MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023

ECONOMICS AND FINANCIAL ACCOUNTING FOR ENGINEERS

(Common to ME, CSE, CSE (AI), CSE (DS), CSE (CS) and CSE (IOT))

Time: 3Hrs　　　　　　　　　　　　　　　　　　　　　　　　　　　　Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	Define elasticity of demand	1M	1	1
	ii.	Define scarcity	1M	1	1
	iii.	Explain variable cost	1M	2	2
	iv	Define break-even analysis (BEA)	1M	2	1
	v.	Explain market	1M	3	2
	vi	Define Oligopoly.	1M	3	2
	vii.	State double entry system	1M	4	1
	viii.	Explain profit and loss account	1M	4	2
	ix.	Define Ratio	1M	5	2
	x.	Explain IRR	1M	5	2
Q.2(A)		Discuss the concept of market equilibrium and its implications for buyers and sellers.	10M	1	2
		OR			
Q.2(B)		Define elasticity of demand and explain its different types.	10M	1	1
Q.3(A)		Define production function and explain production function with one variable input factor.	10M	2	3
		OR			
Q.3(B)		Analyze the limitations of break-even analysis in capturing real-world complexities and uncertainties.	10M	2	5
Q.4(A)		Elaborate the characteristics of perfect competition	10M	3	2
		OR			
Q.4(B)		Paraphrase the price determination process under monopoly competition	10M	3	3
Q.5(A)		Journalise the following transactions in the books of ABC Company On October 1, ABC Company received a cash investment of INR 50,000 from to start the business. On October 5, the company purchased office equipment for INR 20,000. On October 10, ABC Company provided services to a client and received INR cash. On October 15, the company paid INR 5,000 in rent for the month. On October 20, ABC Company paid INR 2,000 towards purchases	10M	4	6
		OR			
Q.5(B)		Classify accounts into different categories based on their nature and function.	10M	4	3

| Q.6(A) | Explain various types of ratios and their role in evaluating a company's financial stability | 10M | 5 | 2 |

OR

| Q.6(B) | ABC Company is considering investing in a new project. The initial investment required is INR 100,000. The expected cash flows from the project over the next five years are as follows: | 10M | 5 | 6 |

Year 1: INR 30,000

Year 2: INR 40,000

Year 3: INR 50,000

Year 4: INR 40,000

Year 5: INR 20,000

The discount rate for the project is 10%. Calculate the Net Present Value (NPV) of the project and determine whether it is a worthwhile investment. Discounting Factor at 10% (Year 1: INR 0.9091, Year 2: INR 0.8264, Year 3: INR 0.7513, Year 4: INR 0.6830, Year 5: INR 0.6209)

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023
DISCRETE MATHEMATICAL STRUCTURES
(Common to CSE, CSE (AI), CSE (DS), CSE (CS), and CST)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Write the following statements in symbolic form "Susan sits between Tom and Bill".	1M	1	1
	ii.	Define inference theory.	1M	1	1
	iii.	How many positive integers between 1000 and 9999 inclusive are divisible by 9?	1M	2	1
	iv	Expand $(x+y)^4$.	1M	2	1
	v.	Define monoid with example.	1M	3	1
	vi	Define cyclic group	1M	3	1
	vii.	Define bounded lattice.	1M	4	1
	viii.	Prove that $(a*b) \oplus (a*b') = a$	1M	4	1
	ix.	Define connected graph	1M	5	1
	x.	Define adjacency matrix of the graph.	1M	5	1
Q.2(A)		(i)Show that $((P \lor Q) \land \neg(\neg P \land (\neg Q \lor \neg R))) \lor (\neg P \land \neg Q) \lor (\neg P \land \neg R)$ is a tautology.	5M	1	3
		(ii) Show the following equivalence (a)$(P \lor Q) \land (\neg P \land (\neg P \land Q)) \Leftrightarrow (\neg P \land Q)$, (b) $P \to (Q \lor R) \Leftrightarrow (P \to Q) \lor (P \to R)$	5M	1	3
		OR			
Q.2(B)		Use rules of inference to show that if $\forall x(P(x) \lor Q(x))$ and $\forall x((\neg P(x) \land Q(x)) \to R(x))$ are true, then $\forall x(\neg R(x) \to P(x))$ is also true, where the domains of all quantifiers are the same.	5M	1	3
		Use rules of inference to show that if $\forall x(P(x) \to (Q(x) \land S(x)))$ and $\forall x(P(x) \land R(x))$ are true, then $\forall x(R(x) \land S(x))$ is true.	5M	1	3
Q.3(A)		(i) Each user on a computer system has a password, which is six to eight characters long, where each character is an uppercase letter or a digit. Each password must contain at least one digit. How many possible passwords are there?	5M	2	4
		(ii) How many positive integers between 100 and 899 inclusive are divisible by 3 but not by 4?	5M	2	3
		OR			
Q.3(B)		(i) Let n and k be positive integers with n≥k. Then$\binom{n+1}{k} = \binom{n}{k-1} + \binom{n}{k}$.	5M	2	3
		(ii) How many solutions does the equation $x_1 + x_2 + x_3 = 11$ have, where$x_1 \geq 1, x_2 \geq 2$, and $x_3 \geq 3$.	5M	2	3
Q.4(A)		(i) Prove that set of integer forms a group under the additive binary operation.	5M	3	3
		(ii) Show that $< \{1,4,13,16\}, \times_{17}>$ is a subgroup of $<Z_{17}^*, \times_{17}>$	5M	3	3

|				
Q.4(B)	(i)Define Cyclic group? Explain with a suitable example.	5M	3	3
	(ii) Derive the language $L(G) = a^2b^2c^2$ is generated by the following grammar. G = <{S, B, C}, {a, b, c}, S, φ> Where φ consists of the productions S→ aSBC, S→aBC, CB→BC, aB→ ab, bB→ bb, bC→ bc, cC→ cc.	5M	3	3
Q.5(A)	If n = 30, S30 = {1, 2, 3, 5, 6, 10, 15, 30}. Let R denote the relation division. Then show by drawing the Hasse diagram that (S30, R) is a Lattice.	10M	4	4

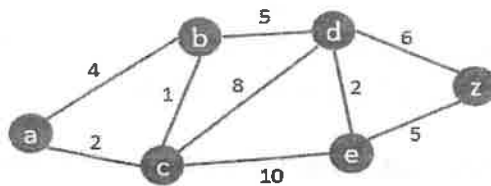|				
Q.5(B)	(i) Simplify the following Boolean expression$(a * b)'⊕(a⊕b)'$.	5M	4	3
	(ii) Use the Karnaugh map representation to find a minimal sum-of-product expression of $f(a,b,c) = \Sigma(0,1,4,6)$.	5M	4	3
Q.6(A)	Show that the digraphs given in Figures (a) and (b) are isomorphic	10M	5	3

(a)   (b)
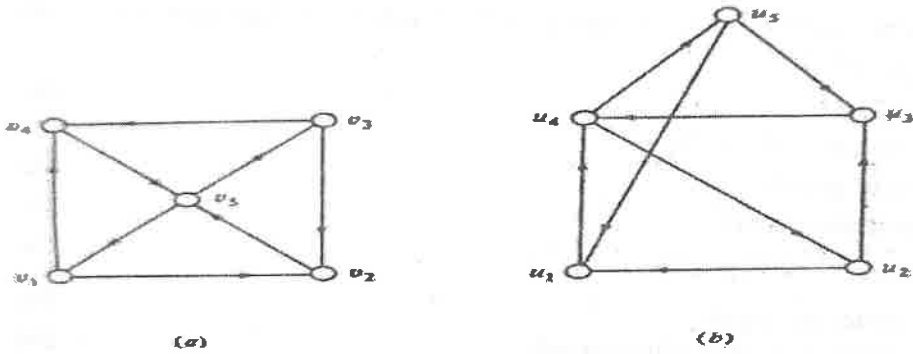
Q.6(B)	Use Dijkstra's algorithm to find shortest paths from source 'a' to all vertices in the given graph	10M	5	4

*** END ***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

PROBABILITY AND STATISTICS FOR ENGINEERS
(Common to CE and EEE)

Time: 3Hrs   Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	Let A and B be events such that $p(A)=0.6$, $p(B)=0.4$ and $p(A \cup B)=0.8$. Are A and B to be independent?	1M	1	1
	ii.	Define a discrete random variable.	1M	1	1
	iii.	Define Binomial Distribution	1M	2	1
	iv	Find the value of Z_1 such that P[$-Z_1< Z<Z_1$]=0.95	1M	2	1
	v.	Define discrete joint density function.	1M	3	1
	vi	What is Covariance?	1M	3	1
	vii.	Define Null hypothesis	1M	4	1
	viii.	Define Critical region.	1M	4	1
	ix.	Give an example of one tailed test	1M	5	1
	x.	What is Randomization?	1M	5	1
Q.2(A)		a) State and prove addition theorem for two events.	10M	1	2
		b) Assume that in a nuclear accident 30% of the workers are exposed to LD_{50} and die; 40% of the workers die; and 68% are exposed to LD_{50} or die. What is the probability that a randomly selected worker is exposed to the LD_{50}? Find the probability that a randomly selected worker is exposed to LD_{50} but does not die.			
		OR			
Q.2(B)		A continuous random variable X has the probability density function, $f(x) = \begin{cases} cx(2-x), if\ 0 \le x \le 2 \\ 0, otherwise \end{cases}$ Find (i) C value (ii) P[0.5 < X < 1.5] (iii) mean and (iv) variance.	10M	1	2
Q.3(A)		Derive the moment generating function of Exponential distribution and find mean and variance from it.	10M	2	3
		OR			
Q.3(B)		Assume that during seasons of normal rainfall the water level in feet at a particular lake follows normal distribution with mean 140 feet and standard deviation 10 feet. During such a season, find the probability that one can observe a water level (i) will exceeds 152 feet (ii) will be between 138 feet and 148 feet (ii) will be less than 120 feet.	10M	2	3
Q.4(A)		For the following bivariate probability distribution find correlation coefficient between X and Y	10M	3	3

X\Y	0	1	2	3
0	0.840	0.030	0.020	0.010
1	0.060	0.010	0.008	0.002
2	0.010	0.005	0.004	0.001

OR

Q.4(B)	Let X denote the temperature (°C) and let Y denote the time in minutes that it takes for the diesel engine on an automobile to get ready to start. Assume that the joint density for (X, Y) is given by	10M	3	3

$$f(x,y) = c(4x + 2y + 1); \quad 0 \le x \le 40, 0 \le y \le 2$$

    (i)   Find the value of C that makes this a density

    (ii)   Find the marginal densities for X and Y.

    (iii)   Find the probability that on a randomly selected day the air temperature will exceed $20°C$.

    (iv)   Are X and Y independent?

Q.5(A)	A random sample of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same, at 5% l.o.s?	10M	4	2

OR

Q.5(B)	Two types of cars produced in U.S.A are tested for petrol mileage and the following information is obtained:	10M	4	2

	Average Mileage	Variance Mileage	Sample size
Car-A	55	10	8
Car-B	57	15	7

Is the difference in the average mileage significant?

Q.6(A)	Five breeds of cattle B_1, B_2, B_3, B_4, B_5 are fed on four different rations R_1, R_2, R_3, R_4. Gains in weights in kg over a given period were recorded and given below:	10M	5	4

	B_1	B_2	B_3	B_4	B_5
R_1	19	22	26	18	21
R_2	25	19	23	26	22
R_3	17	19	22	20	21
R_4	21	18	25	23	24

Test, is there any significant difference between (i) breeds and (ii) rations

OR

Q.6(B)	Sixteen patients are subjected to four different drugs (A, B, C, D) to control the B.P levels. Two blocks, each with four levels, are used: Age (I-below 40, II: 40-50, III: 50-60, IV: above 60) and Health (I: poor, II: fair, III: good, IV Excellent). Analyze the data using LSD and draw the conclusions	10M	5	4

health ↓ age→	I	II	III	IV
I	89 (A)	80 (B)	70 (C)	95(D)
II	91 (B)	92 (A)	77 (D)	86(C)
III	75 (D)	98 (C)	94 (A)	90(B)
IV	80 (C)	85 (D)	93 (B)	102 (A)

*** END ***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023

ENVIRONMENTAL ENGINEERING
(Civil Engineering)

Time: 3Hrs
Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What is the permissible limit of iron in drinking water?	1M	1	1
	ii.	Define hardness of water?	1M	1	1
	iii.	What is the working principle of skimming tank?	1M	2	1
	iv	List out the different stages of wastewater treatment?	1M	2	1
	v.	What is sludge thickening process?	1M	3	1
	vi	What are the factors affecting sludge treatment?	1M	3	1
	vii.	What do you mean by air quality Index?	1M	4	1
	viii.	What is the unit to measure sound or noise?	1M	4	1
	ix.	What is hazardous waste?	1M	5	1
	x.	What are the types and sources of solid waste?	1M	5	1
Q.2(A)		Two primary settling basins are 24m in diameter with a 2.2 m side water depth. Single effluent weirs are located on the peripheries of the tank. For a water flow of 36,000m^3/d calculate: i) surface area and volume: ii) overflow rate in m^3/m^{2}d: iii) Detention time in hours: and iv) Weir loading in m^3/m d	10M	1	3
		OR			
Q.2(B)		What is chlorination and explain how is it used in water treatment process.	10M	1	2
Q.3(A)		Explain the working principle and design consideration of activated sludge process with a neat sketch.	10M	2	2
		OR			
Q.3(B)		Explain the working principle and design consideration of rotating biological contactor with proper diagram.	10M	2	2
Q.4(A)		Explain the working process of an Oxidation ditch?	10M	3	2
		OR			
Q.4(B)		How does biogas production occur? List out the factors affecting the sludge digestion?	10M	3	2
Q.5(A)		How to control gaseous pollutants from a stationary source by using Adsorption process.	10M	4	2
		OR			
Q.5(B)		What do you mean by air pollution? Write the composition of air and classification of air pollutants?	10M	4	2
Q.6(A)		Describe in detail what are the physical properties that are essential to analyse wastes disposed at landfills.	10M	5	3
		OR			
Q.6(B)		Explain the steps involved in municipal solid waste (MSW) management?	10M	5	3

