MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

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

NUMERICAL METHODS

(Civil Engineering, Electrical & Electronics Engineering and 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.	Find first approximation to the root of the equation $x^2 + x - 1 = 0$ by Bisection method	1M	1	2
	ii.	Define diagonally dominant matrix with an example	1M	1	1
	iii.	Define interpolation with an example	1M	2	1
	iv	Find the Lagrange's polynomial for the following table	1M	2	2

x	2	4	7
y	4	7	10

			Marks	CO	BL
	v.	State the expression for $\left(\dfrac{dy}{dx}\right)_{x=x_n}$ using backward differences	1M	3	1
	vi	Write all the sub intervals when $f(x) = e^x$ with $[1.4, 7.4]$ with $h = 0.5$	1M	3	2
	vii.	Find $y(0.1)$ by Euler's method, given that $y' = x^2 - y$ with condition $y(0) = 1$ and $h = 0.1$	1M	4	2
	viii.	State the second order Runge-Kutta method formula	1M	4	1
	ix.	State the principle of least squares	1M	5	1
	x.	State the normal equations to fit the curve of the form $y = a + bx + cx^2$	1M	5	1

Q.2(A)	Find a root of $f(x) = x^2 + e^x - 5$ by Regula-falsi method correct to three decimal places.	10M	1	3

OR

Q.2(B)	Apply Gauss Seidel method to solve the system of equations $20x + y - 2z = 17$, $3x + 20y - z = -18$ and $2x - 3y + 20z = 25$	10M	1	3

Q.3(A)	Estimate the population in the year 1895 and in the year 1925 from the following table:	10M	2	4

Year	1891	1901	1911	1921	1931
Population	46	66	81	93	101

OR

Q.3(B)	Find the value of f (4) using Lagrange's Interpolation formula	10M	2	3

x	0	2	3	6
$f(x)$	-4	2	14	158

Q.4(A) Find the maximum and minimum value of y from the following table   10M   3   4

x	-2	-1	0	1	2	3	4
$f(x)$	2	-0.25	0	-0.25	2	15.75	56

OR

Q.4(B) Evaluate $\int_0^6 \dfrac{e^x}{1+x}\,dx$ by with the proper number of sub intervals by using a)   10M   3   3

Trapezoidal rule. b) Simpson's $\dfrac{1}{3}$ rule.

Q.5(A) Solve the initial value problem $\dfrac{dy}{dx} = x^2 + y^2$, y(0)=1, by Picard's method   10M   4   3

four decimal places.

OR

Q.5(B) Determine $y(1.1)$ and $y(1.2)$ by fourth order Runge-Kutta method, given   10M   4   3

that $\dfrac{dy}{dx} = xy + y^2$, $y(1)=1$.

Q.6(A) Fit a second degree polynomial $y = a + bx + cx^2$ to the following data   10M   5   3

x	1.5	2	2.5	3	3.5	5
y	10	18	13	25	63	95

-- OR

Q.6(B) Using method of least squares, fit a curve of the form $y = ab^x$ for the   10M   5   3
following data

x	1	3	5	7	6
y	144	170	230	324	426

*** END ***

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

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

ECONOMICS AND FINANCIAL ACCOUNTING FOR ENGINEERS
(Common to CE, EEE, ECE 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.	Define Economics	1M	1	1
	ii.	Demonstrate law of supply	1M	1	3
	iii.	Outline opportunity cost	1M	2	1
	iv	Discuss isocost	1M	2	2
	v.	Explain market	1M	3	2
	vi	Paraphrase the features of perfect competition market	1M	3	2
	vii.	Describe accounting	1M	4	2
	viii.	Construct proforma of Ledger	1M	4	2
	ix.	Explain debt-equity ratio	1M	5	2
	x.	Summarize capital budgeting techniques	1M	5	2
Q.2(A)		Summarize the problems of scarcity and choice.	10M	1	5
		OR			
Q.2(B)		Describe is elasticity of demand? Illustrative factors determine elasticity of demand.	10M	1	3
Q.3(A)		Define Cost? Distinguish between long run costand short run cost	10M	2	4
		OR			
Q.3(B)		List out Breakeven point assumptions and importance.	10M	2	4
Q.4(A)		Distinguish between Monopoly and monopolistic.	10M	3	4
		OR			
Q.4(B)		How do you determine price- output under monopoly?	10M	3	5
Q.5(A)		Elucidate accounting concepts and conventions.	10M	4	2
		OR			
Q.5(B)		Prepare Pro-forma of profit & loss account and Balance sheet	10M	4	5
Q.6(A)		Paraphrase different types of ratios	10M	5	2
		OR			
Q.6(B)		Explain NPV & IRR in brief.	10M	5	4

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, February - 2023
PROBABILITY AND STATISTICS FOR COMPUTER SCIENCE
(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.	Let A and B be events such that $p(A) = 0.5$, $p(B) = 0.7$ what must be $p(A \cap B)$ equal for A and B to be independent?	1M	1	1
	ii.	Define a discrete random variable.	1M	1	1
	iii.	Define moment generating function of a Poisson distribution.	1M	2	1
	iv	Define Normal distribution	1M	2	1
	v.	Define continuous joint density function.	1M	3	1
	vi	Define covariance between two random variables	1M	3	1
	vii.	Write a formula for Pearson's coefficient of Skewness	1M	4	1
	viii.	What is the relation between regression coefficients and correlation coefficient	1M	4	1
	ix.	Define critical region	1M	5	1
	x.	If P=0.5 and the sample size is 250 then the standard error is	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?	10M	1	3

OR

Q.No	Question	Marks	CO	BL
Q.2(B)	A continuous random variable X has the probability density function, $$f(x) = \begin{cases} cx(2-x), & if\ 0 \leq x \leq 2 \\ 0, & otherwise \end{cases}$$ Where C is a constant. Find (i) C value (ii) P[0.5 < X < 1.5] (iii) mean and (iv) variance.	10M	1	3

Q.No	Question	Marks	CO	BL
Q.3(A)	Let X be a Poisson random variable with parameter λ (or k) =10. Find the (i) $p(X \leq 4)$ (ii) $p(X > 3)$ (iii) $p(1 \leq X < 4)$ (iv) $E(X)$ (v) $Var(X)$	10M	2	2

OR

Q.No	Question	Marks	CO	BL
Q.3(B)	Assume that during seasons of normal rainfall the water level in feet at a particular lake follows normal distribution with mean 160 feet and standard deviation 10 feet. During such a season, find the probability that one can observe a water level (i) will exceeds 150 feet (ii) will be between 135 feet and 180 feet (iii) will be less than 140 feet.	10M	2	3

Q.4(A) For the following bivariate probability distribution find (i) marginal distributions of X and Y (ii) V(X) and V(Y) (iii) Covariance between X and Y (iv) X and Y are independent?   10M   3   3

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) The joint density for (X,Y) is given by $f(x,y) = xye^{-(x+y)}$ $x > 0, y > 0$ 10M   3   3
- a) Find the marginal densities for X and Y.
- b) Find Cov (X,Y)
- c) Are X and Y independent?
- d) Find $p(X \le 1, Y \le 1)$

Q.5(A) Calculate the first four moments of the following distribution about the mean: 10M   4   3

x	0	1	2	3	4	5	6	7	8
f	1	8	27	56	80	60	29	8	1

Also calculate β_1 and β_2.

OR

Q.5(B) Calculate the rank correlation coefficient for the following data: 10M   4   3

X	68	64	75	50	64	80	75	64	58	40
Y	70	68	80	70	75	90	70	50	60	55

Q.6(A) (i) Before an increase in excise duty on tea, 800 persons out a sample of 1000 persons were found to be tea drinkers. After an increase in duty, 800 people were tea drinkers in a sample of 1200 people. Test whether there is a significant decrease in the consumption of tea after the increase in excise duty?   10M   5   3

(ii) A sample of 900 members is found to have a mean of 3.4 cm with standard deviation 1.61 cm. Can it be reasonably regard as a truly random sample from a large population with mean 3.25 cm.

OR

Q.6(B) A random sample of 10 boys had the following I.Q.: 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a population mean I.Q. of 100 (Test at 5% significance level)? Also construct 95% confidence limits for true mean?   10M   5   2

*** END***

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

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

FUNDAMENTALS OF ENGINEERING MECHANICS
(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.	State the necessary and sufficient condition for static equilibrium of a particle in the two dimensions.	1M	1	2
	ii.	Define Moment of force.	1M	1	1
	iii.	Define truss.	1M	2	1
	iv	What are different methods of truss analysis?	1M	2	1
	v.	Write the laws of limiting friction?	1M	3	1
	vi	Define Ladder Friction.	1M	3	1
	vii.	What is the centroid of semi-circular section from base?	1M	4	1
	viii.	What is the moment of inertia of circular section through centroid axis?	1M	4	2
	ix.	Define D'Alembert's Principle.	1M	5	1
	x.	Draw the Velocity-Time Curve.	1M	5	1
Q.2(A)		Figure shows a 2-D or coplanar force system. If the whole assembly is in equilibrium, then particle C and D are in equilibrium. Determine the force in each cables for a given weight of lamp = 150 kg.	10M	1	4

OR

Q.2(B)	A beam is subjected to a force system shown in the figure. To find the resultant reactions and its position.	10M	1	4

Q.3(A)	Find the support reactions and member forces in all members of the truss as shown in figure by method of joints.	10M	2	4

5 kN

A

60°
B

30°
C

5 m

OR

Q.3(B) Find the support reactions and forces in the member of the truss as shown in the figure using method of sections..   10M   2   4

