockwise direction when viewed from the front. (c) The back axle ratio is 4:1 and the drive through the gear box is direct. (d) The car weighs 10 kN and has its centre of gravity at 0.6 m above the road level. The car takes a right hand turn.	10	6	3

AR16

CODE: 16CE3014 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October, 2023

Transportation Engineering-I

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Compare various road development plans?	7M
	b)	What are the objectives of highway planning?	7M
		(OR)	
2.	a)	Write about various road patterns?	7M
	b)	Give list of reports to be submitted for highway alignment. Explain.	7M

UNIT-II

3.	a)	What are the design controls and criteria of geometric deign?	7M
	b)	Calculate the safe stopping distance for design speed of 50kmph for two-way traffic on a two lane road. Assume coefficient of friction as 0.35 and reaction time of driver as 2.5seconds.	7M
		(OR)	
4.	a)	Write about overtaking sight distance.	7M
	b)	Calculate the extra widening required for a pavement of width 7m on a horizontal curve of radius 250m if the longest wheel base of vehicle expected on the road is 7m, design speed 80kmph.	7M

UNIT-III

5.	a)	Write about aggregate crushing test.	7M
	b)	Compare various abrasion tests.	7M
		(OR)	
6.	a)	Discuss viscosity test of bitumen.	7M
	b)	What are the requirements of bitumen mixes?	7M

UNIT-IV

7.	a)	Explain the relationship between Volume, Speed and Density.	7M
	b)	How the traffic volume study results are presented?	7M
		(OR)	
8.	a)	Describe the parking study procedures.	7M
	b)	Compare Collision and Condition diagram.	7M

UNIT-V

9.	a)	Explain various types of intersection with neat diagrams.	7M
	b)	What are the objectives of Channelization of intersection?	7M
		(OR)	
10.	a)	Explain about cloverleaf with traffic movement systems.	7M
	b)	What are the advantages of grade separated intersection?	7M

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AR18

CODE: 18CET312 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October, 2023

Water Resources Engineering

(CIVIL ENGINEERING)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Describe the process of Hydrological Cycle with the help of a neat sketch. Discuss the components of the Hydrological cycle.	8M
	b)	Explain the significance of flood frequency analysis	4M
		(OR)	
2.	a)	A catchment area has seven raingauge stations. In a year, the annual rainfall recorded by the gauges are as follows: Station P Q R S T U V Rainfall (cm) 130 142.1 118.2 108.5 165.2 102.1 146.9 For a 5% error in the estimation of the mean rainfall, calculate the minimum number of additional stations required to be established in the catchment.	6M
	b)	Differentiate between φ-index and w- index.	6M

UNIT-II

3.	a)	Using neat sketches, explain the various baseflow separation techniques.	6M
	b)	Explain S-Hydrograph with neat sketch and its significance	6M
		(OR)	
4.	a)	Explain the concept of Unit hydrograph with focus on applications and limitations	6M
	b)	A 4-hour hydrograph for a project site in Mahanadi basin is given below. Calculate 2-hour UH by S-hydrograph approach. Time(hour): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26 Discharge (cumec): 0, 30, 110, 170, 210, 180, 120, 80, 40, 35, 20, 15, 5, 0	6M

UNIT-III

5.	a)	A tube well having a diameter of 15cm fully penetrates a confined aquifer of thickness 10m. The discharge from well at a drawdown of 8m is 80lps. Determine the coefficient of permeability and the transmissibility of the aquifer. Take the radius of Influence as 300m.	8M
	b)	State the assumption and limitation of Dupuit's Theory.	4M
		(OR)	
6.	a)	Differentiate between Aquifer, Aquitard, Aquiclude and Aquifuge	6M
	b)	Derive an expression for the steady state discharge of well fully penetrating in a unconfined aquifer by explaining all theterms with diagram.	6M

UNIT-IV

7.	a)	Define Porosity, Specific Retention and Specific Yield and establish a relationship between them.	6M
	b)	Define water logging and Discuss in detail about the causes and ill effects of water logging	6M
		(OR)	
8.	a)	Explain various types of Irrigation Systems	6M
	b)	Discuss the factors affecting Duty.	6M

UNIT-V

9.	a)	Explain the design of Irrigation canals by Lacey's theory	6M
	b)	White short notes on i) Aqueduct ii) Siphon Aqueduct	6M
		(OR)	
10.	a)	Explain the forces acting on a gravity dam.	6M
	b)	Explain different types of river training works	6M

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AR18

CODE: 18ECT314 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October, 2023