*** END***

.Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐   Question Paper Code: 20CE105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023
ENGINEERING HYDROLOGY
(Civil Engineering)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define Hydrology.	1M	1	1
	ii.	What is orographic precipitation?	1M	1	1
	iii.	What is infiltration?	1M	2	1
	iv	Distinguish between actual and potential evapotranspiration.	1M	2	1
	v.	What is rating curve?	1M	3	1
	vi	What do you mean by water year?	1M	3	1
	vii.	What is Standard Project Flood?	1M	4	1
	viii.	What is time of concentration?	1M	4	1
	ix.	State Darcy's law	1M	5	1
	x.	Define aquitard?	1M	5	1
Q.2(A)		(i) Write the application of hydrology in the engineering field.	5M	1	2
		(ii) A catchment of area 150 hectares received a rainfall of 10 cm in 120 minutes due to storm. At the outlet of catchment, the stream draining the catchment was dry before storm and experienced a run off lasting for 12 hours with an average discharge of 1.25 m^3/sec. The stream was given dry after the runoff event. What is the amount of water which was not available to runoff due to combined effect of infiltration, evaporation and transpiration?	5M	1	5
		OR			
Q.2(B)		Explain the different methods of determining the average rainfall over a catchment area due to a storm. Discuss the advantages and disadvantages of the various methods.	10M	1	2
Q.3(A)		A storm with 12 cm rainfall resulted in 6.5 cm of runoff. The duration of rainfall was 16hrs and its time distribution is given below. Find the φ-index of the storm.	10M	2	5

Time from start (h)	0	2	4	6	8	10	12	14	16
Cumulative rainfall (cm)	0	0.5	1.3	2.7	5.1	6.9	8.9	10.2	12

		OR				
Q.3(B)		(i) Explain the infiltration and the resulting soil moisture zones in the soil?	5M	2	2
		(ii) Describe the factors affecting evapotranspiration process.	5M	2	2
Q.4(A)		Using suitable example explain various methods of direct measurement of stream flow.	10M	3	2
		OR				

| Q.4(B) | Given below are observed flows from a storm of 6-h duration on a stream with a catchment area of 500 km^2. Assuming the base flow to be zero, derive the ordinates of 6-h unit hydrograph. | 10M | 3 | 5 |

Time (h)	0	6	12	18	24	30	36
Observed flow (m^3/s)	0	100	250	200	150	100	70
Time (h)	42	48	54	60	66	72	
Observed flow (m^3/s)	50	35	25	15	5	0	

| Q.5(A) | (i) What are the various flood forecasting methods? Discuss any one method of flood forecasting | 5M | 4 | 2 |
| | (ii) What do you understand by prism and wedge storage used in channel routing? | 5M | 4 | 2 |

OR

| Q.5(B) | Data covering a period of 95 years for the river Ganga at Raiwala yielded the mean and standard derivation of the annual flood series as 6090 and 2929 m^3/s respectively. Using Gumbel's method estimate the flood discharge with a return period of 500 years. What are the (a) 68% (b) 95% confidence limits for this estimate? For required data, use Appendix A. | 10M | 4 | 5 |

| Q.6(A) | (i) Describe the different zones of the ground water with the help of a neat sketch. | 5M | 5 | 2 |
| | (ii) A 25-cm diameter well completely penetrates a confined aquifer of permeability 40 m/day. The length of the strainer is 20 m. Under steady state of pumping the drawdown at the well was found to be 3.0 m and the radius of influence was 275 m. Evaluate the discharge. | 5M | 5 | 5 |

OR

| Q.6(B) | (i) Two lakes A (surface elevation 30.5 m) and B (surface elevation 15 m), 2200m away are separated by a land mass (permeability 50m/day) lying on an impervious horizontal later (elevation 17.5m). Determine the flow between the lakes assuming no infiltration loss. | 5M | 5 | 5 |
| | (ii) Explain briefly the following items: (a) Recharge estimation (b) Safe yield of an aquifer. | 5M | 5 | 2 |

*** END ***

AppendixA

Table A1 Reduced mean $\bar{y}_n$ in Gumbel's Extreme Value Distribution

N = sample size

N	0	1	2	3	4	5	6	7	8	9
10	0.4952	0.4996	0.5035	0.5070	0.5100	0.5128	0.5157	0.5181	0.5202	0.5220
20	0.5236	0.5252	0.5268	0.5283	0.5296	0.5309	0.5320	0.5332	0.5343	0.5353
30	0.5362	0.5371	0.5380	0.5388	0.5396	0.5402	0.5410	0.5418	0.5424	0.5430
40	0.5436	0.5442	0.5448	0.5453	0.5458	0.5463	0.5468	0.5473	0.5477	0.5481
50	0.5485	0.5489	0.5493	0.5497	0.5501	0.5504	0.5508	0.5511	0.5515	0.5518
60	0.5521	0.5524	0.5527	0.5530	0.5533	0.5535	0.5538	0.5540	0.5543	0.5545
70	0.5548	0.5550	0.5552	0.5555	0.5557	0.5559	0.5561	0.5563	0.5565	0.5567
80	0.5569	0.5570	0.5572	0.5574	0.5576	0.5578	0.5580	0.5581	0.5583	0.5585
90	0.5586	0.5587	0.5589	0.5591	0.5592	0.5593	0.5595	0.5596	0.5598	0.5599
100	0.5600									

Table A2 Reduced Standard Deviation S_n in Gumbel's Extreme Value Distribution

N = sample size

N	0	1	2	3	4	5	6	7	8	9
10	0.9496	0.9676	0.9833	0.9971	1.0095	1.0206	1.0316	1.0411	1.0493	1.0565
20	1.0628	1.0696	1.0754	1.0811	1.0864	1.0915	1.0961	1.1004	1.1047	1.1086
30	1.1124	1.1159	1.1193	1.1226	1.1255	1.1285	1.1313	1.1339	1.1363	1.1388
40	1.1413	1.1436	1.1458	1.1480	1.1499	1.1519	1.1538	1.1557	1.1574	1.1590
50	1.1607	1.1623	1.1638	1.1658	1.1667	1.1681	1.1696	1.1708	1.1721	1.1734
60	1.1747	1.1759	1.1770	1.1782	1.1793	1.1803	1.1814	1.1824	1.1834	1.1844
70	1.1854	1.1863	1.1873	1.1881	1.1890	1.1898	1.1906	1.1915	1.1923	1.1930
80	1.1938	1.1945	1.1953	1.1959	1.1967	1.1973	1.1980	1.1987	1.1994	1.2001
90	1.2007	1.2013	1.2020	1.2026	1.2032	1.2038	1.2044	1.2049	1.2055	1.2060
100	1.2065									

Table A3

c in per cent	50	68	80	90	95	99
$f(c)$	0.674	1.00	1.282	1.645	1.96	2.58

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023

CONCRETE TECHNOLOGY
(Civil Engineering)

Time: 3Hrs   Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	How do mineral admixtures affect the properties of cement?	1M	1	1
	ii.	What is the relationship between bond strength and other mechanical properties of aggregates?	1M	1	1
	iii.	What are segregation and bleeding in concrete, and how can they be minimized or prevented?	1M	2	1
	iv	Who formulated Abram's Law and what does it state?	1M	2	1
	v.	Is there a relationship between creep and time? If so, what is it?	1M	3	2
	vi	What are the key parameters measured during a compression test on concrete?	1M	3	1
	vii.	What are the key factors to consider in choosing the mix proportions for concrete?	1M	4	1
	viii.	How can the performance of concrete mixes be optimized through appropriate mix design techniques?	1M	4	2
	ix.	How is light-weight aggregate concrete different from conventional concrete?	1M	5	1
	x.	What is high-performance concrete, and what makes it different from regular concrete?	1M	5	2
Q.2(A)		What are the purposes and benefits of using admixtures in cement production?	10M	1	1
		OR			
Q.2(B)		What are the differences between mineral and chemical admixtures, and how do they enhance the properties of cement?	10M	1	1
Q.3(A)		Explain how does the maturity concept help in assessing the progress of concrete curing?	10M	2	2
		OR			
Q.3(B)		Discuss the importance of proper curing techniques and their impact on the strength and durability of concrete structures.	10M	2	2
Q.4(A)		What is the purpose of conducting compression tests on concrete, and how does it help determine its strength?	10M	3	2
		OR			
Q.4(B)		How is the chemical analysis of hardened concrete performed, and what information does it provide?	10M	3	2
Q.5(A)		What are some of the key strategies for optimizing concrete mix designs to enhance performance and meet specific project requirements?	10M	4	2

OR

Q.5(B)	How can the implementation of appropriate mix design methods contribute to achieving desired concrete properties and ensuring project success?	10M	4	2
Q.6(A)	What are the factors to consider when designing high-performance concrete mixtures?	10M	5	2

OR

Q.6(B)	How is SIFCON (Slurry Infiltrated Fiber Reinforced Concrete) different from conventional concrete?	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023
STRENGTH OF MATERIALS
(Civil Engineering)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What is Composite bar?	1M	1	1
	ii.	Write the various types of the stress.	1M	1	1
	iii.	What is meant by point of contraflexure?	1M	2	1
	iv	Define effective length of a column.	1M	2	1
	v.	Write the equation of pure bending theory.	1M	3	1
	vi	Draw the shear stress distribution for symmetric I-section.	1M	3	2
	vii.	Write the Polar Modulus (i) for a solid shaft and (ii) for a hollow shaft	1M	4	1
	viii.	Define principal plane and principal stress.	1M	4	1
	ix.	Write the slope and deflection formulae for a SSB subjected to point load at mid span.	1M	5	1
	x.	Write the relation between bending moment, slope and deflection	1M	5	1
Q.2(A)		A steel rod of 5 cm diameter and 4 m long is connected to two grips and the rod is maintained at a temperature of 100^0C. Determine the stress and pull exerted when the temperature fall to 30^0C, if (i) the ends do not yield and (ii) the ends yield by 0.12 cm. Take E=$2*10^5$ N/mm^2 and α=$12*10^{-6}/^0$C.	10M	1	4
		OR			
Q.2(B)		A member ABCD is subjected to point loads P_1, P_2, P_3 and P_4 as shown in fig. Calculate the force P_3 necessary for the equilibrium if P_1= 120 kN, P_2= 220 kN and P_4= 160 kN. Also determine the net change in the length of the member. Take E= 200 GN/m^2	10M	1	4

40 mm × 40 mm   25 mm × 25 mm   30 mm × 30 mm

A   B   C   D

P_1 P_2 P_3 P_4
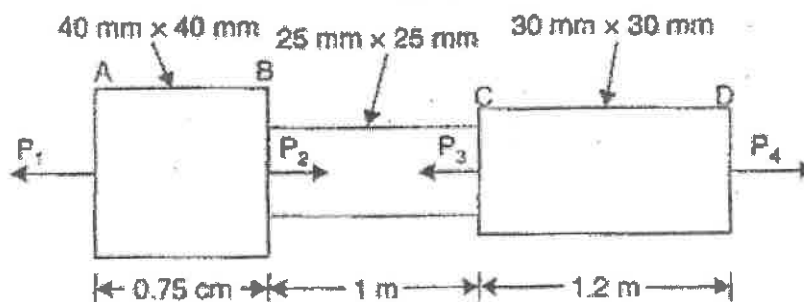
|← 0.75 cm →|← — 1 m — →|← — 1.2 m — →|

| Q.3(A) | | A cantilever of length 2m carries a uniformly distributed load of 1.5 kN/m run over the whole length and a point load of 2kN at a distance of 0.5m from the free end. Draw the SFD and BMD for the cantilever. | 10M | 2 | 4 |

Q.3(B)	Find the Euler crushing load for a hollow cylindrical cast iron column 20cm external diameter and 15 cm internal diameter if it is 6m long and is hinged at both ends. Take E= 1.2×10^5 N/mm^2. Compare the load with the crushing load as given by Rankine's formula, taking σ_c= 550 N/mm^2 and a = 1/1600	10M	2	4
Q.4(A)	State the assumptions and derive the equation of pure bending equation	10M	3	3

OR

Q.4(B)	A beam has a cross section as shown in Figure below. Draw the shear distribution across the beam when it is subjected to a shear force of 150 kN.	10M	3	4

