AR20

CODE: 20CAT302 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

MACHINE LEARNING

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)	Explain about supervised machine learning algorithm with example.	5M	CO1	K2
	b)	Comparison between Artificial Intelligence, Machine Learning and Deep learning	5M	CO1	K3
		(OR)			
2.	a)	Explain the various stages involved in designing a learning system.	5M	CO1	K2
	b)	Discuss about unsupervised machine learning algorithm with example.	5M	CO1	K3
		UNIT-II			
3.	a)	Explain about Nearest Neighbours with example.	5M	CO2	K2
	b)	Discuss about Linear Regression with example.	5M	CO2	K3
		(OR)			
4.	a)	Illustrate about Decision trees with example.	5M	CO2	K2
	b)	Describe about Logistic Regression with example.	5M	CO2	K2
		UNIT-III			
5.	a)	Explain about K-Means algorithm with example.	5M	CO3	K2
	b)	Discuss about DBSCAN algorithm with example.	5M	CO3	K3
		(OR)			
6.	a)	Illustrate about Clustering for Image Segmentation with example.	5M	CO3	K2
	b)	Discuss about Gaussian Mixtures with example.	5M	CO3	K3
		UNIT-IV			
7.	a)	Explain about Random Forests algorithm with example.	5M	CO4	K2
	b)	Discuss about Bagging and Pasting with example.	5M	CO4	K3
		(OR)			
8.	a)	Explain about Non Linear SVM classification with example.	5M	CO4	K2
	b)	Describe about Naïve Bayes Classifiers with example.	5M	CO4	K2
		UNIT-V			
9.	a)	What is "Curse of dimensionality". What solutions do you propose for this.	5M	CO5	K2
	b)	Discuss the Main Approaches for Dimensionality Reduction with example.	5M	CO5	K3
		(OR)			
10.	a)	Explain about Randomized PCA with example.	5M	CO5	K2
	b)	Illustrate about Kernel PCA with example.	5M	CO5	K2
		UNIT-VI			
11.	a)	Draw the architecture of a Multilayer perceptron (MLP) and explain its operation.	5M	CO6	K2
	b)	List and explain the various activation functions used in Artificial Neural Networks.	5M	CO6	K2
		(OR)			
12.	a)	Explain about Artificial Neural Networks with Keras	5M	CO6	K2
	b)	Discuss about Loading and Preprocessing Data with TensorFlow	5M	CO6	K3

AR20

CODE: 20CET308 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

DESIGN OF CONCRETE STRUCTURES

(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)	Describe under reinforced, over reinforced and balanced section in their behavior under the action of loads.	4	CO1	2
	b)	Design a reinforced concrete beam having effective span 5.5m. The beam is subjected to A UDL of 25 kN/m. Use M20 grade concrete and Fe:415 steel.	6	CO1	3
		(OR)			
2.	a)	Distinguish Limit state method Vs. Working stress method	4	CO1	2
	b)	An RC beam having cross section 300 x 450mm (effective size) consists of 4-16mm dia bars in its tension zone. Determine the ultimate moment of resistance. Assume the M20 grade concrete and Fe:415 steel.	6	CO1	3
		UNIT-II			
3.		A simply supported R.C beam of 230mm x 400mm(effective), it is reinforced with 3 no's 20mm dia bars at bottom and 2 no's 16mm dia bars at top. Determine the moment of resistance of the beam section. Use M20 grade concrete and Fe:415 grade steel.	10	CO2	3
		(OR)			
4.		Using the following data and determine the moment of resistance of T-beam section. Width of flange = 600 mm, Depth of flange = 110 mm, Width of rib = 250 mm, Depth of rib = 390 mm, A_{sc} = 800 mm^2. Effective concrete cover = 50 mm, A_{st} = 1500 mm^2	10	CO2	3
		UNIT-III			
5.	a)	Explain types of torsion in RC beams	3	CO3	2
	b)	Design a rectangular beam section, 300 mm wide and 550 mm deep (overall), subjected to an ultimate twisting moment of 30 kN-m, combined with an ultimate bending moment of 50 kN-m and an ultimate shear force of 40 kN. Assume M20 concrete, moderate exposure conditions and Fe:415 steel	7	CO3	4
		(OR)			
6.		A simply supported beam, 300mm wide and 500mm overall depth carries a uniformly distributed factored load of 120kN/m including its own weight, over an effective span of 8m. The tensile reinforcement consists of 6-20mm dia bars at en effect cover of 50mm. Design and detail the shear reinforcement. Use M20 concrete and Fe:415 steel.	10	CO3	4

UNIT-IV

7.		Design a slab for a hall of dimensions 4m x 5m with discontinuous and simply supported edges in all sides with corners prevented from lifting to support live load of 4 kN/m^2. Use M20 concrete and Fe:415 steel.	10	CO4	4
		(OR)			
8.		Design a simply supported one –way slab over a clear span of 3.5 m. It carries a live load of 4 kN/m2 and floor finish of 1.5 kN/m2 . The width of supporting wall is 230 mm. Adopt M- 20 concrete & Fe-415 steel.	10	CO4	4