3 m   2 m   3 m

F   E
   → 40 kN

4 m

A   D

B

70 kN

45 kN
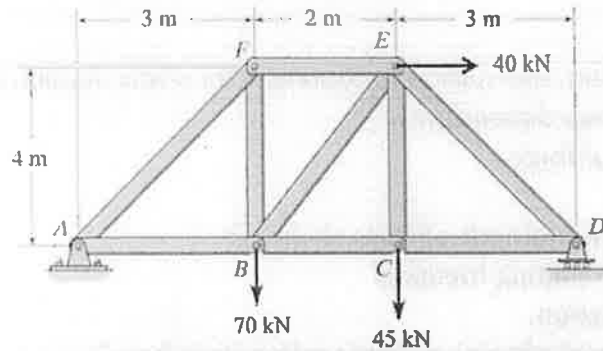
Q.4(A) A 400 kN block is resting on a rough horizontal surface for which the coefficient of friction is 0.25. Determine the force P required to cause motion to impend if applied to the block (a) horizontally or (b) downward at 25° with the horizontal. (c) What minimum force is required to start motion?   10M   3   4

400 kN

OR

Q.4(B) A ladder of length 4 m, weighing 200 N is placed against a vertical wall as shown in the figure below. The coefficient friction between the wall and ladder is 0.2 and that between the floor and ladder is 0.3. In addition to self-weight, the ladder has to support a man weighing 800 N at a distance of 2.7 m from A. Calculate the minimum horizontal forces to be applied at A to prevent slipping.   10M   3   4
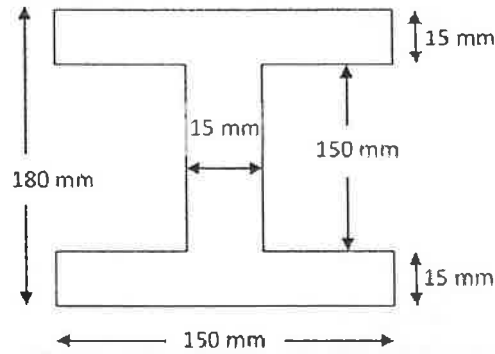

B

4 m
2.7 m
2 m

800 N
200 N

60°

A
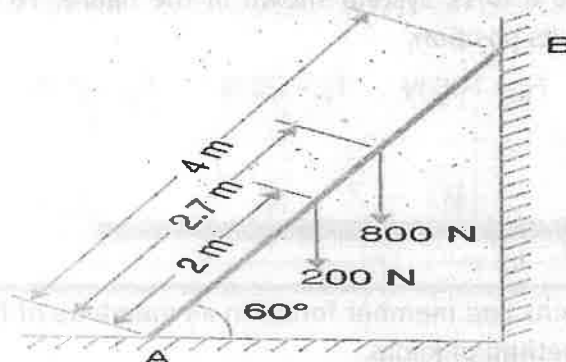
Q.5(A) To find the centroid with respect to the reference axis for the shaded area   10M   4   4
shown in Figure below (All dimensions are in mm).
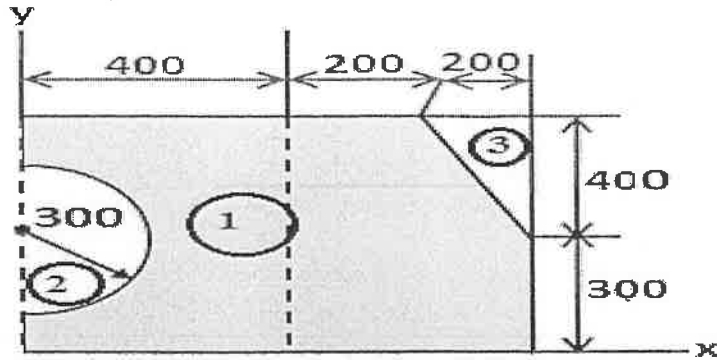
OR

Q.5(B) Determine the moment of inertia of the symmetrical I section shown in   10M   4   4
Figure with respect to its centroidal axes.

Q.6(A) A block of mass 50 kg, resting on a horizontal surface is pulleyed by a   10M   5   5
force 500 N as shown in figure below. Calculate the inertia force,
acceleration, and velocity of the block, after it has travelled a distance of 10
m, take $\mu = 0.3$.
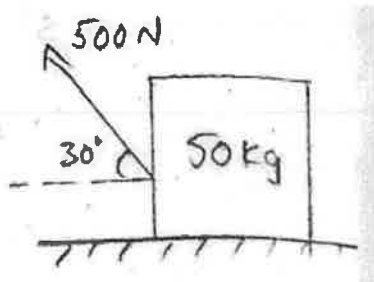
OR

Q.6(B) A ball is dropped from the top of a tower 80 ft (24.38 m) high at the same   10M   5   5
instant that a second ball is thrown upward from the ground with an initial
velocity of 40 ft/sec (12.19 m/s). When and where do they pass, and with
what relative velocity? Solve the problem with neat diagram.

*** END***

Hall Ticket No: ⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜ Question Paper Code: 20CE102

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

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

MECHANICS OF FLUIDS
(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 Compressibility of fluid.	1M	1	1
	ii.	What is differential manometer?	1M	1	1
	iii.	Differentiate between steady and unsteady flow.	1M	2	2
	iv	What is velocity potential?	1M	2	1
	v.	What is Hydraulic Gradient Line?	1M	3	1
	vi	What is equivalent pipe?	1M	3	1
	vii.	Define sub-critical flow.	1M	4	1
	viii.	What is specific energy of flow?	1M	4	1
	ix.	What is Hydraulic Jump?	1M	5	1
	x.	What is gradually varied flow?	1M	5	1
Q.2(A)		i) Explain buoyancy and centre of buoyancy.	4M	1	2
		(ii) Estimate the volume of water displaced and position of centre of buoyancy for a wooden log of cross section 2.5 m (width) x 1.5 m (depth) when it floats horizontally in water. The density of water is 650kg/m^3 and its length is 6.0m.	6M	1	5
		OR			
		i) State Newton's law of viscosity	3M	1	1
		(ii) The velocity velocity distribution for flow over a flat plate is given by	7M	1	5
Q.2(B)		$u = \frac{1}{2}y - y^4$, Where u is the point velocity in meter per second at a distance y metre above the plate. Determine the shear stress at $y = 8cm$. Assume dynamic viscosity =8 poise.			
Q.3(A)		(i) Classify different type of flows and state their conditions	4M	2	2
		(ii) The diameters of a pipe in section 1 and 2 are 10cm and 20cm, respectively. Find the discharge through the pipe if the velocity of flowing water at section 1 is 5m/s. Also, find velocity at section 2.	6M	2	5
		OR			
Q.3(B)		The velocity vector in a fluid flow is given as $V = 4x^3 - 10x^2yj + 2tk$. Find the velocity and acceleration of a particle at (4,3,2) at time $t=3$.	10M	2	5
Q.4(A)		Find the head lost due to friction in a pipe of diameter 250mm and lentgh 60m. Rate of water flow is 3.2m/s. (i) use Darcy formula (ii) use Chezy's formula. Take C =62	10M	3	5
		OR			
Q.4(B)		Three pipes of diameter 400mm, 200mm and 350mm of lengths 500m, 300m and 400m, respectively are connected in series. If the head difference between two ends of the pipe is 20m, find the flow. Take f=0.006.	10M	3	5

Q.5(A)	(i) Classify flow in open channels.	4M	4	2
	(ii) Find the discharge through a trapezoidal channel of width 7m and side slo| of 1:4 (H:V). The depth of flow of water is 2.5m and value of Chazy's constant C=50. The slope of the bed of the given channel is 1 in 5000	6M	4	5

OR

Q.5(B)	A trapezoidal channel has side slopes of 1H:2V and bed slope is 1 in 2000. The area of the section is 42m^2. Find the dimensions of the section if it is most economical. Determine the discharge of the most economical cross section if C=50	10M	4	5

Q.6(A)	(i) Based on Froude number, classify the hydraulic jumps. Draw suitable diagrams.	4M	5	2
	(ii) Depth of flow of water at a certain section of a rectangular channel of 2m width is 0.3m. The discharge through the channel is 2m^3/s. Determine whether a hydraulic jump will occur and if so, find its height and loss of energy.	6M	5	5

OR

Q.6(B)	(i) Compare between distorted and undistorted model	3M	5	2
	(ii) Find the expression of power (P) developed by a pump when P depends on head (H), discharge (Q) and specific weight (w) of the fluid.	7M	5	5

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, February - 2023
SURVEYING
(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 do you understand by well-conditioned triangle?	1M	1	1
	ii.	Write the equipment and accessories uses for ranging and chaining.	1M	2	1
	iii.	What is the least count of a theodolite?	1M	2	1
	iv	Differentiate between true meridian and magnetic meridian.	1M	1	1
	v.	What is GIS?	1M	5	1
	vi	What are horizontal and vertical curves?	1M	3	2
	vii.	What is degree of a curve?	1M	3	2
	viii.	List the different segments of GPS?	1M	4	1
	ix.	What is the full form of GPS?	1M	4	1
	x.	Define Remote Sensing.	1M	5	1
Q.2(A)		Calculate the area encounter between the surveying line of 48 m length and shore of a lake. The surveying offset length as shown in below table. Use any three offset methods.	10M	1	4

Offset	1	2	3	4	5	6	7	8	9
Length	6	4.5	7	8	4.7	5.1	4	3.2	1.9

OR

Q.2(B)		Discuss in detail the various classification schemes of surveying.	10M	1	2
Q.3(A)		Write in detail about the field procedure and its application of levelling surveying.	10M	2	2

OR

Q.3(B)		The following readings were taken with a dumpy level and 4m leveling staff. The instrument was shifted after 3rd and 6th readings. The readings are 2.665, 3.225, 2.905, 1.85, 0.98, 2.62, 1.585, 0.96, 0.425m. Enter the above readings in a page of level book and calculate R.L. of points, if the first reading was taken with a staff held on B.M. of 240 m. Use rise and fall method. Apply arithmetic checks.	10M	2	4
Q.4(A)		A Tachometer was set up at station A and the readings on a vertically held staff at B were 2.233, 2.605 and 2.955, the line of sight being at an inclination of $+8^0\ 24'$. Another observation on the vertically held staff at B.M. gave the readings 1.920 m. Calculate the horizontal distance between A and B, and the elevation of B if the R.L of the B.M is 418.685 meters. The constants of the instruments were 100 and 0.	10M	3	4

Q.4(B) Instrument was set at P point. The line of sight with +32° 0' towards a   10M   3   4
         levelling staff Q. The reading at this levelling staff is 1.620,1.420 and
         1.120m. Compute the distance between P and Q and RL of Q point. The
         benchmark RL 320m and backsight was taken over on the bench mark
         with a vertically held levelling staff which is 1.2m.