15 mm
15 mm
150 mm
180 mm
15 mm
150 mm
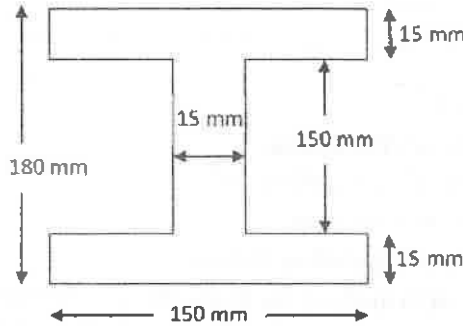
Q.5(A)	Determine the diameter of the solid shaft which will transmit 300kW at 250 rpm. The maximum shear stress should not exceed 30 N/mm^2 and twist should not be more than 1^0 in a shaft length of 2m. Take G= 1×10^5 N/mm^2	10M	4	4

OR

Q.5(B)	A rectangular block of material is subjected to a tensile stress of 110 N/mm^2 on one plane and a tensile stress of 47 N/mm^2 on the plane right angles to the former. Each of the above stresses is accompanied by a shear stress of 63 N/mm^2. Find the (i) direction and magnitude of Principal stress and (ii) magnitude of maximum shear stress.	10M	4	4
Q.6(A)	Using moment area method find maximum slope and deflection of		5	4
	(i) SSB subjected to eccentric point load and	5M		
	(ii) Cantilever beam subjected to UDL over the entire span.	5M		

OR

Q.6(B)	Derive the expression for the deflection and slope of a cantilever beam with a point load at the free end using double integration method.	10M	5	4

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations – July 2023
INDUCTION AND SYNCHRONOUS MACHINES
(EEE)

Time: 3Hrs   **Max Marks: 60**

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	The direction of revolving magnetic field can be reversed, how?	1M	1	1
	ii.	What is active part of a coil?	1M	1	1
	iii.	When the load on an alternator varies then its terminal voltage is also found to be varied. Why?	1M	2	1
	iv	Why is alternator rated in KVA?	1M	2	1
	v.	What is the relation between field excitation and power factor in synchronous motor?	1M	3	1
	vi	Define torque angle.	1M	3	1
	vii.	What are the main advantages of a slip ring motor?	1M	4	1
	viii.	What is the condition for maximum torque at starting in a 3-phase induction motor?	1M	4	1
	ix.	Why single-phase induction motor is not self-starting?	1M	5	1
	x.	List the applications of stepper motor.	1M	5	1
Q.2(A)		Explain the concept of Rotating magnetic field, when stator is excited with 3-phase supply.	10M	1	3
		OR			
Q.2(B)		Find the chording angle of an 8-pole, 3-phase, 600 spread alternators. The winding has 72 coils in 72 slots. Also, the coils are short pitched by two slots. Calculate the winding factor for the fundamental and third harmonics.	10M	1	3
Q.3(A)		What is armature reaction? Explain with relevant phasor diagram, the effect of armature reaction on the terminal voltage of an alternator at (i) UPF load, (ii) lagging ZPF load and (iii) leading ZPF load.	10M	2	3
		OR			
Q.3(B)		Calculate the induced emf per phase of a 10-pole, 3-phase, 50 Hz alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150^0. The flux per pole has a fundamental component of 0.12 wb and a 20 % 3rd harmonic component.	10M	2	3
Q.4(A)		What is the nature of power factor in a power system? Explain how a synchronous motor can be used for power factor improvement, with proper vector diagram.	10M	3	3
		OR			
Q.4(B)		A 2.2 KV, 3-phase, star connected synchronous motor has an impedance, Z=0.1+j1.2 ohms per phase. The motor is operating at 0.6 power factor leading with a line current of 300A. Determine the generated end per phase.	10M	3	3

Q.5(A)	Explain the construction of circle diagram for 3-phase induction motor.	10M	4	3

OR

Q.5(B)	Develop the equivalent circuit for a 3-phase induction motor and draw the phasor diagram of an induction motor.	10M	4	3

Q.6(A)	Explain about the construction and working principle of
	  i) Capacitor-start
	  ii) Capacitor-run single phase induction motors.
		10M	5	2

OR

Q.6(B)	Using double revolving field theory explain the torque slip characteristics of a single-phase Induction motor.	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations – July 2023

DIGITAL ELECTRONICS
(EEE)

Time: 3Hrs

Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	What is Associative law in Boolean Algebra?	1M	1	1
	ii.	Convert the octal number 625 to the equivalent decimal number	1M	1	1
	iii.	What is the difference between combinational and sequential circuit.	1M	2	1
	iv	What is odd parity?	1M	2	1
	v.	Draw the logic diagram of D flip-flop using NAND gates.	1M	3	1
	vi	State any four applications of shift registers	1M	3	1
	vii.	What are the power supply requirements for the TTL and MOS logic families?	1M	4	1
	viii.	What are the advantages of ECL logic family?	1M	4	1
	ix.	Expand FPGA?	1M	5	1
	x.	Which memory is non-volatile and why?	1M	5	1
Q.2(A)		What are Universal gates? Implement AND, OR, EXOR, EXNOR gates by using (a) NAND gates (b) NOR gates.	10M	1	3
		OR			

Q.2(B)	(i)	Perform the following operation in binary:
		      a) $11001 \div 101$ b) 1101×101
		      c) $10100 + 1001$ d) $1010 - 100$
		      e) $10110 + 1011$
			5M	1	3

	(ii)	Obtain the 2's complement on the following numbers (a) 68-45 (b) 22-38	5M	1	3
Q.3(A)		Design a 4-bit BCD to Excess-3 Code converter and draw the equivalent diagram.	10M	2	3
		OR			
Q.3(B)		Minimize the following Boolean function using 4-variable K-map technique and draw the Boolean logic diagram $F(A, B, C, D) = \Sigma m(0,1,6,7,8,9) + d(10,11,12,14,15)$	10M	2	3
Q.4(A)		Design and implement a 4-bit synchronous up counter using T flip-flops.	10M	3	3
		OR			

Q.4(B)		Explain about the following with the help of logic diagram, truth table, excitation table and characteristic table.
		      (a) T Flip flop
		      (b) SR Flip flop
			10M	3	2

Q.5(A)	(i) Compare the characteristics of the logic families	5M	4	3
	(ii) Explain about 2- input RTL NAND gate with suitable diagram?	5M	4	2

OR

Q.5(B)	Explain about the operation of two input CMOS NAND and NOR gates with the help of relevant diagrams	10M	4	2

Q.6(A)	Design the PROM programming for the four Boolean functions listed below	10M	5	3

F1 (x, y, z) = Σ(1, 3, 6)   F2 (x, y, z) = Σ(0, 1, 6, 7)

F3 (x, y, z) = Σ(3, 4, 5)   F4 (x, y, z) = Σ(1, 2, 4, 7)

OR

Q.6(B)	(i) Compare the different Programmable Logic Devices.	5M	5	2
	(ii) What is meant by memory expansion? How is memory expansion attained?	5M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations – July 2023
ELECTROMAGNETIC FIELDS
(EEE)

Time: 3Hrs   **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define Coulombs law.	1M	1	2
	ii.	Define Gauss's law.	1M	1	2
	iii.	Define a capacitance of a capacitor and state its units.	1M	2	1
	iv	Define dielectric strength.	1M	2	4
	v.	Define Biot-savarts law.	1M	3	1
	vi	Define Maxwell's second Equation?	1M	3	4
	vii.	Define magnetic force?	1M	4	1
	viii.	Write torque expression on a current loop placed in a magnetic field.	1M	4	1
	ix.	What is Skin effect?	1M	5	3
	x.	Define Polarization and its types.	1M	5	2
Q.2(A)		Determine the curl of these vector fields. i) P=x2yzax+xyaz ii) P=ρsinφaρ+ρ2zaφ+zcosφaz iii) T= 1 cos θar+rsin θ cos φ aθ+cos θaφ	10M	2	5
		OR			
Q.2(B)		Write short notes on the following: i) Cartesian to rectangular system & vice versa ii) Cartesian to spherical system & vice versa	10M	3	3
Q.3(A)		i) State and explain Coulombs law of force between two charge points? ii) The concentrated charges of 0.25 µC are located at the vertices of an equilateral triangle of 10m of side. Find the magnitude and Direction of Force on one charge due to other two charges?	10M	1	2
		OR			
Q.3(B)		i) Define line charge, surface charge and volume charge distribution? ii) Derive the Expression for Electric Field Intensity at a point 'p' due to an Infinite line charge distribution?	10M	1	1
Q.4(A)		i)Derive Poisson's and Laplace's equations ii) Derive the Stroke's theorem	10M	2	4
		OR			
Q.4(B)		i) Derive differential form of the continuity equation of the current. ii) Find the magnitude of $\bar{D}$ and polarization $\bar{p}$ for a dielectric material in which $|\bar{E}| = 0.15 \times 10^{-3}v/m$ and $x_e = 4.25$.	10M	2	2

Q.5(A)	i) Derive differential form of the continuity equation of the current. ii) Find the magnitude of $\bar{D}$ and polarization $\bar{p}$ for a dielectric material in which $$|\bar{E}| = 0.15 \times 10^{-3} v/m \text{ and } x_e = 4.25.$$	10M	4	3
	OR			
Q.5(B)	i) Derive an expression for force on a straight current carrying conductor in a magnetic field. ii) Derive the magnetic boundary condition with neat diagram.	10M	4	4
Q.6(A)	Explain the concept of Electromagnetic waves, wave equations and its applications.	10M	5	1
	OR			
Q.6(B)	State and prove Poynting's theorem and derive the expression for average power.	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023
CONTROL SYSTEMS
(Electrical & Electronics Engineering)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only. All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define control system.	1M	1	1
	ii.	What is feedback? What type of feedback is employed in control systems?	1M	1	2
	iii.	Write the limitations of Routh's stability.	1M	2	1
	iv	What is transient and steady state response?	1M	2	2
	v.	Define root locus.	1M	3	1
	vi	What is centroid? How the centroid is calculated?	1M	3	2
	vii.	Write the expression for resonant peak and resonant frequency.	1M	4	3
	viii.	What is Band width?	1M	4	2
	ix.	List the advantages of state space analysis.	1M	5	1
	x.	Write the formula for solutions of state equation.	1M	5	3
Q.2(A)	i) Define open loop and closed loop systems. Explain advantages and disadvantages of open loop and closed loop systems.		5M	1	2
	ii) For the mechanical system shown below, derive the transfer function.		5M	1	2
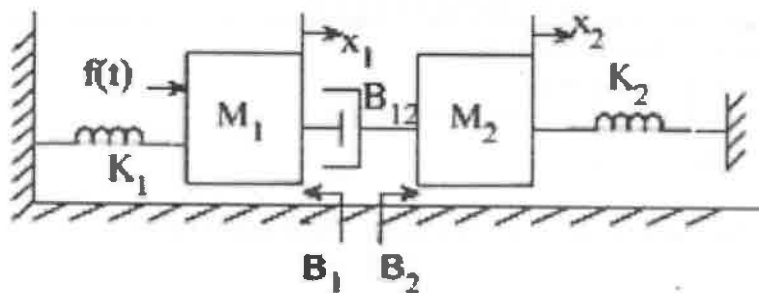
OR

Q.2(B)	i) Deduce the transfer function using Mason's gain formula	6M	1	3
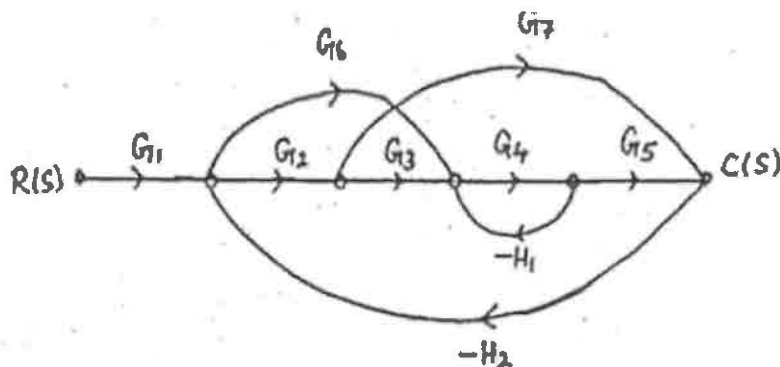
	ii) Explain the properties of Signal Flow Graph.	4M	1	2

Q.3(A)	For a unity feedback system the open loop transfer function is given by $G(S) = \frac{10}{(S+4)}$. Determine: i) maximum overshoot ii) rise time iii) settling time and iv) steady state error if the input is a unit step.	10M	2	3
	OR			
Q.3(B)	For a unity feedback control system, the open loop transfer function $G(S) = \frac{10(s+2)}{s^2(s+1)}$. Determine the position, velocity and acceleration error constants.	10M	2	3
Q.4(A)	Using Routh-Hurwitz criterion determine the stability of a system represented by a characteristic equations $S^5+S^4+2S^3+2S^2+3S+5=0$. Find the location of roots of characteristic equation in s-plane ?	10M	3	3
	OR			
Q.4(B)	Develop the root locus of the system whose open loop transfer function is $$G(S)H(S) = \frac{K}{S(S^2 + 4S + 13)}$$	10M	3	3
Q.5(A)	Develop the Bode plot for the system having the following transfer function $G(S) = \frac{10}{s(1+0.4s)(1+0.1s)}$.	10M	4	3
	OR			
Q.5(B)	Sketch the polar plot and determine the gain margin and phase margin for the open loop transfer function given by, $$G(s) = \frac{k}{s(1+0.2s)(1+0.05s)}$$	10M	4	3
Q.6(A)	A state model of a system is given as: $$\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & 11 & -6 \end{bmatrix} X += \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} U \text{ and } Y = [1\ 0\ 0]\ X$$ Determine: (i) The Eigen Values. (ii) The State Transition Matrix.	10M	5	3
	OR			
Q.6(B)	Find a state model for the system whose Transfer function is given by $$G(S)H(S) = \frac{(7S^2 + 12S + 8)}{(S^3 + 6S^2 + 11S + 9)}$$	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