UNIT-V

9.	a)	Discuss about the classifications of columns.	3	CO5	2
	b)	Design a rectangular column, 5m long restrained in position and direction at both ends, to carry an axial load of 130 KN. Use M20 and Fe:415 grade steel	7	CO5	4
		(OR)			
10.		Determine the reinforcement to be provided in a short column subjected to biaxial bending with the following data. size of the column is 400mm x 400mm axial load on the column is 800KN . Moment about in x axis is 70 KN-m and y axis is 1000 KN-m Use M_{20} mix and Fe_{415} grade steel.	10	CO5	3

UNIT-VI

11.		Design a square isolated footing for a column of size 500mmx500mm carries a load of 1500kN. The safe bearing capacity is 230kN/m^2. Use M20 concrete and Fe415 steel	10	CO6	4
		(OR)			
12.		Design RC footing to carry an axial service load of 2300kN . The Safe Bearing capacity of soil is 300kN/m^2. Use M20 and Fe415 steel. One of the plan dimensions of the footing is restricted to 2.5m.	10	CO6	4

AR20

CODE: 20CST308 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

Formal Languages and Automata Theory

(COMPUTER SCIENCE AND ENGINEERING)

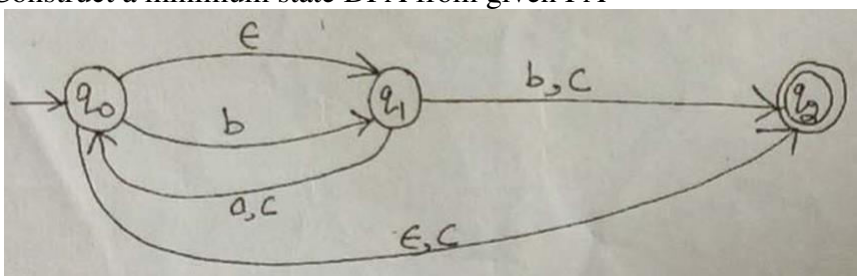
Time: 3 Hours **Max Marks: 60**

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

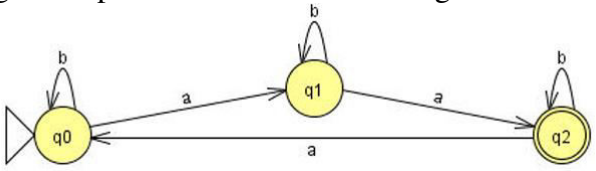
			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Convert the following NFA {p, q, r, s}, {0,1}, δ, p, {q,s} into DFA where δ is given by	5	CO1	K2

	0	1
→p	q, s	q
*q	r	q, r
R	s	p
*s	ϕ	p

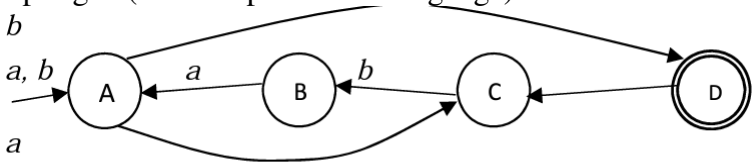
	b)	(a) Design FA for ternary number divisible by 5. (b) Explain Myhill-Nerode Theorem using suitable example.	5	CO1	K2
		(OR)			
2.	a)	What are various points of difference between Moore & Mealy Machine? Explain the procedure to convert a moore machine into Mealy machine.	5	CO1	K2
	b)	Construct a minimum state DFA from given FA	5	CO1	K2



		UNIT-II			
3.	a)	Prove or disprove the following regarding regular expressions: i. $(R+S)^* = R^* + S^*$ ii. $(RS+R)^* RS = (RR^*S)^*$	5	CO2	K2
	b)	Find the regular expression of Given FA using Arden's theorem.	5	CO2	K2



		(OR)			
4.	a)	Let the languageof FA given below be L. Determine the FA accepting L'(i.e. Complemented language)	5	CO2	K2



	b)	Prove that for all sets (i) $(S^+)^+ = S^+$ (ii) $(S^+)^* = S^*$	5	CO2	K2

UNIT-III

5.	a)	Determine the language generated by grammar S →Sab | aSb | abS| baS| bSa| Sba| aS| a	5	CO3	K2
	b)	Determine the grammar for language L = {$a^n b^m$| n >=m}. Also explain the type of this language.	5	CO3	K3
		(OR)			
6.	a)	Explain context free grammars with notation and suitable example?	5	CO3	K2
	b)	Define ambiguity. Show that the grammar G with following production is ambiguous S → a | aAb | abSb, A → aAAb | bS	5	CO3	K3

UNIT-IV

7.	a)	Convert the following CFG to its equivalent GNF: S → AA | a, A → SS | b.	5	CO4	K3
	b)	State the properties of regular languages.	5	CO4	K3
		(OR)			
8.	a)	Convert the following grammar in GNF: $S \rightarrow AB$, $A \rightarrow BS / a$, $B \rightarrow SA / b$	5	CO4	K3
	b)	Obtain a CFG for the following language L={$a^p b^p c^q$|p>=1,q>=1}	5	CO4	K3