Q.5(A) Two straight lines intersect at chainage 1150.50m and the angle of inter   10M   4   4
         120°. If the radius of the curve is 500m. Determine: (i) tangent distance (ii)
         the curve (iii) length of the long chord (iv) degree of curve (v) apex distance

OR

Q.5(B) Write in detail about the different types of curves and its elements.   10M   4   2

Q.6(A) What are the uses of an electronic total station in detail?   10M   5   2

OR

Q.6(B) Describe in detail the complete remote sensing process.   10M   5   3

*** END***

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

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

ELECTRICAL CIRCUIT ANALYSIS
(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**

			Marks	CO	BL
Q.1	i.	State maximum power transfer theorem.	1M	1	1
	ii.	From a linear network with DC Voltage source, the maximum power transferred to a load is 100 W. When the load is shorted, 2A DC current flows. Find open circuit voltage.	1M	1	2
	iii.	Explain an unbalanced electrical system.	1M	2	1
	iv.	What is the power factor of a series RLC circuit at $X_L > X_C$?	1M	2	2
	v.	Define time constant? Write its formula for series R-L circuit with DC excitation.	1M	3	1
	vi.	Write the expression for capacitor voltage for a RC circuit with DC source.	1M	3	1
	vii.	Write the expression for Z parameters.	1M	4	2
	viii.	Define two port network.	1M	4	1
	ix.	What the transfer function?	1M	5	1
	x.	Find the inverse Laplace transform of $X(s) = 1$.	1M	5	2

| Q.2(A) | Use mesh analysis to find currents *i1, i2 and i3* for following Fig. 1 | 10M | 1 | 3 |

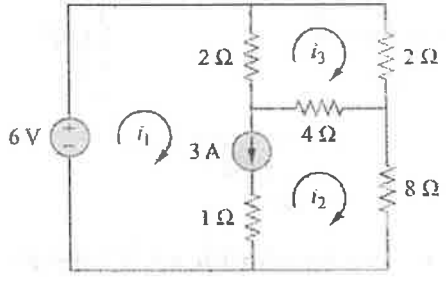Fig. 1

OR   OR

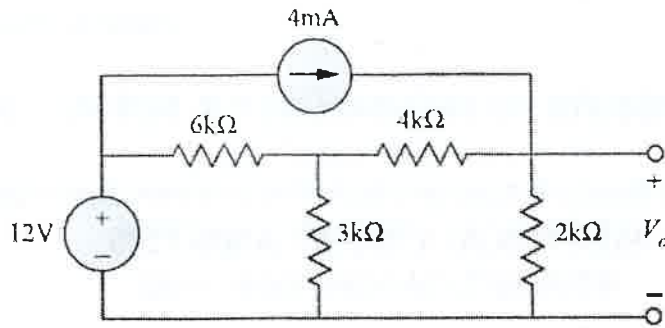| Q.2(B) | Obtain Thevenin's and Nortons equivalent circuit across a-b terminals as shown in Fig. 2. | 10M | 1 | 3 |

Fig. 2

Q.3(A)	i) A pure inductance of 318.3 mH is connected in series with a 200 Ω resistor to a 240 V, 50 Hz AC supply. Calculate (a) the inductive reactance of the coil, (b) the impedance of the circuit, (c) the current in the circuit, (d) the p.d. across each component.	10M	2	3

ii) A sinusoidal voltage of V = 50sinωt is applied to a series RL circuit. The current in the circuit is given by I = 25sin(ωt-53°). Determine real power, reactive power and power factor.

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

Q.3(B)	A balanced three-phase, three-wire, 50Hz, 100 (L-N) volts supply is given to a load consisting of three impedances (1+j1), (1+j2) and (3+j4) Ω connected in star-connection. Assume phase sequence is RYB. Calculate line current and neutral current.	10M	2	3

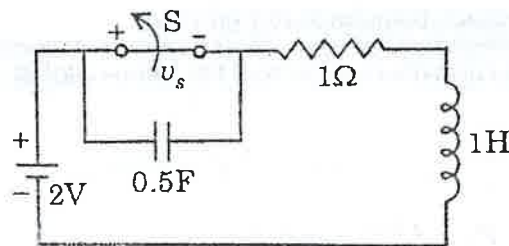|				
Q.4(A)	The circuit shown in the Fig. 4 is in steady state with the switch S closed. The switch is opened at t=0. Determine the voltage across the switch V_s and $\dfrac{dV_s}{dt}$ at t=0$^+$.	10M	3	3

Fig. 4

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

Q.4(B)	Derive the expression for transient current for a RLC circuit with DC voltage source.	10M	3	2

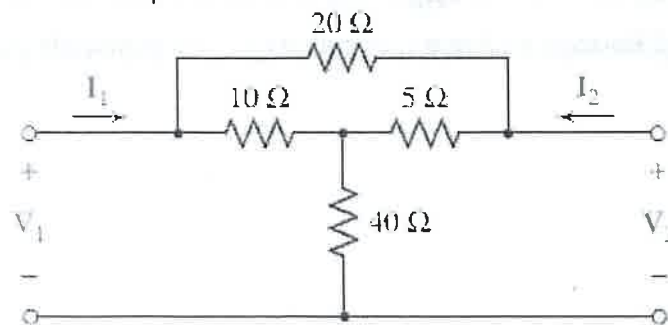|				
Q.5(A)	Find the short circuit parameter of the circuit shown in below Fig. 4.	10M	4	3

Fig. 4

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

| Q.5(B) | Derive transmission parameters in terms of open circuit impedance parameters and h-parameters. Also verify that AD-BC=1. | 10M | 4 | 3 |
| Q.6(A) | Derive the Laplace transform of some common forcing functions with neat sketch. | 10M | 5 | 2 |

OR   OR

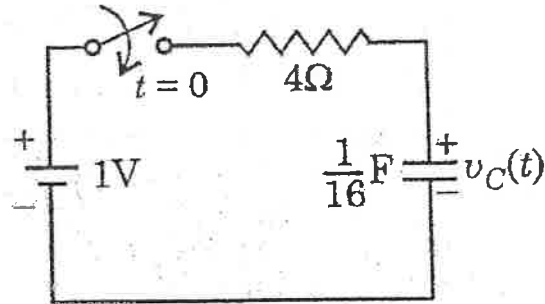| Q.6(B) | Using Laplace method, find the value of $Vc(t)$ for t>0 in the circuit shown in Fig. 6. Assume initial condition $Vc(0^-) = 9$ V. | 10M | 5 | 3 |

Fig. 6
*** END ***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular& Supplementary End Semester Examinations, February - 2023
ANALOG ELECTRONICS
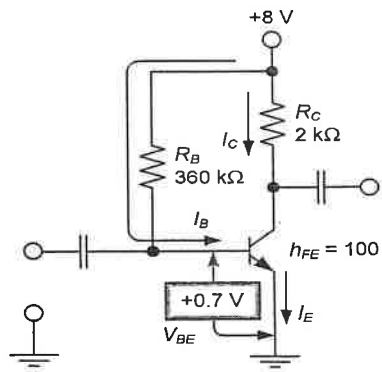### (Electrical & Electronics Engineering)

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 the drift current in PN diode.	1M	1	1
	ii.	Draw the Hybrid model for CE- Bipolar Junction Transistor.	1M	1	2
	iii.	Define trans conductance in JFET	1M	2	1
	iv.	What are the values of dc characteristics of ideal Operational Amplifier?	1M	2	1
	v.	Draw the circuit for series voltage regulator using operation amplifier.	1M	3	2
	vi.	Write the expression for output voltage of non-inverting amplifier.	1M	3	1
	vii.	Give the effects of positive feedback.	1M	4	1
	viii.	State the Barkhausen condition for oscillator.	1M	4	1
	ix.	How many resisters are required in a 12-bit weighted resister DAC?	1M	5	1
	x.	What are the disadvantages of Flash type ADC?	1M	5	1
Q.2(A)	i)	Explain the Fixed bias circuit for BJT and hence derive the stability factor.	6M	1	2
	ii)	How Zener diode works as voltage regulator?	4M	1	1

OR

| Q.2(B) | i) | Explain the input and output characteristics of CE –Bipolar JunctionTransistor | 5M | 1 | 2 |
| | ii) | Compute the values of collectorcurrent (Ic), Collector to emitter voltage (Vce) and stability factor for the fixed bias – CE- Bipolar Junction transistor shown in figure. The current gain is $h_{fe}=\beta= 100$. | 5M | 1 | 4 |

| Q.3(A) | i) | Elaborate the working operation of Depletion mode N channel MOSFET and hence draw its drain and transfer characteristics. | 5M | 2 | 2 |
| | ii) | Discuss the DC characteristics of operation amplifier. | 5M | 2 | 2 |

Q.3(B)	i) Explain Junction Field Effect Transistor parameters and hence write the relationship between drain current and Gate to Source voltage.	6M	2	3
	ii) Draw the op-amp-equivalent circuit and explain its operation.	4M	2	3
Q.4(A)	i) Discuss the gain control for instrumentation amplifier.	5M	3	2
	ii) Illustrate the operation of Schmitt trigger and draw transfer characteristics showing hysteresis.	5M	3	2

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

Q.4(B)	Explain in detail about 1. Differentiator 2. Integrator using operational amplifier and hence derive its transfer function.	10M	3	3
Q.5(A)	i) Derive the transfer function of first order Low pass Butterworth filter and hence draw its frequency response.	6M	4	3
	ii) Design an HPF circuit for the cutoff frequency fl= 1khz, choose c=0.01µf.	4M	4	4