PROBABILITY & STATISTICS
(Mechanical Engineering)

Time: 3Hrs   Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	If $P(A) = \frac{13}{52}$; $P(B) = \frac{20}{52}$ and $P(A \cap B) = \frac{5}{52}$. Find $P(A|B)$.	1M	1	2
	ii.	The density for X is given by $f(x) = c(1 - x), 1 \leq x \leq 3$. Find the value of c	1M	1	2
	iii.	If $Var(X) = 4$, find $Var(X + 5)$, X is a random variable.	1M	2	2
	iv	A discrete random variable has moment generating function $M_X(t) = e^{5(e^t - 1)}$. Find $E[X]$.	1M	2	2
	v.	Define Hazard rate function	1M	3	1
	vi	Write the necessary and sufficient conditions for a function to be a discrete joint density	1M	3	1
	vii.	Define Type-II error in sampling.	1M	4	1
	viii.	Write the statistic formula for difference of means in t-test.	1M	4	1
	ix.	Write down the ANOVA table for one way classification.	1M	5	1
	x.	Give an example of a 4×4 Latin square design.	1M	5	1
Q.2(A)		A computer center has three printers A, B, and C, which print at different speeds. Programs are routed to the first available printer. The probability that a program is routed to printers A, B and C are 0.6, 0.3 and 0.1 respectively. Occasionally a printer will jam and destroy the printout. The probability that printers A, B and C will jam are 0.01, 0.05 and 0.04 respectively. Your program is destroyed when a printer jams. What is the probability that printer A is involved? Printer B involved? Printer C involved?	10M	1	3

OR

Q.2(B)	Let density for X , the number of grafts that fail in a series of five trials, is given the following table:	10M	1	3

x	0	1	2	3	4	5
$f(x)$	0.7	0.2	0.05	0.03	0.01	$f(5)$

(a) Find $f(5)$?

(b) Find the table for F ?

(c) Use F to find the probability that at most three grafts fail; that at least two grafts fail ?

(d) Use F to verify the probability of exactly three failures is 0.03.

Q.3(A)	Find moment generating function, mean and variance of the Binomial distribution?	10M	2	3

OR

Q.3(B)	Let X be a continuous random variable with density $f(x) = cx^2; -3 \leq x \leq 3$	10M	2	3

(i) Find the value of c that makes this a density.

(ii) Find $E(X)$ and σ_X^2.

Q.4(A) Give the following bivariate probability distribution; obtain (i) Mean of X and   10M   3   3
Mean of Y; (ii) Covariance between X and Y.

X\Y	0	1	2
-1	1/15	3/15	2/15
0	2/15	2/15	1/15
1	1/15	1/15	2/15

OR

Q.4(B) Assume that the joint density for (X, Y) is given by   10M   3   3
$f_{X,Y}(x,y) = \frac{1}{x}; 0 < y < x < 1$.
Find $E[X], E[Y], E[XY]$, and $Cov(X,Y)$.

Q.5(A) The following table presents the results of a survey of eight randomly   10M   4   3
selected families:

Annual Income (in 000 Rs.)	8	12	9	24	13	37	10	16
% allocation for investment	36	25	33	15	28	19	20	22

Find the correlation co-efficient.

OR

Q.5(B) Two random samples gave the following results: 10M   4   3

Samples	Size	Sample Mean	Sum of the squares of the mean deviations
1	10	15	90
2	12	14	108

Examine whether the samples come from the same normal population.

Q.6(A) Five doctors each test five treatments for a certain disease and observe   10M   5   3
the number of days each patient takes to recover. Discuss the difference
between (i) the doctors and (ii) the treatments for the following data at
5% level.

		Treatments		
Doctors	1	2	3	4
1	10	14	23	18
2	11	15	24	17
3	9	12	20	16
4	8	13	17	17

OR

Q.6(B) A company is considering three word processors for use by their secretarial   10M   5   3
staff. All of them are acceptable, so the choice depends on which one is the
easiest to learn. Since speed is affected by the type of article being produced
and the learner, a Latin square design is used. The data obtained are given in
the following table.

	Factor (type of article)		
	I prose	II technical	III report
I	B(0.5)	A(1.2)	C(1.0)
II	C(1.2)	B(1.0)	A(0.95)
III	A(0.8)	C(1.7)	B(0.9)

Test $H_0: \mu_{1..} = \mu_{2..} = \mu_{3..}$ at the $\alpha = 0.05$ level

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023

MANUFACTURING TECHNOLOGY - 1

(Mechanical Engineering)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What are the applications of casting?	1M	1	1
	ii.	Name the various pattern materials	1M	1	1
	iii.	List out any four-arc welding equipment.	1M	2	2
	iv	Define – Welding.	1M	2	2
	v.	Differentiate between compound die & progressive die?	1M	3	1
	vi	What is Brazing?	1M	3	1
	vii.	Name the chemicals used in flux Manufacture.	1M	4	2
	viii.	What is extrusion?	1M	4	1
	ix.	Define atomization	1M	5	1
	x.	What are the factors affecting shearing operation?	1M	5	1
Q.2(A)		Explain cold chamber and hot casting process with a neat sketch	10M	1	2
		OR			
Q.2(B)		Mention the applications of investment casting? Discuss the detailed steps involved in investment casting in details with suitable diagrams.	10M	1	2
Q.3(A)		What are the different types of forging defects?	10M	2	2
		OR			
Q.3(B)		Define welding, mention its types, Explain Gas welding with a neat sketch and Mention the equipment's used, types of flames produced and give its advantages and limitations.	10M	2	3
Q.4(A)		Describe the characteristics of sheet metal and differentiate between hydro forming and super plastic forming.	10M	3	1
		OR			
Q.4(B)		Explain the working principle of mechanical press. How is it diverse from a hydraulic press?	10M	3	1
Q.5(A)		Draw a neat sketch and explain metal extrusion process. Give the example of four extruded products. What are different types of extrusion?	10M	4	1
		OR			
Q.5(B)		What is forging? What is the difference between open die forging and closed die forging? Explain upset forging with a neat diagram.	10M	4	1
Q.6(A)		Mention the purpose of compacting and sintering in powder metallurgy process.	10M	5	1
		OR			
Q.6(B)		What is ball milling technique to produce powder? How does it differ from attrition milling?	10M	5	1

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

THEORY OF MACHINES

(Mechanical Engineering)

Time: 3Hrs   **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	How the mechanism is different from machine?	1M	1	2
	ii.	Sketch the various inversions of a slider crank chain	1M	1	3
	iii.	Why do you study velocity and acceleration for a given mechanism?	1M	2	2
	iv	List out the three types of instantaneous centers for a mechanism.	1M	2	1
	v.	State law of gearing.	1M	3	1
	vi	What are the applications of gyroscopic couple?	1M	3	2
	vii.	State the conditions for static and dynamic balancing.	1M	4	1
	viii.	What are the necessary elements of a cam mechanism?	1M	4	2
	ix.	Sketch the different modes of the vibrations of a double rotor.	1M	5	3
	x.	Define whirling speed of the shaft.	1M	5	1
Q.2(A)		What do you mean by inversion of a mechanism? Explain with neat sketch any two inversion of slider crank chain mechanism.	10M	1	2
		OR			
Q.2(B)		The mechanism shown in below is driven by turning AoA. Find out geometrically the maximum and minimum transmission angles.	10M	1	3
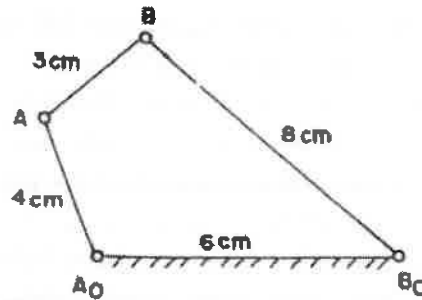
Q.3(A)	In a slider crank mechanism, the length of crank **OB** and connecting rod **AB** are 125 mm and 500 mm respectively. The crank speed is 600 RPM. Clockwise. When the crank has turned 45° from the inner dead center position, determine: 1. Velocity of the slider **A**, 2. Angular velocity of the connecting rod **AB.**	10M	2	3

<div align="center">OR</div>

Q.3(B)	In a pin jointed four bar mechanism, as shown in Fig. AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm. The angle BAD = 60°. The crank AB rotates uniformly at 100 RPM. Locate all the instantaneous centres and find the angular velocity of the link BC.	10M	2	3

A—B 300 mm, B—C 360 mm, C—D 360 mm, A—D 600 mm, angle at A = 60°

Q.4(A)	Derive an expression to determine the length of path of contact between two spur gears of different sizes.	10M	3	3
	OR			
Q.4(B)	An aeroplane makes a complete half circle of 50 metres radius, towards left, when flying at 200 km per hr. The rotary engine and the propeller of the plane has a mass of 400 kg and a radius of gyration of 0.3 m. The engine rotates at 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it.	10M	3	3
Q.5(A)	A cam is to give the following motion to a knife-edged follower: 1. Outstroke during 60° of cam rotation; 2. Dwell for the next 30° of cam rotation; 3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft	10M	4	3
	OR			
Q.5(B)	A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70° and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions.	10M	4	3
Q.6(A)	1. Define degrees of freedom. 2.Distinguish free vibrations, forced vibrations & Damped Vibration 3. Differentiate with an example (i) Longitudinal (ii) Transverse (iii) Torsional vibrations.	10M	5	3
	OR			
Q.6(B)	A coil of spring stiffness 4 N/mm supports vertically a mass of 20 kg at the free end. The motion is resisted by the oil dashpot. It is found that the amplitude at the beginning of the fourth cycle is 0.8 times the amplitude of the previous vibration. Determine the damping force per unit velocity. Also find the ratio of the frequency of damped and undamped vibrations.	10M	5	3

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

MECHANICS OF SOLIDS
(Mechanical Engineering)

Time: 3Hrs   **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	State Hooke's law.	1M	1	1
	ii.	What is principle of superposition?	1M	1	1
	iii.	Define beam and list the different types of beams	1M	2	1
	iv	What are the different types of loads?	1M	2	2
	v.	Define flexural rigidity.	1M	3	1
	vi	Write the equation for maximum deflection in a simply supported beam subjected to uniformly distributed load over the entire span.	1M	3	2
	vii.	What is stiffness of a shaft?	1M	4	1
	viii.	Why a hollow shaft is preferred over a solid shaft?	1M	4	2
	ix.	Distinguish between a long and short column.	1M	5	2
	x.	Define Slenderness Ratio?	1M	5	1
Q.2(A)		Explain briefly about the stress – strain diagram for mild steel with neat sketch	10M	1	3

OR

Q.2(B)		A brass bar, having cross-sectional area of 1000 mm^2, is subjected to axial forces as shown in Fig.	10M	1	4
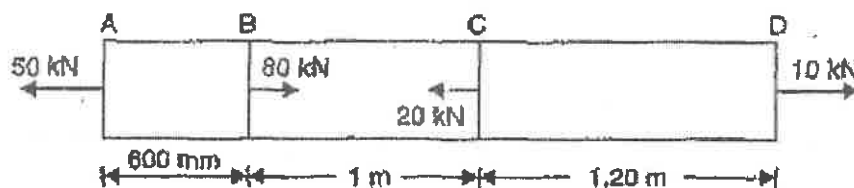
Find the total elongation of the bar. Take E = 1.05×10^5 N/mm^2

Q.3(A)		A simply supported beam carrying number of point loads as shown in figure. Draw the shear force and bending moment diagrams for the beam.	10M	2	3

OR

Q.3(B)	A simply supported beam of length 6 m, carries point load of 3 kN and 6 kN at distances of 2 m and 4 m from the left end. Draw the shear force and bending moment diagrams for the beam.	10M	2	3

Q.4(A)	State the assumption made in the theory of simple bending equation and derives the simple bending equation.	10M	3	3

OR

Q.4(B)	A beam 6 m long, simply supported at its ends, is carrying a point load of 50 kN at its centre. The moment of inertia of the beam is 78 X 10^6 mm^4. If E for the material of the beam = 2.1 X 10^5 N/mm^2. Calculate deflection at the centre of the beam and slope at the supports.	10M	3	3

Q.5(A)	Derive the torsion equation and write the assumptions.	10M	4	3

OR

Q.5(B)	A solid circular shaft of 100 mm diameter of length 4 X 10^3mm is transmitting 112.5 kW power at 150 r.p.m. Determine the maximum shear stress induced in the shaft. Take modulus of rigidity value as 8×10^4 N/mm^2.	10M	4	3

Q.6(A)	Derive the Euler's formula for the given conditions of one end fixed and another end pin jointed.	10M	5	4