UNIT-V

9.	a)	Design a PDA for the Language L ={WW^R | W={a,b}*}	5	CO5	K3
	b)	Generate CFG for the given PDA M is defined as M = ({q0, q1}, {0,1} {x, z0}, δ, q0, z0, q1) where δ is given as follows: δ (q0,1, z0) = (q0, xz0) δ (q0,1, x) = (q0, xx) δ (q0,0, x) = (q0, x) δ (q0, ε, x) = (q1, ε) δ (q1, ε, x) = (q1, ε) δ (q1,0, x) = (q1, xx) δ (q1,0, z0) = (q1, ε)	5	CO5	K3
		(OR)			
10.	a)	Construct context free grammar G corresponding to following context free language, then construct PDA corresponding to G L={$0^n 1^{2n}$|n>=1}	5	CO5	K3
	b)	Design PDA for language: L = {s€ (0, 1)* |number of 0's and 1's are not equal in every string of s}.	5	CO5	K3

UNIT-VI

11.	a)	Write short note on: i) Recursive Language and Recursively Enumerable Language. ii) PCP problem and Modified PCP Problem	5	CO6	K3
	b)	Explain Church's Thesis and prove that Halting problem of Turing machine is undecidable.	5	CO6	K3
		(OR)			
12.	a)	Explain Post Corresponding Problem. Does the following Post Corresponding Problem have a solution? A= (101, 100, 10, 0, 010), B = (10, 01, 0, 100, 1)	5	CO6	K3
	b)	Explain various types of Turing machines.	5	CO6	K3

AR20

CODE: 20ECT308 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

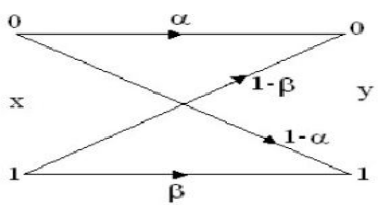
III B.Tech I Semester Regular/Supplementary Examinations, October-2023

DIGITAL COMMUNICATIONS

(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)	What is Quantization Error in PCM System? Derive the Equation for Quantization Noise Power in terms of Step Size?	5	CO1	2
	b)	Consider an Audio Signal is given as $x(t) = 3 \cos(500\pi t)$. Determine (i) Signal to Quantization Noise ratio when this is quantized using 10 bit PCM (ii) How many bits of Quantization are needed to achieve a signal to Quantization Noise ratio at least 40 dB?	5	CO1	3
		(OR)			
2.	a)	Explain the Block diagram of Delta Modulation with Suitable Example.	5	CO1	2
	b)	Compare PCM, DM and DPCM?	5	CO1	3
		UNIT-II			
3.	a)	Discuss about QPSK modulation technique with neat block diagram and explain its Constellation diagram.	5	CO2	2
	b)	Write the Comparisons among Binary Signalling Schemes (ASK, PSK & FSK)?	5	CO2	3
		(OR)			
4.	a)	Explain the generation and detection of DPSK modulation scheme with an example?	5	CO2	2
	b)	Why FSK is preferred over ASK ? Give reasons. How FSK is generated and obtain the expression for its bandwidth .Briefly discuss regarding its frequency spectrum?	5	CO2	3
		UNIT-III			
5.	a)	With the help of block diagram explain baseband signal receiver in data transmission system.	5	CO3	2
	b)	Determine the amount of probability of error in PSK Receiver.	5	CO3	3
		(OR)			
6.	a)	Derive the probability of error & threshold value for ASK schemes?	5	CO3	3
	b)	Explain the properties of matched filter?	5	CO3	2
		UNIT-IV			
7.	a)	Define Entropy? Derive the formula used for it?	5	CO4	2
	b)	A binary channel is shown below. Find H(X), H(Y), H(X/Y), and H(Y/X) when P(X= 0) =1/4, P(X = 1) = 3/4, $\alpha = 0.75$, and $\beta = 0.9$. 	5	CO4	3

(OR)

8.	a)	Write the properties of entropy. Prove that the entropy is maximum when the events are equally likely?	5	CO4	2
	b)	Define the mutual information and explain its properties.	5	CO4	3

UNIT-V

9.	a)	A discrete memory less source generates symbols S_0, S_1, S_2, S_3, S_4, S_5, S_6 and S_7 with probabilities 0.1,0.1,0.2,0.1,0.1,0.2,0.1 and 0.1 respectively. Compute Huffman coding algorithm and find efficiency.	5	CO5	3
	b)	The generator matrix for (7,4) block code is given below i. Find the parity check matrix H of this code. ii. Find the code word for the message (1001) and show that these two matrices satisfy the condition $CH^T = 0$.	5	CO5	3

$$G= \begin{matrix} 1\ 0\ 0\ 0 : 1\ 1\ 1 \\ 0\ 1\ 0\ 0 : 0\ 1\ 1 \\ 0\ 0\ 1\ 0 : 1\ 1\ 0 \\ 0\ 0\ 0\ 1 : 1\ 0\ 1 \end{matrix}$$