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

Q.5(B)	i) Explain Non-sinusoidal -RC relaxation-Triangular wave generator in detail.			
	ii) Design an astable multivibrator using 555 IC to provide a 1 KHz output with a duty cycle of approximately 50 %. Assume capacitor C=0.01 µF.	10M	4	2
			4	4
Q.6(A)	i). With neat sketches explain the operation of successive approximation ADC.	6M	5	2
	ii) Explain about pressure sensor (MPX2010).	4M	5	2

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

Q.6(B)	Explain the 5-bit weighted resistor DAC with circuit diagrams and derive output voltage expressions.	10M	5	2

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

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

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

DC MACHINES AND TRANSFORMERS
(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 MMF	1M	1	1
	ii.	Write the expression of Force in term of partial derivative of stored energy with respect to position of a moving element.	1M	1	1
	iii.	Write the EMF equation of a DC Generator.	1M	2	1
	iv	What is the functioning of Commutator in DC Machines?	1M	2	1
	v.	Suggest the methods to reduce the Eddy current loss in rotating machines	1M	3	1
	vi	Write the expression for shaft torque in DC Motors.	1M	3	1
	vii.	What are called primary and secondary windings in a Transformer?	1M	4	1
	viii.	Why transformers are rated in kVA instead of KW?	1M	4	1
	ix.	What advantage has the star-connection over delta connection?	1M	5	1
	x.	Write thr difference between transformer and Auto Transformer.	1M	5	1
Q.2(A)		Derive the force and Torque as a partial derivative of stored energy with respect to position of a moving element	10M	1	2
		OR			
Q.2(B)		An iron ring of mean length 80 cm has an air gap of 1 mm and winging of 200 turns. If the relative permeability of iron is 600, when a current of 0.8 A flows in the winding. Determine the flux density neglecting leakage and fringing.	10M	1	2
Q.3(A)		Briefly explain the concept of Armature Reaction in a DC Generator.	10M	2	2
		OR			
Q.3(B)		i) Explain the Open circuit characteristic of separately excited DC generator.	6M	2	2
		ii) A 220volts,4 pole lap connected ,480 conductors, long shunt DC Compound Generator have the resistance of series field, shunt field and armature as1.8Ω,210Ω and 0.1Ω respectively. The maximum flux is 0.03wb.Calculate the currents in the generator.	4M	2	3
Q.4(A)		i) What is Back EMF? Write the significance of back EMF in a DC Motor.	4M	3	1
		ii) A 4 Pole , 220 volts, shunt motor has 540 wave conductors. If it takes 32 A from the supply mains and develops output of 5.59KW.The field winding takes 1A current and armature resistance is 0.09Ω and flux is 30mWb.Determine back emf and shaft torque of the motor.	6M	3	2
		OR			
Q.4(B)		Explain the various types of speed control methods of a DC Motor.	10M	3	2

Q.5(A)	What is the working principle of Transformer? Develop the EMF Equation of a single phase transformer	10M	4	3

OR

Q.5(B)	The connected instrument readings obtained from open circuit test and short circuit test on 10KVA,450/120V,50Hz 1-ph transformer are	10M	4	4

O.C test : Vo=120V,Io=4.2A,Wo=80W(LV SIDE)

S.C test: Vsc=9.65V, Isc=22.2A,Wsc=120W(HV SIDE) meter were connected. calculate

i. Equivalent circuit parameters.

ii. Efficiency and voltage Regulation for 80% lagging p.f load.

Q.6(A)	Explain the concept of Parallel operation of three-phase transformers by considering necessary assumptions.	10M	5	2

OR

Q.6(B)	A load of 400 kVA at 0.8 pf lagging is supplied by two 3-ph transformers of A and B of equal rating. The equivalent delta impedances as referred to secondary are (3+ j 6) Ω and (2 + j6) Ω respectively. Find the load shared by the each transformer.	10M	5	4

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

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

BASIC THERMODYNAMICS

(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**

			Marks	CO	BL
Q.1	i.	Define microscopic & macroscopic approach in thermodynamics	1M	1	1
	ii.	Define zeroth law of thermodynamics	1M	1	2
	iii.	Define critical state in pure substance.	1M	2	1
	iv.	List the types of steam used in steam nozzles / turbines	1M	2	2
	v.	What is a refrigerator?	1M	3	2
	vi.	What is a heat pump?	1M	3	1
	vii.	What is Joule-Kelvin effect?	1M	4	1
	viii.	What is DBT & WBT in Psychrometry?	1M	4	2
	ix.	What type of process takes place in steam condenser?	1M	5	1
	x.	Define Dual Cycle.	1M	5	2

Q.2(A)	Derive the mass balance and energy balance equations for a steady flow process. Also derive the steady flow energy equation applied to turbine.	10M	1	2

OR

Q.2(B)	In a steam power station, steam flows steadily through a 0.25m diameter pipeline from the boiler to the turbine. At the boiler end, the steam conditions are found to be p= 4MPa, t= 400°C, h= 3213.6 kJ/kg, and v = 0.073 m^3/kg. At the turbine end, the conditions are found to be p= 3.5 MPa, t = 392°C, h= 3202.6 kJ/ kg, and v = 0.084 m^3/kg. There is a heat loss of 8.5 kJ/kg from the pipeline. Calculate the steam flow rate.	10M	1	3

Q.3(A)	With a neat sketch draw and explain the P-T diagram for a pure substance. Also discuss sublimation, vaporization & fusion curves in detail in the diagram.	10M	2	2

OR

Q.3(B)	Find the saturation temperature, the changes in specific volume and entropy during evaporation, and the latent heat of vaporization of steam at 1 MPa & 2 MPa.	10M	2	3

Q.4(A)	What is a refrigerator? Derive the expression for COP of a refrigerator connected with source and sink at temperatures T1 & T2.	10M	3	2

OR

Q.4(B)	A reversible heat engine operates between two reservoirs at temperature of 600°C and 40°C. The Engine drives a reversible refrigerator which operates between reservoirs at temperature of 40°C and -20°C. The heat	10M	3	3

transfer to the heat engine is 2000KJ and net-work output of combined engine refrigerator plant is 360KJ. Evaluate the heat transfer to the refrigerator and the net heat transfer to the reservoir at 40°C. Reconsider the problem that the efficiency of the heat engine and the COP of the refrigerator are each 60% of their maximum possible values.

Q.5(A)	With neat sketch discuss in detail about Joule-Kelvin effect. Draw T-S diagram for constant enthalpy curves and discuss about inversion curve and its significance.	10M	4	2

OR

Q.5(B)	Explain the principle and working of Diesel cycle with ideal and actual P-V & T-S diagrams. Also derive the expression for efficiency of the cycle.	10M	4	3

Q.6(A)	In a steam turbine steam at 20 bar, 360°C is expanded to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler. Assume ideal processes; find per kg of steam the net-work and the cycle efficiency. If the turbine and the pump have each70% efficiency, find the reduction in the net-work and cycle efficiency.	10M	5	2

OR

Q.6(B)	Explain the principle and working of Otto cycle with ideal and actual P-V & T-S diagrams. Also derive the expression for efficiency of the cycle.	10M	5	3

*** END***

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

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

MATERIAL SCIENCE AND ENGINEERING
(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.	Draw and explain unary phase diagram.	1M	1	1
	ii.	Differentiate substitional and interstitial solid solution with examples?	1M	1	2
	iii.	What is mean by Ficks law of diffusion?	1M	2	1
	iv	Define cyaniding .	1M	2	2
	v.	What do you mean by work hardening?	1M	3	1
	vi	What is mean by quenching?	1M	3	2
	vii.	What is meant by fatigue fracture?	1M	4	1
	viii.	Define iso thermal transformation.	1M	4	2
	ix.	List out the some importance tools steels.	1M	5	1
	x.	Name any four thermoplastics and thermosetting plastics.	1M	5	2
Q.2(A)		Write a note on BCC, FCC and HCP crystalline structures.	10M	1	2
		OR			
Q.2(B)		With neat sketches describe the different types of bonds in solids.	10M	1	3
Q.3(A)		Distinguish between elastic and plastic deformation of a solid.	10M	2	2
		OR			
Q.3(B)		Explain micro structural changes that take place in steel during cooling.	10M	2	3
Q.4(A)		Explain any five mechanical property of material.	10M	3	2
		OR			
Q.4(B)		Define harden ability and explain Jominy End Quench test. How to use this Jominy end quench test data?	10M	3	3
Q.5(A)		Draw iron-iron carbide equilibrium diagram and mention the important composition and temperature.	10M	4	2
		OR			
Q.5(B)		Explain with a phase diagram of Binary eutectic reaction	10M	4	3
Q.6(A)		List all types of composites and explain their advantages over other materials	10M	5	2
		OR			
Q.6(B)		Write short notes on tool steels and their applications	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech. II Year I Semester (R20) Regular & Supplementary End Semester Examinations, February - 2023
FLUID MECHANICS AND HYDRAULIC MACHINERY
(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.	Define surface tension.	1M	1	1
	ii.	Differentiate between Newtonian and non-Newtonian fluids.	1M	1	4
	iii.	State the assumptions made in deriving Bernoulli's equation.	1M	2	1
	iv.	Define Specific Gravity.	1M	2	1
	v.	Define laminar & turbulent flow.	1M	3	1
	vi.	Define Energy thickness.	1M	3	1
	vii.	State the difference between impulse turbines and reaction turbines.	1M	4	1
	viii.	Define Volumetric efficiency.	1M	4	1
	ix.	List out the main parts of a centrifugal pump.	1M	5	1
	x.	Define slip of a reciprocating pump.	1M	5	1
Q.2(A)	a)	Explain the terms: i). Path line ii) Stream line iii). Streak line	5M	1	2
	b)	The dynamic viscosity of oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm.	5M	1	3

OR

Q.2(B)	a)	Explain different types of Fluid Flow.	5M	1	2
	b)	Calculate the capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in (a) water and (b) mercury. Take surface tension as 0.0725 N/m for water and surface tension as 0.52N/m for mercury in contact with air. The specific gravity for mercury is given as 13.6 and angle of contact is 130°.	5M	1	3

Q.3(A)		State the assumptions made in the derivation of Bernoulli's equation and hence derive the Bernoulli's equation.	10M	2	3

OR

Q.3(B)		Water is flowing through a pipe having diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.81 N/cm^2. Determine the differences in datum head if the rate of flow through pipe is 40 litre/sec.	10M	2	4

Q.4(A) For the velocity profile for laminar boundary layer on a flat plate is: 10M 3 1

$$\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$$

Obtain an expression for displacement thickness, momentum thickness and energy thickness.