OR

Q.6(B)	Calculate the safe compressive load on a hollow cast iron column (one end rigidly fixed and the other hinged) of 150 mm external diameter, 100 mm internal diameter and 10 m length. Use Euler's formula with a factor of safety of 5, and E = 95 GN/m^2.	10M	5	4

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023
PROBABILITY THEORY AND STOCHASTIC PROCESSES
(Electronics & Communication Engineering)

Time: 3Hrs   Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	In a game of dice a Shooter can win outright if the sum of two numbers showing up is either 7 or 11 when two dice are thrown. What is his probability of winning outright?	1M	1	2
	ii.	Define independence of two events?	1M	1	1
	iii.	Define distribution function of a random variable?	1M	2	1
	iv	Write the *m.g.f.* of a Gaussian random variable.	1M	2	1
	v.	Define conditional density function of x given Y ?	1M	3	1
	vi	Variances $\sigma_X^2 = 6$ and $\sigma_Y^2 = 9$; correlation coefficient $\rho_{XY} = -2/3$; Find the covariance C_{XY}	1M	3	2
	vii.	Define monotonic transformation of a continuous random variable?	1M	4	2
	viii.	State the Central limit theorem?	1M	4	1
	ix.	State the Ergodic theorem?	1M	5	1
	x.	Write any one of the properties of power density spectrum?.	1M	5	2
Q.2(A)		In a binary communication system transmitted symbols 1 and 0. Define appropriate events A_i and B_i, $i = 1, 2$ to represent symbols after and before channel respectively. Assume channel transition probabilities are all equal at $P(A_i|B_j) = 0.1$, $i \neq j$ and are $P(A_i|B_j) = 0.9$ for $i = j = 1, 2$, while symbol transmission probabilities are $P(B_1) = 0.6$ and $P(B_2) = 0.4$. (a) Compute the received symbol probabilities $P(A_1)$ and $P(A_2)$? (b) Compute the posterior probabilities for the system?	10M	1	3

OR

| Q.2(B) | (i) In a communication system the signal sent from point 'a' to point 'b' arrives by two paths in parallel. Over each path the signal passes through two repeaters (in series). Each repeater in one path has a probability of failing (becoming an open circuit) of 0.005. The probability is 0.008 for each repeater on the other path. All repeaters fail independently of each other. Find the probability that the signal will not arrive at point 'b'?
 (ii) Spacecraft are expected to land in a prescribed recovery zone 80 % of the time. Over a period of time, six spacecraft land. Find the probability that (a) none lands in the prescribed zone (b) at least one will land in the prescribed zone (c) The landing program is called successful if the probability is 0.9 or more that three or more out of six spacecraft will land in the prescribed zone. Is the program successful? | 10M | 1 | 2 |

Q.3(A) (i) A random variable X has the distribution function 10M 2 3

$$F_X(x) = \sum_{n=1}^{12} \frac{n^2}{650} u(x-n)$$

Find (a) $P(-\infty < X \le 6.5)$ (b) $P(X > 4)$ and (c) $P(6 < X \le 9)$.

(ii)The number of cars arriving at a certain bank drive-in window during any 10-min period is a Poisson random variable X with $\lambda = 2$. Find (i) the probability that more than 3 cars will arrive during any 10-min period. (ii) the probability that no cars will arrive.

OR

Q.3(B) For a Gaussian density function, show that 10M 2 4

(i) $\int_{-\infty}^{\infty} x f_X(x) dx = a_X$ and (ii) $\int_{-\infty}^{\infty} (x - a_X)^2 f_X(x) dx = \sigma_X^2$.

Q.4(A) 10M 3 3

Given the function $f_{X,Y}(x,y) = \frac{(x^2 + y^2)}{8\pi}$; $x^2 + y^2 < b$. Find

(i) constant b so that this is a valid joint density function and

(ii) $P\{0.5b < X^2 + Y^2 \le 0.8b\}$. (Use polar coordinates in both parts).

OR

Q.4(B) For two random variables X and Y 10M 3 4

$$f_{X,Y}(x,y) = 0.15\delta(x+1)\delta(y) + 0.1\delta(x)\delta(y) + 0.1\delta(x)\delta(y-2)$$

$$+0.4\delta(x-1)\delta(y+2) + 0.2\delta(x-1)\delta(y-1) + 0.05\delta(x-1)\delta(y-3)$$

Find: (a) the correlation, (b) the covariance, (c) the correlation coefficient of X and Y, (d) Are X and Y either uncorrelated or orthogonal?

Q.5(A) State and Prove Chebychev's inequality? 10M 4 3

OR

Q.5(B) Gaussian random variables X_1 and X_2 for which $\overline{X_1} = 2$, $\sigma_{X_1}^2 = 9$, $\overline{X_2} = -1$, 10M 4 3 $\sigma_{X_2}^2 = 4$ and $C_{X_1 X_2} = -3$ are transformed to new random variables Y_1 and Y_2 according to $Y_1 = -X_1 + X_2$, $Y_2 = -2X_1 - 3X_2$. Find (a) $\overline{X_1^2}$ (b) $\overline{X_2^2}$ (c) $\rho_{X_1 X_2}$ (d) $\sigma_{Y_1}^2$ (e) $\sigma_{Y_2}^2$ and (f) $C_{Y_1 Y_2}$

Q.6(A) (i) Show that the random process $X(t) = A\cos(w_0 t + \Theta)$ is wide sense 10M 5 3 stationary if it is assumed that A and w_0 and Θ is a uniformly distributed random variable on the interval $(0, 2\pi)$

(ii) The auto correlation function of a stationary random process $X(t)$ is

given by $R_{XX}(\tau) = 25 + \frac{4}{1+6\tau^2}$. Find the mean, mean square and variance of the process.

OR

Q.6(B) Find the autocorrelation function and spectral density function of a 10M 5 3 random process $X(t) = A\sin(\omega_o t + \Theta)$ where Θ a random variable is over the ensemble and is uniformly distributed over the interval $(0, \pi)$. Also find the average power.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations – July 2023
## PRINCIPLES OF SIGNALS AND SYSTEMS
(ECE)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define linear and nonlinear system.	1M	1	1
	ii.	Find the odd part of the signal given by $x(t) = e^{j\omega t}$	1M	1	3
	iii.	What is Nyquist rate? Also state aliasing effect.	1M	2	1
	iv	Test whether the signal $x(t) = e^{-2t}u(-t)$ is causal or not	1M	2	3
	v.	What is the condition for the existence of Fourier transform of a signal x(t)?	1M	3	1
	vi	Find the Fourier transform of impulse signal.	1M	3	3
	vii.	Define Bilateral and Unilateral Laplace transform.	1M	4	1
	viii.	Determine the Laplace transform of $-e^{-at}u(-t)$	1M	4	3
	ix.	What do you mean by Region of Convergence?	1M	5	1
	x.	Find the ROC for Z transform of $x(n)=a^n u(n)$.	1M	5	3
Q.2(A)	Check whether the system $y(n) = a^n u(n)$ is (i) Static or dynamic (ii) Linear or nonlinear (iii) Time-invariant or time-variant (iv) Stable or unstable		10M	1	3
	OR				
Q.2(B)	i) Sketch the given signal x(t), x(t)=3u(t+2)-2u(t+1)+u(t)+u(t-2)-3u(t-3) ii) Determine whether or not the following signal x(t) is periodic. If signal is periodic, determine its fundamental period. $x(t) = cos(t) + sin(\sqrt{2}t)$ b)		10M	1	3
Q.3(A)	Graphically find out the convolution for the following signals $x(t) = u(t) - u(t-3),\ h(t) = u(t-1) - u(t-4)$		10M	2	3
	OR				
Q.3(B)	What do you understand by LTI system? Derive the expression for the response of LTI system to any arbitrary input signal. Can this expression be called as Convolution?		10M	2	6
Q.4(A)	State and prove any four properties of Fourier transform.		10M	3	3
	OR				
Q.4(B)	Identify the Fourier transform of the gate function shown in the below figure. Also, plot the magnitude response.		10M	3	3

$$f(t)$$

$$1$$

$$-T/2 \qquad T/2 \qquad t$$
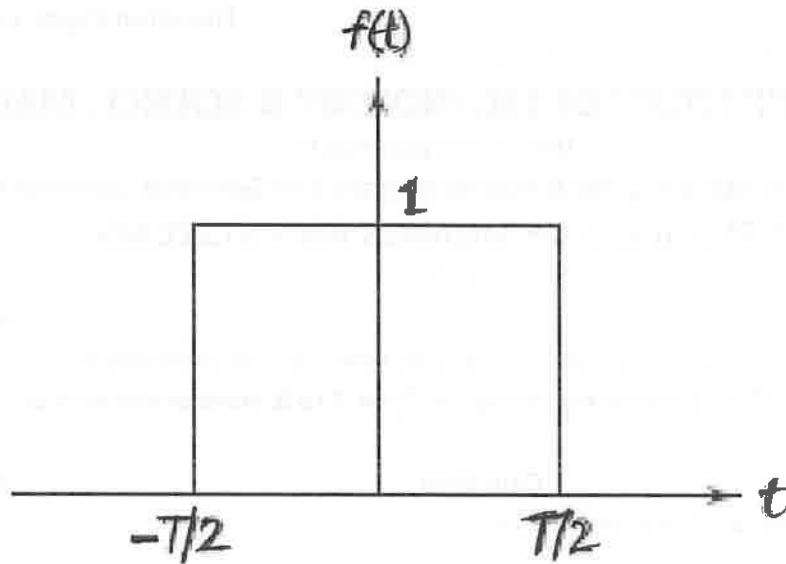
Q.5(A)	(i) Find the Laplace transform of the following signal and hence find out its ROC:	10M	4	3

a) $x(t) = e^{-b|t|}$

b) $x(t) = e^{-3t}u(t) + e^{-2t}u(t)$

(ii) State and prove convolution and differentiation properties of Laplace Transform

OR

Q.5(B)	Find the inverse Laplace-transform of	10M	4	3

$$X(s) = \frac{1}{s(s+2)(s+1)^2}$$

Q.6(A)	(i) State and prove properties of Z- transformation	10M	5	3
	(ii) Find the inverse Z-transform of			

$$X(z) = \frac{z(z-1)}{(z+2)^3(z+1)}$$

OR

Q.6(B)	Explain the Convolution, Time reversal and Differentiation properties of Z-Transform	10M	5	4

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations – July 2023
MICROPROCESSORS AND MICROCONTROLLERS
(Electronics & Communication Engineering)

Time: 3Hrs   Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	What is the size of an instruction byte queue in 8086 microprocessor?	1M	1	1
	ii.	What is the physical memory capacity of 8086 microprocessor?	1M	1	1
	iii.	What is the need for DMA?	1M	2	2
	iv	Find the BSR control word for setting PC 3 pin?	1M	2	3
	v.	What is an embedded system?	1M	3	2
	vi	What is the use of DJNZ instruction in 8051?	1M	3	1
	vii.	What is MAC in ARM7 processor and explain with example.	1M	4	1
	viii.	Compare RISC and CISC in terms processor and compiler complexity.	1M	4	4
	ix.	What is HAL stands for?	1M	5	2
	x.	List the three control signals in LCD display.	1M	5	1
Q.2(A)		Draw the internal architecture of 8086 Microprocessor and explain the function of each block	10M	1	2
		OR			
Q.2(B)		i) Explain the various assembler directives by providing at least one example in each.	5M	1	2
		ii) Draw and explain the flag register of 8086.	5M	1	2
Q.3(A)		Analyse the function of each block of 8255-PPI with the block diagram and explain the modes of operation.	10M	2	4
		OR			
Q.3(B)		Analyse the function of each block of 8279 Keyboard/Display interface with the block diagram.	10M	2	4
Q.4(A)		Explain the addressing modes in 8051 microcontrollers with suitable examples.	10M	3	2
		OR			
Q.4(B)		Draw and explain the architecture of 8051 microcontroller.	10M	3	2
Q.5(A)		Draw the architecture of ARM7 and explain each block of the ARM7?	10M	4	2
		OR			
Q.5(B)		i) Explain the arithmetic instructions of ARM microcontrollers with examples.	5M	4	2
		ii) Write ARM assembly code for the following C assignment. y = a*(b+c);	5M	4	3
Q.6(A)		Design a system for LCD display with the 8051 microcontroller and develop a complete program to display the strings 'MITS' on the LCD. Assume that the strings are coded as part of the program.	10M	5	3
		OR			
Q.6(B)		Draw the simple sketch of an 8-bit DAC interface with 8051 microcontroller and develop an assembly language program to generate a square wave.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations – July 2023
ANALOG CIRCUITS
(ECE)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
**All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	What is the ideal value of CMRR for a differential amplifier?	1M	1	1
	ii.	What do you mean by current-steering?	1M	1	1
	iii.	Define positive and negative feedback?	1M	2	1
	iv	What are advantages of RC oscillator?	1M	2	1
	v.	Write the ideal characteristics of op-amp.	1M	3	2
	vi	An op-amp has a differential voltage gain of 100,000 and a common-mode gain of 0.2. Determine and CMRR and express it in dB.	1M	3	5
	vii.	Write an application of Instrumentation amplifiers.	1M	4	1
	viii.	All-pass filter passes all the frequency components. Why is it then used?	1M	4	1
	ix.	Give some examples of monolithic IC voltage regulators.	1M	5	3
	x.	What is meant by astable and monostable multivibrators?	1M	5	1
Q.2(A)		Draw the circuit diagram of MOSFET differential amplifier and obtain, Ad, Ac, and CMRR.	10M	1	6
		OR			
Q.2(B)		Explain the working of class-B push-pull power amplifier and obtain the power efficiency.	10M	1	3
Q.3(A)		Explain RC Phase shift oscillator using op-amp and calculate the gain required to have oscillations.	10M	2	2
		OR			
Q.3(B)		What is feedback? Explain the different types of feedback and properties of negative feedback.	10M	2	1
Q.4(A)		Design and explain Summing and Difference amplifier using OP-AMP.	10M	3	6
		OR			
Q.4(B)		Write down the ideal characteristics of an OPAMP and derive the equations for integrator.	10M	3	2
Q.5(A)		Draw the circuit of a Schmitt trigger and explain its operation. Sketch the transfer characteristic and mark the hysteresis. What parameters determine hysteresis?	10M	4	6
		OR			
Q.5(B)		Explain the operation of log and antilog amplifiers with the help of neat circuit diagrams.	10M	4	3
Q.6(A)		Explain in detail the function of 555 timers in Monostable Multivibrator and derive the expression for frequency of oscillation.	10M	5	3
		OR			
Q.6(B)		Explain the different types of linear regulators using Op-amps.	10M	5	3