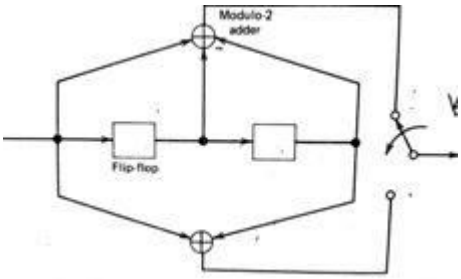
(OR)

10.	a)	A (15,5) Linear Cyclic codes has a $g(x)=1+x+x^2+x^4+x^5+x^8+x^{10}$ draw the encoder and find the code vector for $D(x)=1+x+x^2$	5	CO5	3
	b)	The parity check bits of a (8, 4) block code are generated by C5=d1 ⊕ d2 ⊕d4 C6=d1 ⊕d2 ⊕d3 C7=d1 ⊕d3 ⊕d4 C8=d2 ⊕d3 ⊕d4 Where d1, d2, d3 and d4 are message bits Find the generator matrix and parity check matrix for this code.	5	CO5	3

UNIT-VI

11.		A convolution encoder has 3 shift registers with two stages, two modulo-2 adders and an output multiplexer. The generator sequences of the encoder are as follows. $g^{(1)} = (1, 1, 1, 1)$; $g^{(2)} = (1, 1, 0, 1)$. Draw the block diagram of the encoder. Find the encoder output produced by the message sequence 101101 using transform domain approach?	10	CO6	4

(OR)

12		For the encoder shown below , input message bit is m  (a) Define constraint length, code rate, generating sequence. (b) Generate the code sequence for the message sequence (mo, m1, m2…)= [11001] in time domain and transform domain methods.	10	CO6	4

AR20

CODE: 20EET308 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

ELECTRO MAGNETIC FIELD THEORY

(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)	State coulomb's law and derive the expression for force between two charged particles.	5M	CO1	1
	b)	A large plane charge sheet having surface charge density $\sigma = 2.0 \times 10^{-6}$ C-m^{-2} lies in the X-Y plane. Find the flux of the electric field through a circular area of radius 1 cm lying completely in the region where x, y and z are all positive and with its normal, making an angle of 60^0 with the Z-axis.	5M	CO1	3
		(OR)			
2.	a)	Derive the relation between electric flux density and electric field intensity.	5M	CO1	2
	b)	Derive the expression for electric flux density for a volume of charge with uniform charge density.	5M	CO1	2
		UNIT-II			
3.	a)	An electric dipole of magnitude 0.5 C m is placed parallel to an electric field of intensity 30 N/C. Calculate the torque acting on the dipole.	5M	CO2	1
	b)	An electric dipole with dipole moment 4×10^{-9} C m is aligned at 30 degree with the direction of a uniform electric field of magnitude 5×104 NC^{-1}. Calculate the magnitude of the torque acting on the dipole.	5M	CO2	2
		(OR)			
4.		Derive an expression for electric torque at a point due to an uniform electric dipole.	10M	CO2	3
		UNIT-III			
5.	a)	Derive an expression for laplace and possion equations.	5M	CO3	4
	b)	Derive an expression for capacitance of a spherical capacitor.	5M	CO3	2
		(OR)			
6.	a)	Derive the expression for Ohm's law in point form.	5M	CO3	2
	b)	A parallel plate capacitor has a plate area 3m^2 ,spaced by 3 dielectric slabs of dielectric constant 2,3,6 and of thickness 0.4mm, 0.6 mm and 1.2mm respectively. Find the effective capacitance.	5M	CO3	1
		UNIT-IV			
7.	a)	State and explain Biot-Savart's law.	5M	CO4	1
	b)	Calculate the magnetic field at a point on the centre of the circular conductor of radius 2m with current 8A.	5M	CO4	2
		(OR)			
8.	a)	State Ampere's circuital law and derive the expression for it.	5M	CO4	1
	b)	Write the maxwell's equations both integral and differinitianal forms	5M	CO4	3

UNIT-V

9.	a)	Derive the expression for coefficient of coupling between two magnetically coupled circuits.	5M	CO5	2
	b)	Calculate the inductance of a solenoid with 900 turns wound tightly on a cylinder with cross-sectional area of 0.080 m, and 9.0 m in length.	5M	CO5	3
		(OR)			
10.		Derive an expression for self inductance of Toroid.	10M	CO5	2

UNIT-VI

11.	a)	Derive the expressions for Faraday's law of electromagnetic induction in integral and point form.	5M	CO6	3
	b)	Explain in detail about Statically induced EMF.	5M	CO6	1
		(OR)			
12.		State and prove Poynting theorem.	10M	CO6	3