OR

Q.4(B) An Orifice meter consisting of 100 mm diameter orifice in a 250 mm 10M 3 1
diameter pipe has coefficient equal to 0.65. The pipe delivers oil (specific gravity = 0.8). The pressure difference on the two sides of the orifice plate is measured by a mercury oil differential manometer. If the differential gauge reads 80 mm of mercury, find the rate of flow.

Q.5(A) With a neat sketch, describe the principle and working of a Pelton Turbine. 10M 4 2

OR

Q.5(B) An inward flow reaction turbine has external and internal diameters as 1 m 10M 4 4
and 0.6 m respectively. The hydraulic efficiency of the turbine is 90% when the head on the turbine is 36 m. The velocity of flow at outlet is 2.5 m/s and discharge at outlet is radial. If the vane angle at outlet is 15° and width of the wheel is 100 mm at inlet and outlet.
Determine: (i) the guide blade angle, (ii) speed of the turbine, (iii) vane angle of the runner at inlet,(iv) volume flow rate of turbine and (v) power developed.

Q.6(A) A single-acting reciprocating pump, running at 50 rpm, delivers 0.01 m³/s of 10M 5 4
water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine: (i) The theoretical discharge of the pump, (ii) Co-efficient of discharge, and (iii) Slip and the percentage slip of the pump.

OR

Q.6(B) With a neat sketch, explain the principle and working of a centrifugal pump. 10M 5 2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

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

ENGINEERING MECHANICS

(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

---

			Marks	CO	BL
Q.1	i.	Distinguish clearly between resolution of forces and composition of forces.	1M	1	2
	ii.	State Lami's Theorem.	1M	1	1
	iii.	Distinguish between a simply supported truss and a cantilever truss.	1M	2	2
	iv.	State the laws of friction.	1M	2	1
	v.	List various methods of finding out the centre of gravity of a body.	1M	3	1
	vi.	State the theorem of perpendicular axis.	1M	3	1
	vii.	What is the difference between uniform acceleration and variable acceleration?	1M	4	2
	viii.	What is a projectile? Give an example of a projectile.	1M	4	1
	ix.	What are the units of work done? What is the relation between work done and power?	1M	5	2
	x.	State the Principle of impulse momentum.	1M	5	1

| Q.2(A) | The forces 20 N, 30 N, 40 N, 50 N and 60 N are acting at one of the angular points of a regular hexagon, towards the other five angular points, taken in order. Find the magnitude and direction of the resultant force. | 10M | 1 | 3 |

OR

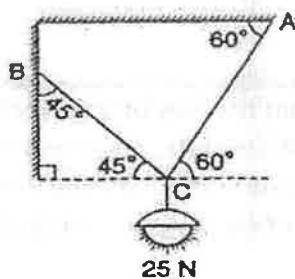| Q.2(B) | Define Lami's theorem. Calculate the tensions in the ropes which support a load of 25 N as shown in the figure 1. | 10M | 1 | 3 |

25 N

Fig. 1

| Q.3(A) | Draw the free body diagram and find the maximum angle θ at which the box of weight 2.5 kg will start sliding down the inclined plane (take g=10 m/s^2) as shown in the figure 2. Assume coefficient of static friction to be 0.35. | 10M | 2 | 3 |

Fig. 2

OR

Q.3(B) Calculate the support reactions for the beam as shown in the figure 3.   10M   2   3
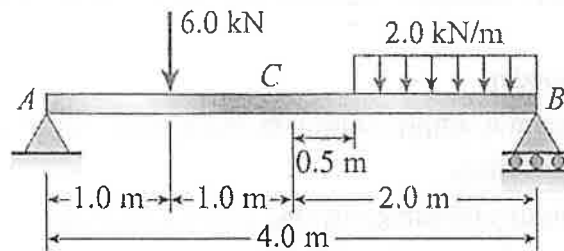

Fig. 3

Q.4(A) Calculate the centroidal coordinates of the plane region shown in Fig. 4.   10M   3   3
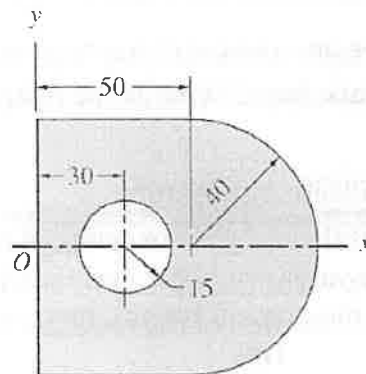

Fig. 4 (All Dimensions are in mm)

OR

Q.4(B) Find the moment of inertia of a T-section having flange and web both 120   10M   3   3
mm × 30 mm about X-X axis passing through the centre of gravity of the
section.

Q.5(A) A stone is thrown vertically up from the top of a tower with a certain initial   10M   4   3
velocity. It reaches ground in 5.64 seconds. A second stone, thrown down
from the same tower with the same initial velocity reaches ground in 3.6
seconds. Determine (i) the height of the tower, and (ii) the initial velocity of
the stones.

OR

Q.5(B) A projectile is aimed at a mark on the horizontal plane through the point of   10M   4   3
projection. It falls 12 metres short when the angle of projection is 15°; while
it overshoots the mark by 24 metres when the same angle is 45°. Find the
angle of projection to hit the mark. Assume no air resistance.

Q.6(A)   Two bodies A and B of mass 8 kg and 10 kg are placed on two smooth   10M   5   3
         inclined planes as shown in Fig. 5. Find the acceleration of the body of mass
         8 kg.

Fig. 5

OR

Q.6(B)   A bullet of 25 g mass is fired with a speed of 400 m/s. What is its kinetic   10M   5   3
         energy? If the bullet can penetrate 20 cm in a block of wood, what is the
         average resistance of the wood? If the bullet were fired into a similar block
         of 10 cm thick wood, what would be the exit speed?

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular& Supplementary End Semester Examinations, February - 2023
TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
(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.	Define Laplace transform of a function?	1M	1	1
	ii.	Find the inverse Laplace transform of $\dfrac{6}{(p+2)^2+9}$	1M	1	1
	iii.	Express Fourier integral of a function?	1M	2	1
	iv	State the change of scale property on Fourier transforms?	1M	2	1
	v.	Find $Z(ne^{an})$?	1M	3	1
	vi	State the Initial value theorem on Z-transforms?	1M	3	1
	vii.	Form the PDE by eliminating arbitrary constants a and b from $z=ax+by$?	1M	4	1
	viii.	Solve $p-q=1$	1M	4	1
	ix.	Write assumed solution form in method of separation of variables.	1M	5	1
	x.	Write the form of one dimensional wave equation?	1M	5	1
Q.2(A)		Prove that $L\{J_o(x)\}=\dfrac{1}{\sqrt{1+p^2}}$ and hence deduce that $\displaystyle\int_0^\infty J_o(x)\,dx=1$	10M	1	3
		OR			
Q.2(B)		Solve the following equations:		1	3
		(i) $3\sin 2x = y(x)+\displaystyle\int_0^x (x-t)y(t)dt$	5M		
		(ii) $y''-4y'+4y=0 \quad y(0)=0;\ y'(0)=3$	5M		
Q.3(A)		Express $f(x)=\begin{cases}1 \text{ for } |x|\le 1\\ 0 \text{ for } |x|>1\end{cases}$ as a Fourier integral. Hence evaluate $\displaystyle\int_0^\infty \frac{\sin\lambda\cos(\lambda x)}{\lambda}d\lambda$	10M	2	4
		OR			
Q.3(B)		(i) Find the Fourier cosine transform of $f(x)=\begin{cases}x, \text{ for } 0<x<1\\ 2-x, \text{ for } 1<x<2\\ 0, \text{ for } x>2\end{cases}$ (ii) Find the Fourier sine transform of e^{-ax}/x.	10M	2	4
Q.4(A)		If $U(z)=\dfrac{2z^2+5z+14}{(z-1)^4}$, evaluate u_2 and u_3	10M	3	3

Q.4(B)   Using Z-transform solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ with $u_0 = 0, u_1 = 1$ 10M   3   3

Q.5(A)   (i) Form the PDE by eliminating the arbitrary functions from   10M   4   2

(a) $z = f(x) + e^y g(x)$ (b) $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} = 1$

(ii) Solve the following equation $\dfrac{\partial^3 z}{\partial^2 x \partial y} + 18xy^2 + \sin(2x - y) = 0$ by direct integration.

OR

Q.5(B)   (i) Solve the Lagrange's linear equation $p \tan x + q \tan y = \tan z$ 10M   4   3

(ii) Solve the non-linear equation $2xz - px^2 - 2qxy + pq = 0$ by Charpit's method

Q.6(A)   Using the method of separation of variable, solve $3\dfrac{\partial u}{\partial x} + 2\dfrac{\partial u}{\partial y} = 0$;   10M   5   3

where $u(x, 0) = 4e^{-x}$.