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations – July 2023

CONTROL SYSTEMS ENGINEERING
(ECE)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Distinguish between open-loop system and closed-loop system.	1M	1	2
	ii.	Why negative feedback is invariably preferred in closed loop system?	1M	1	2
	iii.	Distinguish between type and order of a system.	1M	2	3
	iv	What is type number of a system? What is its significance?	1M	2	3
	v.	What is necessary and sufficient condition for stability in Routhcriteria?	1M	3	3
	vi	What is crossing point on imaginary axis in s-plane?	1M	3	3
	vii.	What is frequency response?	1M	4	1
	viii.	What is gain cross over frequency?	1M	4	2
	ix.	Define controllability and observability	1M	5	2
	x.	What is the significance of state transition matrix?	1M	5	3
Q.2(A)		Evaluate the transfer function of the system shown in below figure using block reduction techniques.	10M	1	4
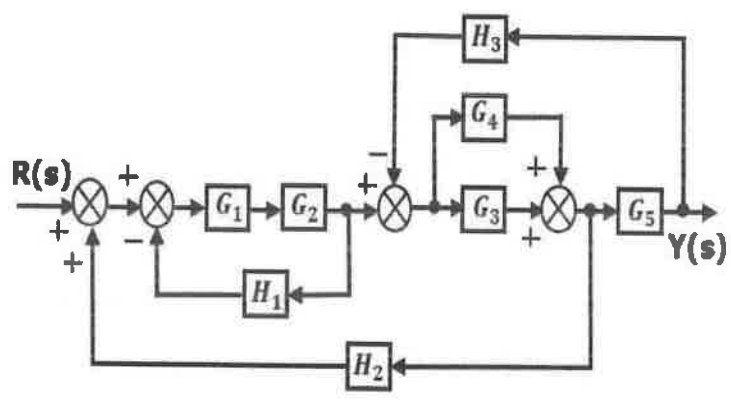
OR

Q.2(B)	Obtain the transfer function, Y(s)/X(s) of the system represented by signal flow graph in below figure.	10M	1	4
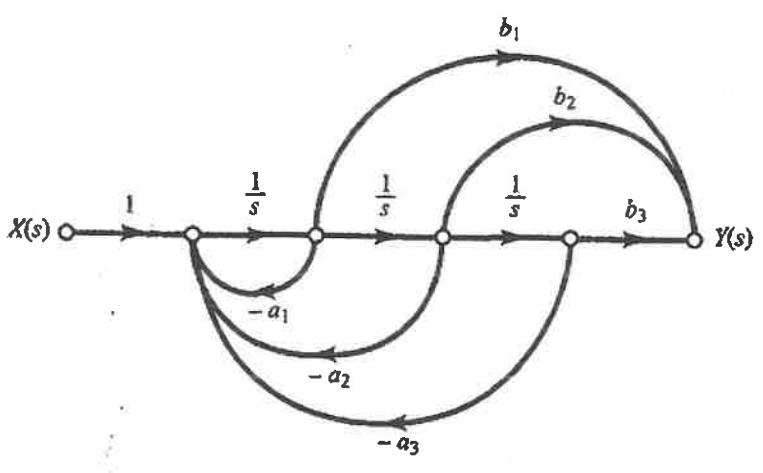
Q.3(A)	A unity feedback control system has an open loop transfer function, $G(s) = \dfrac{10}{s(s+2)}$. Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units.	10M	2	4

OR

Q.3(B)	Determine the value of K and P for the system so that $\zeta = 0.7$ and $\omega n = 5$.	10M	2	4
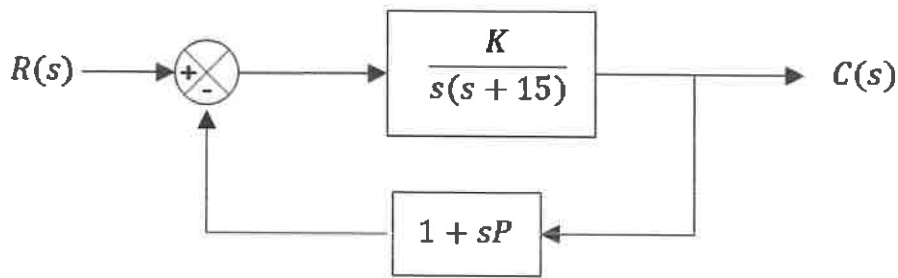
Q.4(A)	A unity negative feedback control system has an open loop transfer function as $G(s) = \dfrac{K}{S(S+2)(S+4)}$ Sketch the root locus and find the value of K corresponding to crossing point on imaginary axis	10M	3	4

OR

Q.4(B)	Determine the stability of the system using Routh array whose characteristic equation is given by $3s^4 + 10s^3 + 5s^2 + 5s + 2 = 0$. Also comment on location of roots in s-plane.	10M	3	4

Q.5(A)	The open loop transfer function of a unity feedback system is $G(s) = \dfrac{1}{s(1+s)(1+2s)}$. Sketch the polar plot and determine the gain margin and phase margin.	10M	4	

OR

Q.5(B)	A unity feedback control system has $G(s) = \dfrac{10}{s(1+0.1s)(1+0.4s)}$. Draw the Bode plot and determine gain cross over frequency (ω_{gc}), phase cross over frequency (ω_{pc}) from it.	10M	4	4

Q.6(A)	Discuss concept of observability. Evaluate the observability of the system. $$\begin{bmatrix} \dot{X_1} \\ \dot{X_2} \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ -2 & -1 \end{bmatrix}\begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} U(t)$$ $$and \quad Y(t) = \begin{bmatrix} 1 & 0 \end{bmatrix}\begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$$	10M	5	4

OR

Q.6(B)	What is State Variable Analysis or State Space Analysis? State the advantages of state variable analysis.	10M	5	4

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

OPERATING SYSTEMS FUNDAMENTALS
(Computer Science & Engineering)

Time: 3Hrs   **Max Marks: 60**

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	Why system calls are needed?	1M	1	1
	ii.	Write the syntax for if-else statement in Korn Shell Programming.	1M	1	1
	iii.	List out the various process scheduling criteria.	1M	2	2
	iv	Define process.	1M	2	1
	v.	Write a short note on message passing.	1M	3	1
	vi	Give the condition necessary for a deadlock situation to arise.	1M	3	1
	vii.	List the disadvantages of paging.	1M	4	2
	viii.	Define Demand paging in memory management.	1M	4	1
	ix.	List various file attributes.	1M	5	2
	x.	Define C-SCAN scheduling.	1M	5	1
Q.2(A)		Explain about the various structure of an operating system.	10M	1	4
		OR			
Q.2(B)		Explain in detail about the various decision making structure of Korn Shell Scripting.	10M	1	2
Q.3(A)		List and explain the different states of a Process.	10M	2	3
		OR			
Q.3(B)		Consider the following set of processes, with the length of the CPU burst given in milliseconds:	10M	2	4

Process	Burst Time	Priority
P1	2	2
P2	1	1
P3	8	4
P4	4	2
P5	5	3

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.

a. Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, nonpreemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2).

b. What is the turnaround time of each process for each of the scheduling algorithms in part a?

c. What is the waiting time of each process for each of these scheduling algorithms?

d. Which of the algorithms results in the minimum average waiting time (over all processes)?

Q.4(A)		Discuss the Necessary and sufficient conditions for Deadlock.	10M	3	2

Q.4(B) Consider the following snapshot of a system P0, P1,P2,P3,P4 and three   10M   3   4
resources of type A,B,C Resource type A has 10 instances, B has 5
Instances and C has 7 instances.

Process	Allocation				Max		
	A	B	C		A	B	C
P0	0	1	0		7	5	5
P1	2	0	0		3	2	2
P2	3	0	2		9	0	2
P3	2	1	1		2	2	2
P4	0	0	2		4	3	3

Solve using the banker's algorithm

Q.5(A) List and explain the different concepts involved in paging.   10M   4   3

OR

Q.5(B) Discuss paging and Explain page table structure with necessary diagram.   10M   4   4

Q.6(A) Classify the different file allocation methods with neat diagram. Mention   10M   5   3
the advantages and disadvantages.

OR

Q.6(B) List and explain the various disk scheduling.   10M   5   4

*** END***

Hall Ticket No:

Question Paper Code: 20CSE108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023
## JAVA PROGRAMMING
(Computer Science &Engineering)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Why Java is strongly typed language?	1M	1	2
	ii.	List out the rules to declare a variable in Java?	1M	1	1
	iii.	Define package.	1M	2	1
	iv	When can you use super keyword in Java?	1M	2	2
	v.	What are the states of a thread?	1M	3	1
	vi	Define race condition.	1M	3	1
	vii.	Differentiate Hash Set and Linked Hash Set.	1M	4	2
	viii.	Write the syntax for opening a file in Java?	1M	4	1
	ix.	Write down the syntax for Label and JLabel.	1M	5	1
	x.	Differentiate between Swings and AWT.	1M	5	2
Q.2(A)		What is constructor? Write the types of constructor with example?	10M	1	2
		OR			
Q.2(B)		Compare instance variable and static variable with appropriate example code and show what happens in runtime.	10M	1	3
Q.3(A)		Why Multiple inheritance is not allowed in Java? Explain how it is implemented using interfaces with suitable example.	10M	2	2
		OR			
Q.3(B)		Investigate why Strings are immutable in Java? How to create an object of type String?	10M	2	3
Q.4(A)		Discuss in detail about the various types of exception handling mechanism supported by Java	10M	3	2
		OR			
Q.4(B)		What is a thread? Explain thread life cycle and write a java program to create thread by implementing runnable interface.	10M	3	2
Q.5(A)		State and explain the usage of Stack, Queue, HashSet, LinkedHashSet, Trees	10M	4	2
		OR			
Q.5(B)		Describe about I/O Streams in detail with appropriate example.	10M	4	2
Q.6(A)		Discuss the various layout managers used in Java?	10M	5	3
		OR			
Q.6(B)		Explain about TabbedPane, ScrollPane, tree and Table with examples.	10M	5	2

*** END***

Hall Ticket No:

Question Paper Code: 20CSE109

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science &Engineering)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Differentiate between Big-oh and omega notation.	1M	1	1
	ii.	What do you understand by worst-case time complexity? What is it for merge sort algorithm?	1M	1	1
	iii.	Define the terms feasible solution, optimal solution, and objective function	1M	2	1
	iv	Differentiate greedy method and dynamic programming.	1M	2	1
	v.	What is articulation point in graph?	1M	3	1
	vi	State the complexity of kruskal's algorithm.	1M	3	1
	vii.	State 4-Queens problem.	1M	4	1
	viii.	Name two optimization problems where branch and bound algorithm is used.	1M	4	1
	ix.	Define tractable problems.	1M	5	1
	x.	What are Polynomial time and Non-deterministic Polynomial time algorithms?	1M	5	1
Q.2(A)		Derive the Best, Worst and Average time complexities of Merge sorting technique.	10M	1	3
		OR			
Q.2(B)		Explain Strassen's matrix multiplication method with an example.	10M	1	4
Q.3(A)		Explain about Optimal Merge Pattern with Nodes A=6, B=5, C=2, D=3.	10M	2	5
		OR			
Q.3(B)		Explain about String Editing with the strings abcfg and adceg.	10M	2	4
Q.4(A)		Find the minimum spanning tree using Prim's algorithm for the below graph.	10M	3	5
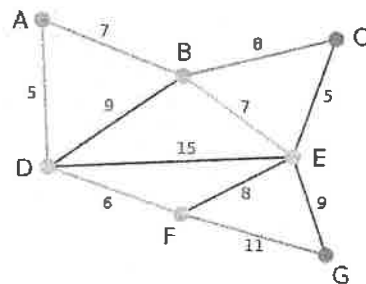
OR