AR20

CODE: 20ITT301 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

Data Communication and Computer Networks

(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)	Discuss about the concept of addressing in data networks.	5M	CO1	L3
	b)	Explain how the data can be represented in data communications.	5M	CO1	L3
		(OR)			
2.		Draw the hierarchical model of OSI and explain each layer in detail.	10M	CO1	L3
		UNIT-II			
3.		Illustrate in detail about classification of transmission medium.	10M	CO2	L3
		(OR)			
4.	a)	Discuss about periodic analog signals.	5M	CO2	L3
	b)	List the advantages and disadvantages of wireless transmission medium.	5M	CO2	L3
		UNIT-III			
5.	a)	List out the design issues of data link layer and explain each.	5M	CO3	L3
	b)	Describe the concept of Pure Aloha.	5M	CO3	L3
		(OR)			
6.	a)	Write short note on stop and wait protocol with neat flow diagrams.	5M	CO3	L3
	b)	Discuss about persistence protocol in CSMA.	5M	CO3	L3
		UNIT-IV			
7.		Illustrate in detail about various open loop and closed loop congestion control policies.	10M	CO4	L4
		(OR)			
8.	a)	Explain shortest path routing method with an example.	5M	CO4	L3
	b)	Differentiate classful addressing and classless addressing.	5M	CO4	L3
		UNIT-V			
9.	a)	Draw and explain UDP header.	5M	CO5	L3
	b)	Discuss about services and features of TCP	5M	CO5	L3
		(OR)			
10.		Illustrate how connection in TCP can be established and terminated in TCP with neat flow diagrams.	10M	CO5	L4
		UNIT-VI			
11.	a)	Explain about WWW architecture.	5M	CO6	L3
	b)	Discuss about the message format of an Email.	5M	CO6	L3
		(OR)			
12.	a)	Discuss about various DNS servers.	5M	CO6	L3
	b)	Explain the concept of final delivery of an email.	5M	CO6	L3

AR20

CODE: 20MET308 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

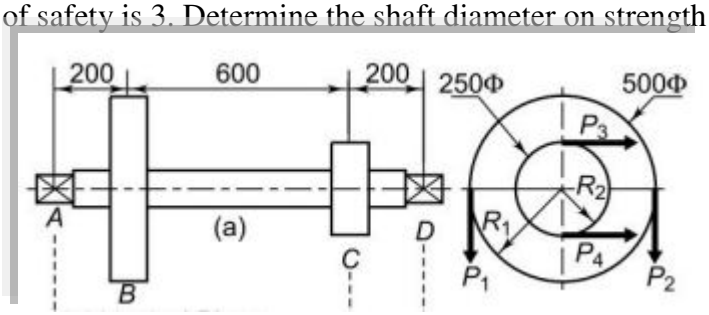
MACHINE DESIGN

(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

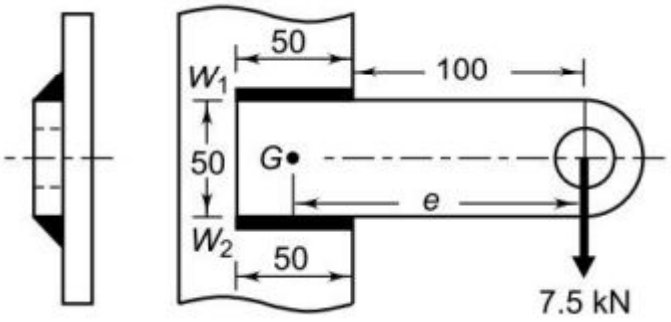
			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain the relation for finding stresses in case of a component under combined shear and bending loading.	3	1	II
	b)	A bolt is subjected to a direct load of 25 kN and shear load of 15 kN. Considering following theories of failure. Determine a suitable size of the bolt if the material of the bolt is C15 having 200 MPa yield strength. Assume factor of safety as 2. i) Maximum normal stress theory ii) Maximum shear stress theory.	7	1	III
		(OR)			
2.		The layout of a transmission shaft carrying two pulleys B and C and supported on bearings A and D is shown in Fig. Power is supplied to the shaft by means of a vertical belt on the pulley B, which is then transmitted to the pulley C carrying a horizontal belt. The maximum tension in the belt on the pulley B is 2.5 kN. The angle of wrap for both the pulleys is 180° and the coefficient of friction is 0.24. The shaft is made of plain carbon steel 30C8 (S_{yt} = 400 N/mm^2) and the factor of safety is 3. Determine the shaft diameter on strength basis	10	1	III



		UNIT-II			
3.		Design a protective type of cast iron flange coupling for a steel shaft transmitting 15 kW at 200 r.p.m. and having an allowable shear stress of 40 MPa. The working stress in the bolts should not exceed 30 MPa. Assume that the same material is used for shaft and key and that the crushing stress is twice the value of its shear stress. The maximum torque is 25% greater than the full load torque. The shear stress for cast iron is 14 MPa.	10	2	III
		(OR)			
4.		A cold drawn steel bar is to withstand a tensile preload of 36.3 kN and a fluctuating tensile load varying from 0 to 72.6 kN. The bar has geometric stress concentration factor of 2.02 corresponding to a fillet whose radius is 4.75 mm. Determine the size of the bar for an infinite life and a factor of safety of 2. The material properties are S_{yt} = 588 MPa and S_{ut} =700 MPa. Take surface finish factor = 0.73, load factor =0.85 and notch sensitivity 0.95.	10	2	III