OR

Q.6(B)   Find the eigenvalues λ_n and eigenfunctions $y_n(x)$ for the equation   10M   5   3
$y'' + \lambda y = 0$ in each of the following cases:
(i) $y(0) = 0$, $y(2\pi) = 0$
(ii) $y(-L) = 0$, $y(L) = 0$ when $L > 0$
(iii) $y(a) = 0$, $y(b) = 0$ when $a < b$

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations – Feb' 2023
NETWORK THEORY
(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 millers theorem.	1M	1	1
	ii.	Define link, twig and tree.	1M	1	1
	iii.	What happens to resonant frequencies for a series RLC network if C changed to 2C?	1M	2	1
	iv	Which resonance circuit performs current magnification?	1M	2	1
	v.	Define initial and final value theorem.	1M	3	1
	vi	Find the Laplace transform of $\cos \omega t$.	1M	3	1
	vii.	Write the expressions for hybrid parameters	1M	4	1
	viii.	Write the parameter Y_{11} in terms of Z parameters	1M	4	1
	ix.	Define driving point impedance.	1M	5	1
	x.	Define decibel and Neper.	1M	5	1
Q.2(A)		Find the fundamental cut-set matrix for the graph shown in figure 1.	10M	1	2

Figure 1
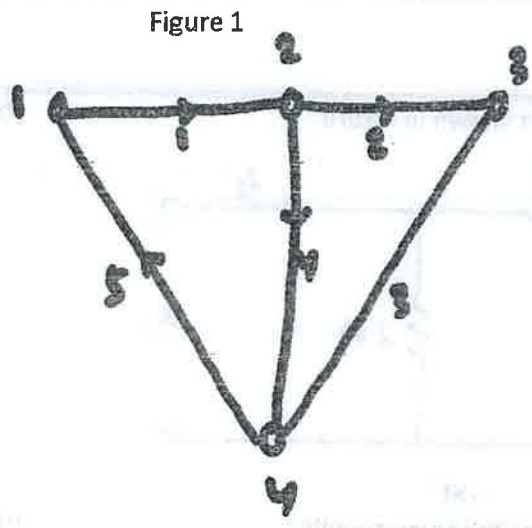
OR

| Q.2(B) | For the graph shown in fig. Write down the incidence matrix, tie set matrix and cut set matrix. (Twigs dark lines and links by dotted lines) | 10M | 1 | 2 |
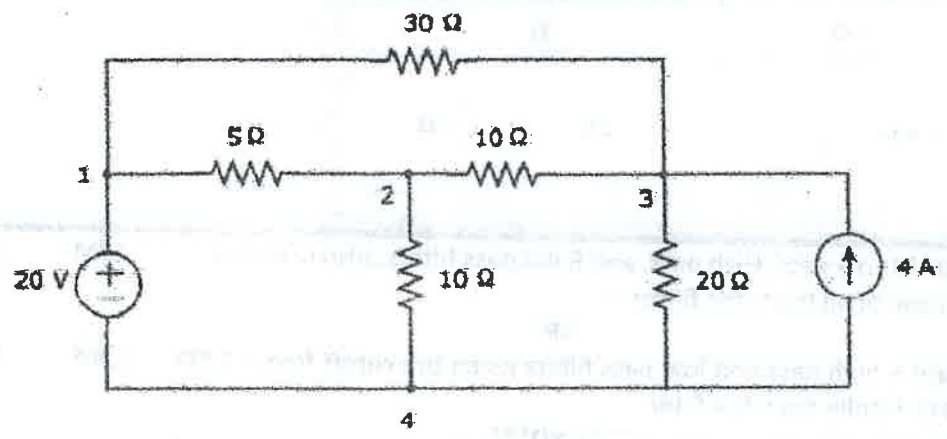
Q.3(A) Derive the resonance frequency of the circuit shown below.   10M   2   3
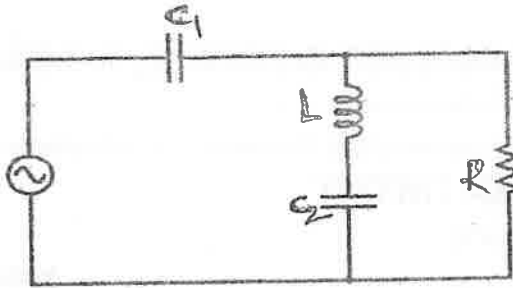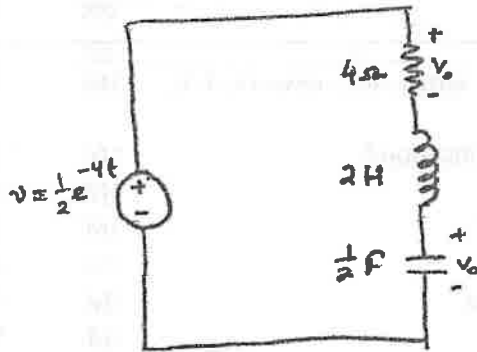

OR

Q.3(B) a) Derive the expression for V_L becomes maximum in series RLC circuit.   10M   2   3
b) Define Band width of the Series RLC Resonance circuit.

Q.4(A) Determine the v_o for the circuit shown below.   10M   3   3

$$v = \tfrac{1}{2}e^{-4t}$$
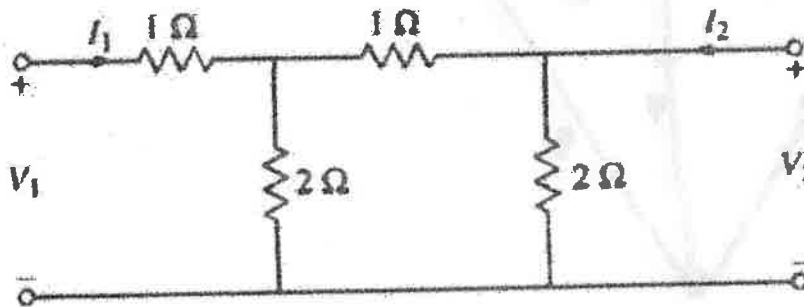
$$i(0) = 0$$
$$v_c(0) = 0$$

OR

Q.4(B) Find inverse Laplace transform for the below function   10M   3   2

$$F(s) = \frac{2(s+4)}{(s+3)(s+8)}$$

Q.5(A) Find the ABCD parameters of the two-port shown in Figure.   10M   4   2

OR

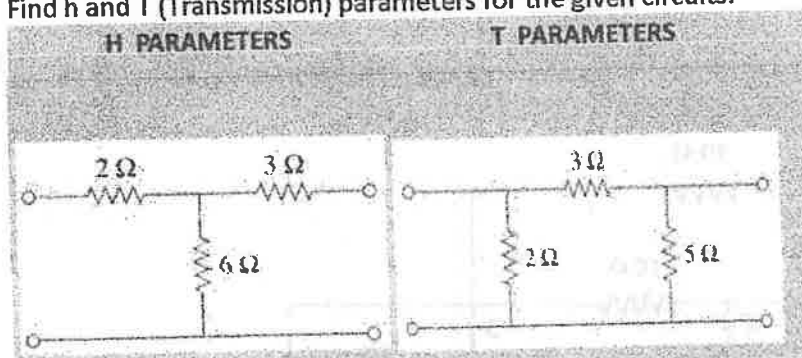**Q.5(B)** Find h and T (Transmission) parameters for the given circuits.   10M   4   2

Q.6(A) Draw the circuits of Low pass, High pass, and Band pass filters. Also draw the   10M   5   2
frequency response of all the three filters.

OR

Q.6(B) Design a constant k high pass and low pass filters given the cutoff freq = 2000   10M   5   3
Hz and Z_0 = 600 Ω. Finally draw the filter.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations – Feb' 2023
ELECTRONIC DEVICES & 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.	Write the Einstein relation connecting drift and diffusion phenomena in semiconductors.	1M	1	1
	ii.	State Mass-action law and write its expression.	1M	1	1
	iii.	Draw the I-V characteristics of Tunnel diode.	1M	2	1
	iv	List the four applications on LED.	1M	2	2
	v.	What is the impact of base-width modulation (Early effect) in BJTs?	1M	3	1
	vi	Why FET is called a voltage-controlled device?	1M	3	1
	vii.	Write down four applications of diode.	1M	4	1
	viii.	Draw the input and output waveforms of a bridge rectifier.	1M	4	1
	ix.	Why are h-parameters not used at high frequencies?	1M	5	1
	x.	Draw the hybrid model for CE configuration.	1M	5	1
Q.2(A)		Describe Hall Effect. Derive the expression for hall voltage, carrier concentration and mobility.	10M	1	2
		OR			
Q.2(B)		Compare the characteristics of ideal versus practical diode. Write down four practical applications of diode.	10M	1	2
Q.3(A)		Explain the working principle of tunnel diode with necessary band diagrams. Also, illustrate the V-I characteristics and the negative resistance phenomenon.	10M	2	2
		OR			
Q.3(B)		Derive the expression for the built-in voltage of a p-n junction diode under thermal equilibrium.	10M	2	6
Q.4(A)		A transistor with $I_B = 100$ µA and $I_C = 2$ mA. Find α, β of the transistor, I_E and if I_B changes by 25 µA and I_C changes by 0.6 mA, find the new value of β.	10M	3	3
		OR			
Q.4(B)		Draw the construction of n-channel JFET. Apply the proper biasing between drain and source and sketch the depletion region for V_{GS} =0 V.	10M	3	3
Q.5(A)		Explain the working principle of Clipper and Clamper circuits.	10M	4	2
		OR			
Q.5(B)		A full wave rectifier is fed from a transformer having a center tapped secondary winding. The RMS voltage from either end of secondary to center tap is 30V. If the diode forward resistance is 2Ω and that of the half secondary is 8Ω, for a load of 1kΩ, determine the power delivered to load, percentage regulation efficiency and transformer utility factor (TUF) of secondary.	10M	4	3
Q.6(A)		Analyze the Low-Frequency response model for BJT amplifier.	10M	5	4
		OR			
Q.6(B)		Explain the operation of common source (CS) amplifier circuit and derive the expressions for its small-signal voltage gain, current gain, input impedance and output impedance.	10M	5	2

*** END***

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

B.Tech II Year I Semester (R20) Regular & Supply End Semester Examinations – February-2023