Q.4(B)	Perform Dijkstra's single source shortest path algorithm for the following graph where **1** is the source node.	10M	3	4
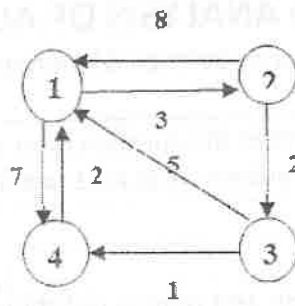
Q.5(A)	Write an algorithm for solving 4 Queens problem using Backtracking and analyze all possible solutions.	10M	4	4

OR

Q.5(B)	Determine the cost of an optimal tour for a given network using Branch and Bound method	10M	4	3
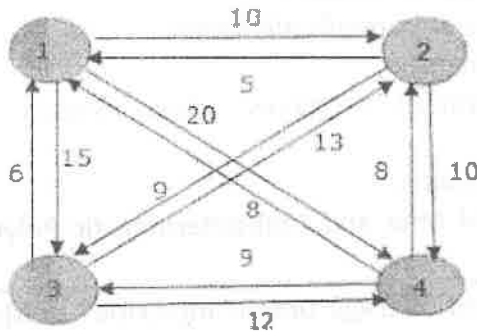
Q.6(A)	Distinguish P, NP, NP hard and NP- complete in detail.	10M	5	3

OR

Q.6(B)	Analyze the approximation algorithm for knapsack problem.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

AI TOOLS, TECHNIQUES AND APPLICATIONS
(CSE (Artificial Intelligence))

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define machine learning.	1M	1	1
	ii.	Define null hypothesis.	1M	1	1
	iii.	Name the method to find the number of clusters in K-means clustering	1M	2	1
	iv	What is semi-supervised learning	1M	2	1
	v.	What is the output of logistic regression	1M	3	1
	vi	What is entropy of a leaf node in DT	1M	3	1
	vii.	Give the formula to calculate inverse term document matrix.	1M	4	1
	viii.	What is the root when stemming is applied on the following terms: Going, goes, went.	1M	4	1
	ix.	What is role the of filters in image processing.	1M	5	1
	x.	Define pixel	1M	5	1
Q.2(A)		Fifteen fourth-grade students were randomly assigned to three groups to experiment with three different methods of teaching arithmetic. At the end of the semester, the same test was given to all 15 students. The table gives the scores of students in the three groups.	10M	1	2

Method I	Method II	Method III
48	55	84
73	85	68
51	70	95
65	69	74
87	90	67

Calculate the value of the test statistic F. Assume that all the required assumptions hold true

OR

Q.2(B)	Explain linear regression. What are SSSTO, SSE, and SSR? Explain with help Of diagram.	10M	1	2

Q.3(A)	Write K-means++ algorithm. Mention advantages and disadvantages of K-means++.	10M	2	2

OR

Q.3(B)	With respect to outlier and anomaly detection answer the following Question: i) Define outlier. ii) Different types of outliers. iii) Detect outlier using inter quartile range 62, 64 ,72, 76, 70, 64, 81, 77, 81, 63	10M	2	2

Q.4(A)	Create ANN with 3 layers with bias and without bias. Calculate the Output feed forward signal propagation. Input Layer: x0, x1 are two nodes with values 2 and 3 Hidden Layer: x2, x3 are two nodes with weights 1,1 and -1,1 Output Layer: x4 is output node with weight 2,-1 OR	10M	3	3
Q.4(B)	Write Decision Tree algorithm with a proper example and diagram.	10M	3	2
Q.5(A)	Explain how Latent Semantic Analysis is used for analyzing term-Document matrix. OR	10M	4	2
Q.5(B)	With respect to text pre-processing answer the following questions. i) unitization and tokenization ii) Standardize & Cleanse iii) Stop Word Removal iv) Stemming or Lemmatization.	10M	4	2
Q.6(A)	Explain the models of an auto-encoder. How is it different from Restricted Boltzmann machine. What is the use of both OR	10M	5	2
Q.6(B)	What are the two different vector representation of a term? Which one Is better and why? Explain Skip Gram with the neural network diagram Where term=2000 and W2V vector of 70 elements. What are the total Number of connected weights?	10M	5	2

<div align="center">*** END***</div>

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE (AI) and CSE (DS))

Time: 3Hrs   Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	How do you measure the efficiency of an Algorithm?	1M	1	2
	ii.	What is Binarysearch?	1M	1	2
	iii.	Explain the objective of job scheduling with deadlines problem.	1M	2	2
	iv	What is memorization?	1M	2	2
	v.	Define biconnected components in a graph.	1M	3	2
	vi	Explain about Direct Acyclic Graph.	1M	3	2
	vii.	What is single source shortest path problem?	1M	4	2
	viii.	Define Branch and Bound.	1M	4	2
	ix.	What is the difference between NP hard and NP Complete problem?	1M	5	2
	x.	Define deterministic algorithm.	1M	5	2
Q.2(A)		i) Define algorithm and explain the algorithm specifications.			
		ii) Define time complexity and analyse the time complexity for the below:	5M	1	3
			5M	1	3

```
int fun(int n)
{
  int count = 0;
  for (int i = 0; i < n; i++)
    for (int j = i; j > 0; j--)
      count = count + 1;
  return count;
}
```

OR

Q.2(B)		Explain the working of Strassen's Matrix Multiplication with the help of divide and conquer method.	10M	1	3
Q.3(A)		Consider the following set of characters and their frequencies: A: 5, B: 9, C: 12, D: 13, E:16, F:45, Show the steps of the Huffman coding algorithm to generate the optimal prefix code for this set of characters.	10M	2	3

OR

Q.3(B)		(a) Explain the methodology of Dynamic programming. Mention the applications of Dynamic programming.	3M	2	2
		(b) Solve the following instance of 0/1 KNAPSACK problem using Dynamic programming n = 3, (W1, W2, W3) = (2, 3, 4), (P1, P2, P3) = (1, 2, 5), and m = 6.	7M	2	3
Q.4(A)		Explain Breadth First Traversal Algorithm with example	10M	3	3

OR

Q.4(B) Consider the following matix and find the shortest path distance between   10M   3   3
every pair of vertices Using Floyd Warshall Algorithm.

$$A^0 = \begin{array}{c c} & \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \end{array} & \begin{bmatrix} 0 & 3 & \infty & 5 \\ 2 & 0 & \infty & 4 \\ \infty & 1 & 0 & \infty \\ \infty & \infty & 2 & 0 \end{bmatrix} \end{array}$$

Q.5(A) Explain the Graph – coloring problem. And draw the state space tree for   10M   4   3
m= 3 colors, n=4 vertices graph using Backtracking.

OR

Q.5(B) Discuss Draw the portion of state space tree generated by FIFOBB for the   10M   4   3
followinginstance of 0/1 knapsack n= 5, M=12, (p1, ...p5) = (10,15,6,8,4)
(w1,. ...w5)=(4,6,3,4,2)

Q.6(A) Explain Class NP-Hard? Differentiate between NP-Hard & NP-Complete   10M   5   2
algorithms?

OR

Q.6(B) Discuss the approximation algorithm for NP-hard Problems.   10M   5   2

*** END***

Hall Ticket No:

Question Paper Code: 20CAI107/20CSD107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023

OPERATING SYSTEMS FUNDAMENTALS

(Common to CSE (AI) and CSE (DS))

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What are the objectives of operating system?	1M	1	2
	ii.	What is the '$#' used in shell scripting?	1M	1	2
	iii.	State Process Control Block (PCB).	1M	2	1
	iv	What are the benefits of threads?	1M	2	2
	v.	Define race condition.	1M	3	1
	vi	List out the methods used to recover from deadlock.	1M	3	1
	vii.	Define fragmentation and list its types.	1M	4	1
	viii.	What are Page Hit and Page Fault?	1M	4	1
	ix.	Enlist different types of directory structure.	1M	5	1
	x.	What is the use of boot block?	1M	5	2
Q.2(A)		Explain different operating system structures with neat sketch.	10M	1	2
		OR			
Q.2(B)		Describe about looping control structure in Shell script with an example.	10M	1	2
Q.3(A)		(i) Write short notes on different Multithreading models with neat diagram. (ii) Discuss the Scheduling Criteria.	10M	2	2
		OR			
Q.3(B)		Consider the set of 6 processes whose arrival time and burst time are given below	10M	2	3

Process Id	Arrival time	Burst time
P1	0	4
P2	1	5
P3	2	2
P4	3	1
P5	4	6

i) If the CPU scheduling policy is FIFO, SJF and Round Robin with time quantum = 2, calculate the average waiting time and average turnaround time.

Q.4(A)		Define semaphore. Explain the usage and implementation of semaphore.	10M	3	2
		OR			
Q.4(B)		Explain Deadlock Avoidance in detail.	10M	3	2
Q.5(A)		What is the purpose of Paging? Discuss the advantages and disadvantages of Paging?	10M	4	2

Q.5(B)	Consider the following page reference string: 4,7,6, 1, 7, 6, 1, 2, 7, 2, 3, 7. How many page faults would occur for the FIFO, LRU and optimal page replacement algorithm, assuming three frames, six frames and all frames are initially empty	10M	4	4
Q.6(A)	Describe in detail about various file allocation methods with suitable diagram.	10M	5	3

Q.6(B)	Consider a disk queue with requests for I/O to blocks on cylinders in the following order: 98, 183, 37, 122, 14, 124, 65, 67 The disk head is initially at cylinder 53. Discuss how the following disk scheduling algorithm will work for the above data set.	10M	5	3

    i)   First come first serve scheduling.
    ii)   Shortest seek time first scheduling.
    iii)   SCAN scheduling.
    iv)   C-SCAN scheduling

Compute the total head movement for each algorithm. Also comment in terms of performance.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

PYTHON FOR DATA SCIENCE
(CSE (Data Science))

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Name any three applications of data science	1M	1	1
	ii.	Differentiate between data cleansing and data transformation	1M	1	2
	iii.	Differentiate between copy and view in Numpy array.	1M	2	1
	iv	Write the source code to create a Numpy ndarray object from a tuple.	1M	2	1
	v.	Define Drop Index.	1M	3	1
	vi	Write python code to create the given Pandas Data Frame.	1M	3	2
		Name ID Place 0 Mohe 12 Delhi 1 Shyni 43 Kochi 2 Parul 54 Pune 3 Sam 32 Patna			
	vii.	Name the package used to plot in pandas. Write it's syntax	1M	4	2
	viii.	Define map ().	1M	4	2
	ix.	List out any four applications of machine learning	1M	5	1
	x.	Draw the schematic representation of Evaluationphase in Machine learning.	1M	5	2
Q.2(A)	Explain in detail: i). Data Cleaning ii). Data Management iii). Data Manipulation	5M 3M 2M	1	2
		OR			
Q.2(B)	Write short notes on establishment of computational environment for data scientist using python.	10M	1	3
Q.3(A)	What are the various statistical and mathematical functions in python describe with suitable examples?	10M	2	2
		OR			
Q.3(B)	i.) Explain about slicing. ii.) What is negative slicing? iii.) With examples show how slicing works on 1D and 2D arrays.	 3M 3M 4M	2	3
Q.4(A)	Explore various methods involving in Indexing and Selecting Data with Pandas	10M	3	2
		OR			
Q.4(B)	How to Sort Data in a Pandas DataFrame. Explain with illustrations.	10M	3	2

Q.5(A)	Discuss various methods used for handling Missing Data in Pandas	10M	4	3
	OR			
Q.5(B)	Discuss different plotting approaches used in python.	10M	4	2
Q.6(A)	Elucidate the major categories of machine learning algorithms with suitable diagrams.	10M	5	2
	OR			
Q.6(B)	What is supervised machine learning algorithm? Explain the categories of supervised machine learning algorithm with applications.	10M	5	3

*** END***

Hall Ticket No: ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚ Question Paper Code: 20CSC108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

JAVA PROGRAMMING
(CSE (Cyber Security))

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What are objects? How are they created from a class?	1M	1	1
	ii.	Mention the properties of a constructor.	1M	1	1
	iii.	How does the String class differ from the String Buffer class?	1M	2	1
	iv	List any four built-in packages from Java API along with their use.	1M	2	1
	v.	Define user-defined exceptions.	1M	3	1
	vi	Define resume thread.	1M	3	1
	vii.	What is the difference between a hash set and a Linked hash set?	1M	4	1
	viii.	What is a Vector class?	1M	4	1
	ix.	What are the components available in the swing?	1M	5	1
	x.	What is the use of Scroll panes?	1M	5	1
Q.2(A)		Explain about Class, Objects, and Methods in Java with an example program.	10M	1	2
		OR			
Q.2(B)		Illustrate the arrays and their types in detail with an example program.	10M	1	2
Q.3(A)		What is meant by a string? Explain various string handling methods in detail.	10M	2	2
		OR			
Q.3(B)		Identify the different types of inheritance, and explain them with a Java program.	10M	2	3
Q.4(A)		Distinguish in detail about Exception handling functions.	10M	3	4
		OR			
Q.4(B)		Infer the concepts of multithreading with an example program for a) Extending the thread class b) Implement runnable interface	10M	3	4
Q.5(A)		Determine in detail about Byte stream classes.	10M	4	5
		OR			
Q.5(B)		Illustrate the queue interface with an example program.	10M	4	3
Q.6(A)		What are the types of JDBC Drivers? Explain in detail about them.	10M	5	2
		OR			
Q.6(B)		Explain JApplet, JFrame & JComponent with an example.	10M	5	5