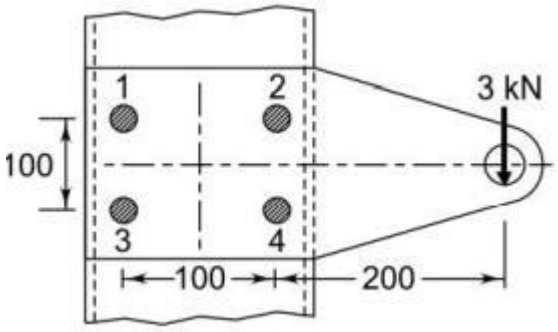
UNIT-III

5.		A welded connection, as shown in Fig. is subjected to an eccentric force of 7.5 kN. Determine the size of welds if the permissible shear stress for the weld is 100 N/mm^2. Assume static conditions	10	3	III



(OR)

6.		A steel plate subjected to a force of 3 kN and fixed to a vertical channel by means of four identical bolts is shown in Fig. 7.49. The bolts are made of plain carbon steel 45C8 (S_{yt} = 380 N/mm^2) and the factor of safety is 2. Determine the diameter of the shank	10	3	III



UNIT-IV

7.	a)	State advantages and applications of flat belt drives	4	4	I
	b)	An open belt drive is used to connect two parallel shafts 4 m apart. The diameter of bigger pulley is 1.5 m and that of the smaller pulley 0.5 m. The mass of the belt is 1 kg/m length. The maximum tension is not to exceed 1500 N. The coefficient of friction is 0.25. The bigger pulley, which is the driver, runs at 250 RPM. Due to slip, speed of the driven pulley is 725 RPM. Calculate the power transmitted, power lost in friction and the efficiency of the drive.	6	4	III

(OR)

8.		The cylinder of a four-stroke diesel engine has the following specifications: Brake power = 5 kW Speed = 600 rpm Indicated mean effective pressure = 0.5 MPa Make suitable assumptions and calculate: (i) bore and length of the cylinder liner (ii) thickness of the cylinder liner (iii) thickness of the cylinder head (iv) size, number and pitch of studs	10	4	III

UNIT-V

9.	The following data is given for the cap and bolts of the big end of connecting rod: Engine speed = 1800 rpm Length of connecting rod = 350 mm Length of stroke = 175 mm Mass of reciprocating parts = 2.5 kg Length of crank pin = 76 mm Diameter of crank pin = 58 mm Thickness of bearing bush = 3 mm Permissible tensile stress for bolts = 60 N/mm^2 Permissible bending stress for cap = 80 N/mm^2 Calculate the nominal diameter of bolts and thickness of cap for the big end.	10	5	III
	(OR)			
10.	Explain the design procedure of centre crank shaft with neat sketches when The crank is at the top dead centre position and subjected to maximum bending moment and no torsional moment	10	5	III

UNIT-VI

11.	A pair of straight teeth spur gears, having 20° involute full depth teeth is to transmit 12 kW at 300 r.p.m. of the pinion. The speed ratio is 3:1. The allowable static stresses for gear of cast iron and pinion of steel are 60 MPa and 105 MPa respectively. Assume the following: Number of teeth of pinion = 16; Face width = 14 times module; σ_{es} = 600 MPa; Determine the module, face width and pitch diameter of gears. Check the gears for wear and dynamic tooth load	10	6	III
	(OR)			
12.	A helical cast steel gear with 30° helix angle has to transmit 35 kW at 1500 r.p.m. If the gear has 24 teeth, determine the necessary module, pitch diameter and face width for 20° full depth teeth. The static stress for cast steel may be taken as 56 MPa. The width of face may be taken as 3 times the normal pitch. What would be the end thrust on the gear? The tooth is of 20° full depth involute.	10	6	III

AR16

CODE: 16CE3013 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

Design of Concrete Structures

(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) Explain the concept of limit state design in reinforced concrete members 5M

   b) Draw the stress block parameters of rectangular RCC beam. Sketch the strain diagram of under reinforced, balance and over R.C sections 9M

(OR)

2. Design a cantilever R.C beam of rectangular cross section supported by column 300x300mm. Assume the service loads (DL + LL) 5kN/m and effective span of beam 2m.Use M20 concrete and Fe415 steel. Apply necessary design for checks. Detail the reinforcement of beam with neat sketch 14M

UNIT-II

3. Design a R.C beam of 350x800mm depth subjected to factored bending moment 215kN-m and ultimate Torsional shear 105kN-m. Use M_{20} grade concrete and Fe415 grade steel. Assume the reinforcement bars with clear cover 50mm on all sides. Design and Detail the reinforcement of beam with neat sketch and necessary design checks 14M

(OR)

4. A cantilever R.C beam of rectangular cross section 200x400mm effective depth and effective span 3m, supports UDL (live load) 8kN/m and reinforced with 4nos 16mm diameter tension reinforcement and supported by column 300x300mm . Design the shear reinforcement, and calculate (i) Maximum local bond stress (ii) Anchorage length required , (iii) Average bond stress . Use M20 grade concrete and Fe415 steel. 14M

UNIT-III

5. Design a R/C slab of class room dimension 4x6m supported on four walls 300mm width and carry live load 3kN/m^2. Assume the corners of slab held down, Apply necessary design checks and Neatly sketch detail the slab reinforcement.(Concrete grade M25 and Steel grade Fe415). 14M