DIGITAL SYSTEM DESIGN
(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.	Write the Hexa code for the equivalent of $(43)_{10}$.	1M	1	2
	ii.	Define the following terms: (a) SOP (b) POS.	1M	1	1
	iii.	Write the limitation of Half Subtractor.	1M	2	1
	iv	Write the Boolean expression for sum and carry of a half adder	1M	2	1
	v.	Define Latch and Flip-flop	1M	3	1
	vi	Write the difference between Synchronous and Asynchronous counters	1M	3	1
	vii.	Draw the basic configuration of PAL.	1M	4	1
	viii.	Compare RTL and DTL logic families.	1M	4	1
	ix.	State the difference between Verilog and VHDL?	1M	5	1
	x.	List out the levels of abstraction in VHDL.	1M	5	1
Q.2(A)		Design the following expression using K-Map and implement it using the NAND Logic: $F(w, x, y, z) = \Sigma m(0, 1, 4, 8, 9, 10) + d(2, 11)$	10M	1	3
		OR			
Q.2(B)		Express the following numbers in decimal form: (i) $(10110.0101)_2$ (ii) $(16.5)_{16}$ (iii) $(26.24)_8$ (iv) $(ABCD.E)_{16}$.	10M	1	3
Q.3(A)		Explain about the BCD Adder with neat logic diagrams. Realize their output using basic gates.	10M	2	2
		OR			
Q.3(B)		Design 8x1 Multiplexer and also implement 8x1 multiplexer by using 4x1 Multiplexer	10M	2	2
Q.4(A)		Design Asynchronous 4-bit binary Up-counter using JK flip-flop. and draw its timing diagram with truth table.	10M	3	2
		OR			
Q.4(B)		Design SISO, SIPO shift Register using D - flip-flop	10M	3	2
Q.5(A)		What is programmable logic array (PLA)? Discuss the design of a combinational circuit using PLA with suitable example.	10M	4	2
		OR			
Q.5(B)		Explain briefly about CMOS logic considering NAND and NOR gates as example.	10M	4	2
Q.6(A)		Write the VHDL code for Half adder and Full Adder.	10M	5	3
		OR			
Q.6(B)		Explain Data flow modeling of combinational and sequential circuits. How does it differ from Behavioral Modeling?	10M	5	2

*** END***

Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐   Question Paper Code: 20CST101

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

B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, February/March - 2023

DIGITAL DESIGN
(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.	State the Duality property of Boolean Algebra	1M	1	2
	ii.	Design an XOR gate using NAND gate.	1M	1	1
	iii.	Define Minterms and Maxterms	1M	2	3
	iv	Convert the given Boolean function to Maxterms: $A(A' + B)C'$.	1M	2	2
	v.	Draw the logic diagram of Half Adder.	1M	3	2
	vi	What is the advantage of Look Ahead Carry Adder as compared to Parallel Adder.	1M	3	3
	vii.	What will be the resulting modulus (Mod), if Mod 6 & Mod 5 counter are cascaded.	1M	4	2
	viii.	What is the minimum number of flip-flops required for designing a MOD-9 UP/Down counter	1M	4	3
	ix.	Draw the basic configuration of PAL.	1M	5	2
	x.	List the various types of ROMs.	1M	5	3
Q.2(A)		(i) Convert the decimal number $(123456)_{10}$ to Binary, Octal, and Hexadecimal. (ii) Perform subtraction by using 2's Complement method for the given ones: (a) 111001 – 101010 (b) 10011 – 10001	10M	1	3
		OR			
Q.2(B)		Why NAND and NOR gates are called as Universal Gates? Implement the logic AND, OR, NOT, and EX-OR function using the NOR gate?	10M	1	3
Q.3(A)		Simplify the expression, F (A, B, C, D) = Σm (0,2,,3,6,7,8,10,11,12,15) using K-Map	10M	2	2
		OR			
Q.3(B)		Implement the expression, F (A, B, C, D) = Σm (0, 1, 3, 4, 5, 7, 10, 13, 14, 15) using Tabulation Method. Also, realize the redundant expressions with the help of NAND gate.	10M	2	3
Q.4(A)		i) Design a Full Adder circuit with two Half Adder circuit. (ii) Design 3:8 Decoder with neat diagram and explain the truth table to perform its analysis	10M	3	2
		OR			
Q.4(B)		Design the following Combinational Circuits with their relevant explanations: (a) Decimal to BCD Encoder (10:4 Encoder) (b) Binary to Octal Decoder (3:8 Decoder)	10M	3	3

Q.5(A)	Explain the procedure for converting of one Flip-Flop to other. By using the s convert the following: (i) SR-FF to JK-FF. (ii) JK-FF to D-FF	10M	4	3

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

Q.5(B)	Explain in details, the implementation of Asynchronous 4-bit Counter using JK flip-flop.	10M	4	3

Q.6(A)	What is Programmable Logic Array (PLA). Discuss the design of a combinational circuit with suitable example by using the concept of PLA	10M	5	2

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

Q.6(B)	Apply the following Boolean functions in PAL. (a) $A(w,x,y,z)=\sum m(0,2,6,7,8,9,12,13)$ (b) $B(w,x,y,z)=\sum m(0,2,6,7,8,9,12,13,14)$ (c) $C(w,x,y,z)=\sum m(1,3,4,6,10,12,13)$ (d) $D(w,x,y,z)=\sum m(1,3,4,6,9,12,14)$	10M	5	3

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

Hall Ticket No: Question Paper Code: 20CST102

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

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

DATA STRUCTURES AND ALGORITHMS
(Computer Science &Technology)

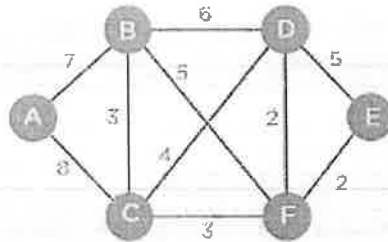Time: 3Hrs   Max Marks: 60

> 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 data structure? How it is classified?	1M	1	1
	ii.	State the advantages of circular lists over doubly linked list.	1M	1	2
	iii.	List the real time application of queues.	1M	2	2
	iv	Write a routine to check whether the stack is full or empty.	1M	2	2
	v.	What do you mean by internal Sorting?	1M	3	1
	vi	Compare quick sort and merge sort.	1M	3	2
	vii.	The depth of complete binary tree is 8 and compute the number of nodes in leaf.	1M	4	2
	viii.	Define Binary Search Tree	1M	4	1
	ix.	What is meant by strongly connected in a graph?	1M	5	1
	x.	List the applications of depth first traversal	1M	5	2
Q.2(A)		(i) State the polynomial representation for $6x^3+9x^2+7x+1$ using linked list.	10M	1	3
		(ii) Write procedure to add two polynomial and explain with suitable example			
		OR			
Q.2(B)		What are the ways to insert a node in a linked list? Write an algorithm for inserting a node before a given node in a linked list.	10M	1	2
Q.3(A)		Write the procedure to convert the infix expression to postfix .convert the expression A-(B/C+(D%E*F)/G)*H to postfix form.	10M	2	3
		OR			
Q.3(B)		Explain the different operation that can be performed on Stacks? Write the algorithm for each operation.	10M	2	2
Q.4(A)		Write down the algorithm for Quick sort and using it sort the sequence of numbers 42, 23, 74, 11, 65, 57, 94, 36, 99, 81, 61.	10M	3	2
		OR			
Q.4(B)		Given the input { 4371, 1323, 6173, 4199, 4344, 9679, 1989 } and a hash function of h(X)=X (mod 10) show the resulting: (i) Separate Chaining hash table (ii) Open addressing hash table using linear probing	28	3	3
Q.5(A)		Write an algorithm to insert , delete, Find minimum and maximum element from a binary search tree.	10M	4	2

Q.5(B)   What is AVL tree? Illustrate the steps in the algorithm for deleting node   10M   4   2
from a AVL tree with an example.

Q.6(A)   Apply the Kruskal's algorithm to find the minimal spanning tree for the   10M   5   4
following graph.

OR

Q.6(B)   Present the pseudocodes of the different graph traversal methods and   10M   5   2
demonstrate with an example.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

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

DATABASE 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.	What is a Database? Give an example.	1M	1	1
	ii.	What is meant by schema and instance?	1M	1	1
	iii.	What is meant by DML?	1M	2	1
	iv	Write the syntax to update the salary from 500 to 5000 for the employee 'E1'.	1M	2	1
	v.	Write the different types of function dependencies?	1M	3	1
	vi	What is Redundancy?	1M	3	1
	vii.	Draw the States of transactions.	1M	4	1
	viii.	What is Cascading rollback?	1M	4	1
	ix.	What is importance of access control?	1M	5	1
	x.	Analyse the Authorization in application layer vs. database layer?	1M	5	3
Q.2(A)		Design the relation model for the given the ER Diagram.	10M	1	4

ER DIAGRAM OF A COMPANY
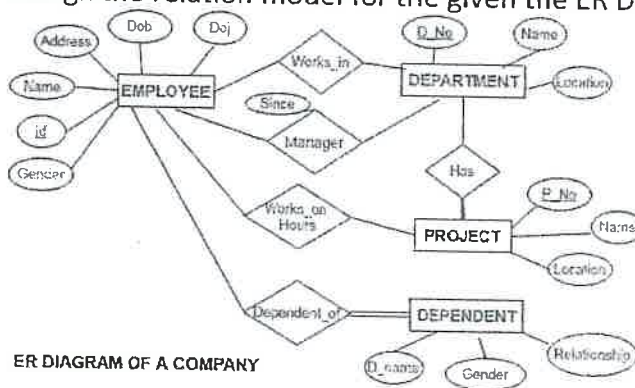
OR

Q.2(B)	Explain Database Architecture with neat diagram.	10M	1	3

Q.3(A)	Construct the SQL queries for the following:	10M	2	2

i) Display all employee whose name start with 'A' and third character is ' 'a'.

ii) Display name, number and salary of those employees whose name is 5 characters long and first three characters are 'Ani'.

iii) Display the non-null values of employees and also employee name second character should be 'n' and string should be 5 character long.

iv) Display the null values of employee and also employee name's third character should be 'a'.