LINEAR AND DIGITAL IC APPLICATIONS

(ELECTRONICS AND COMMUNICATION ENGINEERING)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Define slew rate and derive the equation.	[6M]
	b)	Draw the DC equivalent circuit of dual input balanced output differential amplifier and analyze it.	[6M]
		(OR)	
2.	a)	Draw and explain the frequency response of a 741 op-amp	[6M]
	b)	Describe the working of practical integrator circuit. Derive the expression for output voltage.	[6M]

UNIT-II

3.	a)	Describe how 555 timer acts as mono stable multi vibrator? Explain with a neat circuit diagram.	[6M]
	b)	Explain the working principle of log amplifier using op-amp.	[6M]
		(OR)	
4.	a)	Calculate the expression for Hysteresis of Schmitt Trigger circuit using op-amp. And also draw the input and output waveforms	[12M]

UNIT-III

5.	a)	Draw and explain about the counter type ADC converter in detail.	[6M]
	b)	Draw and explain about narrow band reject filter.	[6M]
		(OR)	
6.	a)	Discuss the working of Dual-slope type ADC with neat diagrams.	[6M]
	b)	Draw the first order bandpass filter using op-amp and explain its working.	[6M]

UNIT-IV

7.	a)	Design 2-input NOR gate using CMOS technology	[6M]
	b)	Design a 1 to 8 Demultiplexer with diagram and truth table	[6M]
		(OR)	
8.	a)	Design an octal to binary encoder	[6M]
	b)	Draw the logic diagram and a truth table, explain a 3-line to 8-line decoder.	[6M]

UNIT-V

9.	a)	Explain the working of a master-slave JK flip flop and state its advantages	[6M]
	b)	With neat diagram explain the operation of 3-bit universal shift register.	[6M]
		(OR)	
10.	a)	Draw and explain the operation of 4 bit ring counter	[6M]
	b)	Draw the logic diagram of a SR latch using NOR gates. Explain its Operation using excitation table.	[6M]

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AR18 (RA)

CODE: 18EET311 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular (RA)/Supplementary Examinations, October, 2023

MICROPROCESSORS AND MICROCONTROLLERS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Elaborate the role of segment registers, pointing and index registers in referencing a memory location in a given segment of the physical memory in 8086 microprocessors.	8M
	b)	Illustrate how a 20-bit physical address can be generated with an example.	4M
		(OR)	
2.	a)	Explain in detail about the Intel 8086 predefined (or dedicated) interrupts.	6M
	b)	Illustrate the role of three control bits in 8086 microprocessors.	6M
		UNIT-II	
3.	a)	What is an assembler directive? Elaborate the following assembler directives (i) ASSUME (ii) DB & DW (iii) SEGMENT & ENDS (iv) EQU	6M
	b)	Write an assembly language program to transfer a block of 256 bytes of data from offset 1000H in DS to offset 2000H in DS.	6M
		(OR)	
4.	a)	With an example for each explain the following addressing modes (i) Direct addressing (ii) Register Indirect addressing (iii) Direct I/O port addressing (iv) Indirect I/O port addressing	8M
	b)	Write an assembly language program to evaluate the expression W=X*(X+Y-Z), where X=10H, Y=30H and Z=20H.	4M
		UNIT-III	
5.	a)	With a neat sketch explain the pin diagram of 8255.	8M
	b)	Explain in detail the control word register of 8255.	4M
		(OR)	
6.	a)	Draw the pin diagram of DMA controller 8257.	4M
	b)	With a neat sketch explain the functional block diagram of 8257.	8M
		UNIT-IV	
7.	a)	With a neat sketch explain the architecture of 80386 microprocessor.	8M
	b)	Write a short note on various types of interrupts handled by ARM microprocessor.	4M
		(OR)	
8.	a)	What is pipelining? Explain the concept of pipelining and its depth in ARM microprocessor.	6M
	b)	Draw the pin diagram and explain the signals of 80386 microprocessor.	6M
		UNIT-V	
9.	a)	What is addressing mode? Explain about various addressing modes used in 8051 microcontrollers.	8M
	b)	Write a program to copy the content of registers R0 to R7 into internal RAM addresses 40H to 47h respectively using PUSH instructions. Assume bank 0 is selected.	4M
		(OR)	
10.	a)	Explain in detail about the following pins of 8051 microcontroller. (a) EA (b) PSEN (c) ALE (d) RST (e) XTAL1 & XTAL2 (f) VPP	6M
	b)	Write a program to find the square of a number stored at internal RAM address 50H. Store the result at address 60H(LSByte) and 61(MSByte).	6M

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