(OR)

6. Design a waist slab of stair case for clear span 3m between the landings (each of size 1mx1m). Assume the size of stairs riser 150mm and thread 250mm and monolithic casted with waist slab to carry live load 3kN/m^2. Design the slab and reinforcement include checks Neatly sketch detail the slab reinforcement.(use Concrete grade M25 and Steel grade Fe415). 14M

UNIT-IV

7. a) Design a R/C column hinged at top and bottom to carry axial load 2000kN.. Assume the clear height of column 3.6m. Use steel grade Fe500, M30 grade concrete and clear cover of steel 40mm.Apply necessary design checks for strength and serviceability conditions. Detail the reinforcement of column with neat sketch 10M

   b) Explain the I.S code provisions for slender columns 4M

(OR)

8. a) Find the maximum moment carry capacity of square column of 300x300mm size fixed at bottom and free at top to carry axial load 250kN at 100mm eccentricity in both X and Z directions. Assume the column provided with reinforcement 4nos 20mm dia bars each in tension and compression side. Use clear cover 50mm and steel Fe415, M20 grade concrete 8M

   b) Explain the types of failures in short columns. What are the I.S code limitations for short column effect 6M

UNIT-V

9. a) Neatly explain with sketch about pressure distribution of footing in clay soils and sandy soils 6M

   b) Design an isolated rectangular footing of uniform thickness to receive axial load 600kN and moment 15kN-m from column size 300x300. Assume safe bearing capacity of soil 160kN/m^2 .Use concrete grade M25, steel Fe415. Do the necessary design checks and sketch the detailing of reinforcement 8M

(OR)

10. a) Design an isolated rectangular footing (pedestal type) to carry axial load 400kN from column size 300x300. Assume safe bearing capacity of soil 180kN/m^2 .Use concrete grade M20, steel Fe415. Do the necessary design checks and sketch the detailing of reinforcement 8M

    b) What is meant by punching shear in footings. Explain the design provisions for punching shear as per I.S code. 6M

***

AR18

CODE: 18CST310 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

Formal Languages & Automata Theory
(COMMON TO CSE & IT)

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

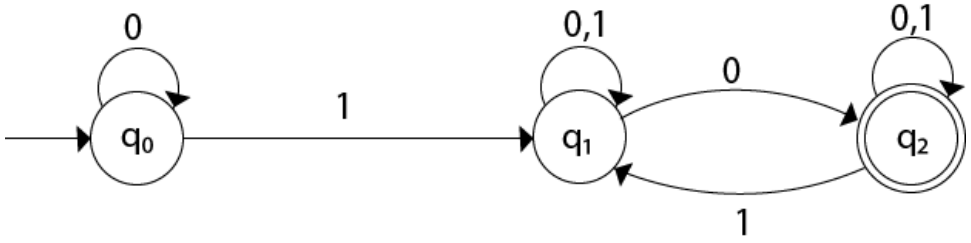
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) What is a Language? Explain any 3 operations on Languages. 6M
   b) Design a FA with ∑ = {0, 1} accepts the strings with an even number of 0's followed by single 1 and also check for string acceptance. 6M

(OR)

2. a) Illustrate Mathematical notation for Finite automata with Outputs 6M
   b) Convert the following NFA to DFA 6M

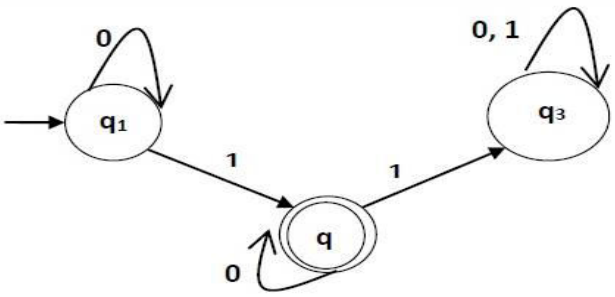


UNIT-II

12M

State and prove Arden's theorem. Apply the Arden's theorem to convert the following Finite automata to Regular expression

3.



(OR)

4. a) Show that the language L={ a^p/ p is prime} is not regular. 6M

   b) Write the closure properties of Regular languages. 6M

UNIT-III

5. a) Explain the three simplification methods for CFG 6M
   b) Convert CFG into GNF form for the following Grammar 6M
   S-> AA/a
   A->SS/b

(OR)

6.	a)	Prove the language is not CFG using pumping lemma $L=\{a^n b^n c^n / n \geq 1\}$	8M
	b)	Write CFG for the regular expression (0+1)*	4M

UNIT-IV

7.		Design Push-Down Automata for the language $L=\{ww^R / w=\{a,b\}^*\}$	12M

(OR)

8.	a)	Discuss about PDA acceptance	6M
	b)	Construct PDA for the following Context free grammar $S \rightarrow 0BB$ $B \rightarrow 0S \mid 1S \mid 0$	6M

UNIT-V

9.	a)	Design a Turing Machine to accept the language $L=\{0^n 1^n / n>=1\}$.	8M
	b)	Explain the variations of Turing machines.	4M

(OR)