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023
DESIGN AND ALALYSIS OF ALGORITHMS
(CSE (Cyber Security))

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	If $f(n) = 5n^2 + 6n + 4$ then prove $f(n) = O(n^2)$	1M	1	1
	ii.	Define Big-O notation.	1M	1	1
	iii.	Can we solve 0/1 knapsack problem with greedy method? Comment on your answer.	1M	2	1
	iv	Define Strongly Connected Components of a graph.	1M	3	1
	v.	Explain the applications of depth first search algorithm.	1M	3	1
	vi	Define Backtracking? List the applications of Backtracking.	1M	4	1
	vii.	Define State space tree.	1M	4	1
	viii.	Define Bounding function.	1M	4	1
	ix.	What is the relation between NP-hard and NP-complete?	1M	5	1
	x.	Distinguish between deterministic and non deterministic algorithm.	1M	5	2
Q.2(A)		Discuss about different ways of Divide and conquer strategies in detail.	10M	1	2
		OR			
Q.2(B)		Illustrate the procedure of Strassen's Matrix multiplication.	10M	1	2
Q.3(A)		Write a greedy algorithm to the job sequencing with deadlines.	10M	2	4
		OR			
Q.3(B)		Define merging and purging rules in 0/1 knapsack problem using dynamic programming. Explain it with an appropriate example.	10M	2	3
Q.4(A)		State and Explain N-Queens Problem. Write the backtracking algorithm for solving 8-Queens problem.	10M	3	2
		OR			
Q.4(B)		Explain Branch and Bound method for 0/1 Knapsack Problem.	10M	3	3
Q.5(A)		State and Explain 8-Queens Problem. Write the backtracking algorithm for solving 8-Queens problem.	10M	4	2
		OR			
Q.5(B)		Explain Branch and Bound method for solving Travelling Salesman Problem.	10M	4	2
Q.6(A)		Explain the steps used to show a given problem is NP-Complete? Discuss Cooks's theorem in detail.	10M	5	3
		OR			
Q.6(B)		Write notes on polynomial time reducibility. Give Examples and explain by intractable problems?	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

OPERATING SYSTEM FUNDAMENTALS FOR SECURITY

(CSE (Cyber Security))

Time: 3Hrs   **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q. no 1 are compulsory. In Q. no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Mention the list of services provided by an Operating System?	1M	1	2
	ii.	What are the operations performed on process?	1M	1	1
	iii.	Give the condition necessary for a deadlock situation to arise?	1M	2	2
	iv	What are the conditions under which a deadlock situation may arise?	1M	2	1
	v.	Define demand paging in memory management?	1M	3	1
	vi	Determine the most common schemes for defining the logical structure of a directory?	1M	3	2
	vii.	List out some the information flow models for both confidentiality and integrity?	1M	4	2
	viii.	Mention some of the key characteristics of Trusted systems?	1M	4	2
	ix.	List out different types of systems threats?	1M	5	2
	x.	Mention the steps for performing the Vulnerability Hypothesis Methodology?	1M	5	2
Q.2(A)		Consider the following five processes, with the length of the CPU burst time given in milliseconds. Process Burst time P1 8, P2 6, P3 1, P4 9, P5 3 .Consider the First come First serve (FCFS), Non Pre-emptive Shortest Job First (SJF) Illustrate the scheduling using Gantt chart. Which algorithm will give the minimum average waiting time, throughput and turnaround time? Discuss.	10M	1	3
		OR			
Q.2(B)		Define operating system and list out the functions and components of operating system?	10M	1	1
Q.3(A)		What is the important feature of critical section? State the Dining Philosopher's problem and show how to allocate the several resources among several processes in a deadlock and starvation free manner?	10M	2	3
		OR			
Q.3(B)		Explain the use of Deadlock Avoidance Algorithm with suitable illustration?	10M	2	2
Q.4(A)		Consider scenario Disk head is start at 53.The queue of pending request is, 98,183, 37, 122, 14, 124, 65, 67. Analysis the following problem using different disk scheduling algorithm FCFS , SSTF,SCAN,C-SCAN, LOOK	10M	3	3
		OR			
Q.4(B)		When page faults will occur? Describe the actions taken by operating system during page fault in detail?	10M	3	2

Q.5(A)	Discuss in detail about Mandatory Protection Systems with neat Architecture?	10M	4	2
	OR			
Q.5(B)	Explain briefly about threats and different threat models in detail?	10M	4	2
Q.6(A)	Explain various security issues and attacks present in Pervasive Computing, wireless network systems?	10M	5	2
	OR			
Q.6(B)	Discuss the security issues and attacks on different types of operating systems?	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations – July 2023
COMPUTER ARCHITECTURE
(CST)

Time: 3Hrs   Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Draw the Memory hierarchy pyramid.	1M	1	1
	ii.	What are the basic functional units of a computer?	1M	1	1
	iii.	Sign extend 11001010 to a 16 bit number.	1M	2	2
	iv	Perform arithmetic shift right for 1110110?	1M	2	2
	v.	What is a Program Counter?	1M	3	2
	vi	Define structural Hazard.	1M	3	1
	vii.	List the techniques used for overcoming Data hazard.	1M	4	1
	viii.	Write atleast two approaches in hardware multithreading.	1M	4	1
	ix.	Draw the schematic of the I/O module?	1M	5	2
	x.	Define Cache memory.	1M	5	1
Q.2(A)		Tabulate the various registers available in MIPS architecture with their symbolic name, number and usage.	10M	1	3
		OR			
Q.2(B)		Explain in detail about the Functional units of a computer system with diagrams.	10M	1	2
Q.3(A)		Explain the Booth's Multiplication Algorithm with the help of a flowchart. Multiply 11 x -11 using Booth's Multiplier?	10M	2	4
		OR			
Q.3(B)		i) Find the decimal value of the below binary number in IEEE Standard 754 single precision format.	4M	2	5
		Binary number - $(00111110001000000000000000000000)_2$			
		ii) Add 9.75 and 18.5625 and represent the result in IEEE 754 single precision format.	6M		
Q.4(A)		List the various types of hazards in pipelining. Discuss how to deal with control hazards.	10M	3	2
		OR			
Q.4(B)		What is pipelining? With necessary diagrams, write about pipelined data path and control.	10M	3	2
Q.5(A)		Explain in detail Flynn's classification of parallel hardware with neat diagrams.	10M	4	2
		OR			
Q.5(B)		What is meant by Instruction level parallelism? Explain in detail.	10M	4	2

Q.6(A) i) Draw the Memory Hierarchy diagram and explain about various memory technologies.   5M   5   4

ii) A computer system with a word length of 32 bits has a 16 MB byte addressable main memory and 64 KB 4-way set associative cache memory with a block size of 256 bytes. Consider the following physical addresses.   A1=(42C8AA)$_{16}$,   A2=(546B88)$_{16}$,   A3=(6A2C9C)$_{16}$, A4=(5E4CD0)$_{16}$. Determine the sets in the cache to which these physical addresses are mapped.   5M

OR

Q.6(B) i) Explain briefly about the various Cache memory mapping techniques.   5M   5   4

ii) A 4KB Set-associative cache memory consists of 256 lines with each set having 8 lines. The main memory has a blocks worth 8KB.   5M
Find

    a) Main memory size

    b) Physical Address(P.A) bits split up.

*** END***

Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐   Question Paper Code: 20CST107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July- 2023

OPERATING SYSTEMS
(Computer Science &Technology)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	List out any three functions of Operating System.	1M	1	2
	ii.	What is operating system?	1M	1	1
	iii.	List out various states of a process.	1M	2	2
	iv	What is meant by PCB?	1M	2	1
	v.	List out the scheduling algorithms.	1M	3	2
	vi	Mention the deadlock avoidance approach.	1M	3	1
	vii.	What is swapping?	1M	4	1
	viii.	Define Virtual memory.	1M	4	1
	ix.	Draw a disk structure.	1M	5	2
	x.	What is an interface?	1M	5	1
Q.2(A)		Illustrate in detail about different types of system calls.	10M	1	3
		OR			
Q.2(B)		Describe operating system structure and Operations.	10M	1	2
Q.3(A)		Discuss about the process in detail.	10M	2	2
		OR			
Q.3(B)		Illustrate the functioning of inter process communication.	10M	2	2

Q.4(A) Consider the following set of process with the length of CPU burst time   10M   3   3
given in milliseconds:

Process	Arrival Time	Burst Time	Priority
P1	2	2	3
P2	3	3	2
P3	0	1	4
P4	4	2	1
P5	3	2	3

Draw the Gantt chart that illustrate the execution of the processes using
Round Robin (quantum =2) and SJF. Calculate waiting and turnaround time
of each process for the scheduling algorithm.

OR

Q.4(B)	Explain in detail about deadlock prevention and detection methods.	10M	3	2
Q.5(A)	How does Contiguous Memory Allocation works? Explain in detail.	10M	4	3

OR

Q.5(B)	Consider the following page reference string 7,0, 1,2,0,3,0,4,2,3,0,3,2, 1,2,0, 1, 7, 10 0, 1. How many page faults would occur for FIFO page replacement algorithm, assuming three frames?	10M	4	3
Q.6(A)	Explain about the different access methods of a file.	10M	5	2
	OR			
Q.6(B)	Illustrate the process of disk storage management in detail.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023
OBJECT ORIENTED PROGRAMMING USING JAVA
(Computer Science & Technology)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What is a Class? How it is Created in java?	1M	1	1
	ii.	Difference between static variable and instance variable.	1M	1	2
	iii.	How many classes can implement an interface?	1M	2	1
	iv	List the benefits of Inheritance.	1M	2	1
	v.	Give the syntax of using try and catch.	1M	3	1
	vi	What class is at the top of the exception hierarchy?	1M	3	1
	vii.	List the methods in InputStream class.	1M	4	1
	viii.	What is the difference between a Scrollbar and a ScrollPane?	1M	4	1
	ix.	Make a comparison between the swing & AWT.	1M	5	2
	x.	Write a simple applet program to draw a circle.	1M	5	1
Q.2(A)		What is Constructor? Explain types of Constructors in Java	10M	1	3
		OR			
Q.2(B)		Define scope and lifetime of variables. Explain about the scope and lifetime of variables in Java.	10M	1	4
Q.3(A)		What is inheritance? Explain different forms of inheritance with suitable program segments and real world example classes.	10M	2	2
		OR			
Q.3(B)		Explain interface in JAVA. How do interfaces support polymorphism?	10M	2	3
Q.4(A)		Describe different types of Exceptions Class. Write a program for handling Array out of bounds Exception.	10M	3	4
		OR			
Q.4(B)		Discuss about the Java error handling mechanism? What is the difference between "unchecked exceptions" and "checked exceptions"? What is the implication of catching all the exceptions with the type "Exception"?	10M	3	3
Q.5(A)		Explain the delegation event model used to handle events in JAVA. What events, event listener, and event sources?	10M	4	2
		OR			
Q.5(B)		Describe about different input and output streams and their classes.	10M	4	4
Q.6(A)		Write a java Program to implement an AWT based calculator with basic operations.	10M	5	3
		OR			
Q.6(B)		Write detail about labels, button, scrollbars, Text components & Checkbox.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R20) Regular & Supplementary End Semester Examinations, July - 2023

NETWORK AND COMMUNICATION
(Computer Science & Technology)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Differentiate between various types of networks.	1M	1	1
	ii.	What are the responsibilities of data linklayer?	1M	1	2
	iii.	What is Bluetooth Low Energy?	1M	2	1
	iv	What are the responsibilities of Network Layer?	1M	2	1
	v.	Define Intra and Interdomain Routing.	1M	3	1
	vi	What is unicast, Multicast and Broadcast routing?	1M	3	1
	vii.	List the applications of UDP.	1M	4	1
	viii.	What is meant by QoS?	1M	4	1
	ix.	Write the responsibilities of ApplicationLayer.	1M	5	1
	x.	What is CIA in Network Security?	1M	5	1
Q.2(A)		State the purpose of layering in networks. Explain layers of OSI reference model along with their functionalities.	10M	1	2
		OR			
Q.2(B)		Describe Cyclic Redundancy Check (CRC) technique. The generator polynomial is $x^3 + x + 1$. A sender wants to send data 1001. Generate CRC code. Also describe error checking process if 3rd bit is inverted from the left.	10M	1	3
Q.3(A)		a) Write a note on Ethernet (802.3).	5M	2	2
		b) Discuss about packet switching.	5M	2	2
		OR			
Q.3(B)		Discuss various layers in Bluetooth architecture.	10M	2	2
Q.4(A)		Discuss Distance Vector Multicast Routing Protocol (DVMRP) and Reverse Path Forwarding (RPF) protocols in detail.	10M	3	2
		OR			
Q.4(B)		Briefly explain about various Unicast routing protocols.	10M	3	2
Q.5(A)		Discuss Sliding Window Protocol in detail.	10M	4	2
		OR			
Q.5(B)		a) Draw and explain each field in the TCP Segment header.	5M	4	2
		b)Explain techniques to improve QoS in transport layer.	5M	4	2
Q.6(A)		What is electronic E-mail? Describe in brief about the architecture of email.	10M	5	2
		OR			
Q.6(B)		Explain Firewall in detail with a neat diagram.	10M	5	4

*** END***