10.	a)	Differentiate between recursive and recursively enumerable languages with suitable examples.	6M
	b)	What is Post correspondence problem (PCP)? Explain with the help of an example.	6M

***

AR18

CODE: 18ECT313 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

DIGITAL COMMUNICATIONS

(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) Draw and explain the PCM waveforms at each block for a sinusoidal input with a peak to peak to amplitude of 8V. Assume necessary data wherever required. 6M
   b) Discuss different types of Uniform quantisation techniques. 6M

(OR)

2. a) Elaborate the concept of Delta modulation with neat diagrams. List out Advantages,drawbacks and applications. 6M
   b) Represent the binary code 11001011 in Unipolar NRZ, Polar RZ, Bipolar RZ & Manchester codes. 6M

UNIT-II

3. a) Illustrate how the binary sequence 110110111 is modulated using ASK technique. 6M
   b) Compare BFSK, BPSK, BASK methods on different aspects. 6M

(OR)

4. a) Discuss about Quadrature shift keying method with neat diagrams. 6M
   b) Examine the working of BFSK modulator and non coherent detector for bit stream 11110101 with neat diagrams. 6M

UNIT-III

5. a) Derive the expression of signal to noise ratio for an Optimum filter assuming the noise as White gaussian noise. 6M
   b) Elaborate mutual information and its properties. 6M

(OR)

6. a) Discuss about Optimum filter realization using Correlator. 6M
   b) A source delivers 5 symbols X1,X2,X3,X4 and X5 with P(X)= 1/2,1/8,1/8,1/8,1/8 at the rate of 3 symbols per sec. Determine entropy and the rate of information. 6M

UNIT-IV

7. a) A DMS has 5 symbols A, B, C, D and E with probabilities 0.2, 0.3, 0.2, 0.2 and 0.1 respectively. Using Shanoon Fano algorithm, find unique code for this source. 6M
   b) State and prove that the capacity of a continuous channel C=Blog(1+S/N). 6M

(OR)

8. a) Consider a (7, 4) code whose generator matrix is 12M

$$G=\begin{bmatrix}1&0&0&0&1&1&1\\0&1&0&0&1&0&1\\0&0&1&0&0&1&0\\0&0&0&1&0&0&1\end{bmatrix}$$

a).Find all codewords.
b). Compute syndrome for the received code vector 1101101. Is this a valid code vector?
c). What is the error correcting capability of this code?
d). What is the error detecting capability of this code?

UNIT-V

9.	a)	Consider a (K, k, n)=(3,1,2) convolution code with g_1**=(011),** $\mathbf{g_2}$**=(110)** (i) Draw encoder Block diagram (ii) Obtain encoded sequence using transform domain approach for m=(10101) (iii) Draw Code tree for the above data. (iV) Draw Code trellis	12M
		(OR)	
10.	a)	What is the state diagram implementation of a Convolution encoder.	4M
	b)	Illustrate Viterbi decoding algorithm with an example.	8M

***

AR18 (RA)

CODE: 18EET312 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

ELECTRICAL MEASUREMENTS

(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)	Derive the torque equation for moving iron instrument	6M
	b)	Explain the working of Attraction type M.I. Instrument	6M
		(OR)	
2.	a)	What is meant by damping. Explain the different damping's used in measuring instruments.	6M
	b)	Design a shunt to provide an ammeter with the current rating of 1A, 5A and 10 A. A Basic Resistance is 50Ω and full scale deflection current is 1 mA.	6M

UNIT-II

3.		Derive the Deflection torque Expression for Dynamometer type Watt meter and also explain its working	12M
		(OR)	
4.		Derive and Explain the Equivalent circuit and phasor diagram of a current transformer	12M

UNIT-III

5.	a)	Explain the construction and operation of 1-Φ induction type Energy meter.	6M
	b)	A 1-Φ Energy meter making 500 revolutions per KWH. It is found on testing that it makes 40 revolutions in 58.1 sec at 5 KW full load. Find the percentage of Error .	6M
		(OR)	
6.	a)	Explain about dynamometer type of frequency meters	6M
	b)	Write a short note on trivector meter.	6M

UNIT-IV

7.	a)	Derive the Expression for unknown resistance using Kelvin's Double Bridge. Explain how it is accurate to measure low resistances.	6M
	b)	Describe the working of Desauty bridge with the help of Phasor diagram and also derive the balance condition	6M
		(OR)	
8.	a)	Describe the working of Anderson's bridge with the help of Phasor diagram and also derive the balance condition	6M
	b)	The arms of an A.C Bridge are adjusted as: Arm AB: Non Reactive Resistance of 700 Ω Arm CD: Non Reactive Resistance of 300 Ω Arm AD: Non Reactive Resistance of 1200 Ω in parallel with capacitance of 0.5μF. If the bridge is balanced condition, find the components of the arm BC	6M

UNIT-V

9.		Explain the construction and working of Ballistic galvanometer and also prove that the "charge is proportional to first swing of the moving coil"	12M
		(OR)	
10.	a)	Explain the Working of AC coordinate type Potentiometer.	6M
	b)	Explain the working principle of DC Crompton potentiometer	6M