OR

Q.3(B)	Illustrate the usage of key in designing database and explain its types.	10M	2	4
Q.4(A)	State the Procedure to find minimal set of FD's and solve the following A-->B, C→B, D→AB C, A C→ C using the same.	10M	3	4

OR

Q.4'(B)	Explain briefly about 3NFand BCNF with suitable examples?	10M	3	2
Q.5(A)	Define conflict equivalent schedule. Detect whether the following the schedules are conflict equivalent or not.	10M	4	4

$$S1: R1(A) \; R2(B) \; W1(A) \; W2(B)$$
$$S2: R2(B) \; R1(A) \; W2(B) \; W1(A)$$

OR

Q.5(B)	State the comparison between the ordered indexing and hashing.	10M	4	4
Q.6(A)	Discuss about different types of types of Access control models.	10M	5	2

OR

Q.6(B)	Explain about SQL injection in details and measure it effects.	10M	5	2

*** END***

Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐   Question Paper Code: 20CSE106

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

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

DATABASE MANAGEMENT SYSTEMS
(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.	Define Schema.	1M	1	1
	ii.	Define instance	1M	1	1
	iii.	Define Cursor.	1M	2	1
	iv	What is the difference between stored procedure and function?	1M	2	1
	v.	What is INF	1M	3	1
	vi	Define loss less join decomposition with example?	1M	3	1
	vii.	Define B-Tree.	1M	4	1
	viii.	What is serializability?	1M	4	1
	ix.	Compare immediate and deferred update	1M	5	2
	x.	Define NOSQL database	1M	5	1
Q.2(A)		Explain in detail about DBMS architecture in detail.	10M	1	2
		OR			
Q.2(B)		Design and draw an ER diagram that captures the information about the Hotel Management System.	10M	1	6
Q.3(A)		Explain in detail about relational algebra in DBMS	10M	2	2
		OR			
Q.3(B)		Explain types of triggers with examples.	10M	2	2
Q.4(A)		What is meant Functional Dependency? Explain its types in detail.	10M	3	1
		OR			
Q.4(B)		Explain 1-NF and 2-NF with suitable examples.	10M	3	2
Q.5(A)		What is transaction? Explain ACID Properties of transactions with examples	10M	4	2
		OR			
Q.5(B)		Explain the Time Stamp - Based Concurrency Control protocol?	10M	4	2
Q.6(A)		Explain the two approaches for log-based recovery.	10M	5	2
		OR			
Q.6(B)		Discuss the shadow paging recovery technique	10M	5	6

*** END***

Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐   Question Paper Code: 20CSE104

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

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

DATA STRUCTURES
(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

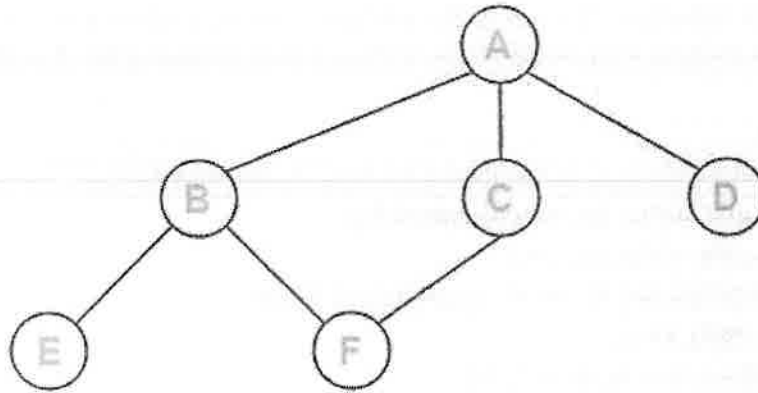| Q.No		Question	Marks	CO	BL
Q.1	i.	Differentiate between singly linked list and doubly linked list.	1M	1	4
	ii.	List the Applications of Circular linked list.	1M	1	2
	iii.	Define Double ended queue?	1M	2	1
	iv	Write a pseudocode for push operation of stack.	1M	2	1
	v.	What is a skew tree?	1M	3	1
	vi	Define degree of a Node in Tree.	1M	3	1
	vii.	What is open addressing?	1M	4	1
	viii.	What Is the time complexity for selection sort algorithm?	1M	4	1
	ix.	What are the properties of Red Black tree?	1M	5	1
	x.	List the Applications of Graphs.	1M	5	2
Q.2(A)		Write an algorithm to insert a new node at the end of a singly linked list and traverse it. Explain with an example.	10M	1	3
		OR			
Q.2(B)		Discuss in detail about asymptotic notations.	10M	1	4
Q.3(A)		How can we represent queue? Explain with examples.	10M	2	1
		OR			
Q.3(B)		Write an algorithm to convert a infix expression into postix using stack and convert the following: A ^ B + C – D + (E * F) / (G+H)	10M	2	3
Q.4(A)		Explain the implementation of max heaps with examples	10M	3	4
		OR			
Q.4(B)		What is a BST? Construct a BST for the following values and analyze the height of the constructed BST. 67, 12, 89, 45, 43, 9, 34, 89, 32, 63, 83, 54, 49, 51	10M	3	3
Q.5(A)		Explain about Merge sort algorithm with example.	10M	4	4
		OR			
Q.5(B)		Define collision in hashing. Explain collision resolution techniques in context of hashing with example.	10M	4	2

Q.6(A) Write an algorithm to AVL tree insertion. Insert the following elements in   10M   5   4
        an empty tree and balance the tree after each insertion:
        Data: 3, 6, 5, 8, 19, 10, 2, 17,13,11,1,4

OR

Q.6(B) What is DFS? Traverse the following graph using DFS.   10M   5   4

*** END***

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

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

OBJECT ORIENTED PROGRAMMING USING C++
(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.	List the features of Object-Oriented Programming.	1M	1	1
	ii.	What is encapsulation and give an example.	1M	1	1
	iii.	Define this pointer in C++.	1M	2	1
	iv	What is Copy constructor?	1M	2	1
	v.	State the difference between Static and Dynamic Binding.	1M	3	1
	vi	Define aggregation.	1M	3	1
	vii.	Sketch the C++ Stream class hierarchy.	1M	4	1
	viii.	How can we handle Errors while dealing with files?	1M	4	1
	ix.	Write the syntax of class template?	1M	5	1
	x.	List the different types of exceptions in c++.	1M	5	1
Q.2(A)		(i) Explain about various C++ statements with example program.	5M	1	2
		(ii) What are the different ways to define member functions of a class. What is the role of scope resolution operator in the definition of member function?	5M		2
		OR			
Q.2(B)		Design a simple calculator to add, subtract, multiply and divide using switch and break statement.	10M	1	4
Q.3(A)		Create a class 'Student' with three data members which are name, age and address. The constructor of the class assigns default values to name as "unknown", age as '0' and address as "not available". It has two functions with the same name 'setInfo'. First function has two parameters for name and age and assigns the same whereas the second function takes has three parameters which are assigned to name, age and address respectively. Print the name, age and address of 10 students. Hint - Use array of objects.	10M	2	6
		OR			
Q.3(B)		(i) What are the features of friend function? Discuss friend class with an example program.	5M	2	2
		(ii) Explain functional overloading with example.	5M		2
Q.4(A)		Briefly explain about the following: (i) Copy Constructor (ii) Pure virtual functions	10M	3	2
		OR			
Q.4(B)		What are abstract classes? Give an example (with the program) to illustrate the use of abstract classes.	10M	3	2

Q.5(A)	Discuss about various C++ I/O Streams with example program.	10M	4	2

OR

Q.5(B)	Create a C++ Program to Read and Write Student Details using File Handling techniques.	10M	4	6

Q.6(A)	Write a C++ program using function template for finding the maximum value in an array.	10M	5	3

OR

Q.6(B)	(i) What is a user defined exception. Write down the scenario where we require user defined exceptions.	5M	5	2
	(ii) When do we need multiple catch blocks for a single try block? Give an example.	5M		2

*** END***

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

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

COMPUTER SYSTEM ARCHITECTURE
(Common to CSE, CSE-AI, 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.	Write down the equivalent Gray code for $[10010110]_2$.	1M	1	2
	ii.	Differentiate between an Encoder and Decoder.	1M	1	2
	iii.	Express $(-120)_{10}$ in 8-bit and 16-bit signed integer format.	1M	2	2
	iv	What are guard bits? Why are they essential?	1M	2	1
	v.	List out the segment registers of Intel 8086 microprocessor.	1M	3	1
	vi	Specify the purpose of PSW.	1M	3	1
	vii.	Define the term pipelining.	1M	4	1
	viii.	Mention the characteristics of Symmetrical Multiprocessors.	1M	4	1
	ix.	Differentiate between Write Back and Write Through Protocol.	1M	5	2
	x.	A 16 KB cache memory has 64 sets and each cache block has a capacity of 64 bytes. Determine the number of cache lines.	1M	5	4
Q.2(A)		i. Design 8 X 1 Multiplexer with suitable logic gates.	6M	1	3
		ii. Design a JK Flip flop and illustrate its working with a characteristic table.	4M		
		OR			
Q.2(B)		Using K-map method reduce the following Boolean function $F=\sum m(0,2,3,6,7) + d(8,10,11,15)$ in SOP and POS forms.	10M	1	4
Q.3(A)		Illustrate the flow chart for a Non - Restoring Division algorithm with dividend as 22 and divisor as 3.	10M	2	3
		OR			
Q.3(B)		Draw the block diagram of a floating-point adder and illustrate the steps involved in single precision floating-point addition with a suitable example.	10M	2	3
Q.4(A)		Define the term addressing mode. Illustrate the various x86 addressing modes with suitable examples.	10M	3	2
		OR			
Q.4(B)		What is a Control Unit? Explain in detail about the Microprogrammed Control Unit.	10M	3	2
Q.5(A)		i) Illustrate the working of a six-stage instruction pipeline with a suitable timing diagram.	5M	4	2
		ii) Explain in detail about methods to overcome control hazards.	5M		
		OR			
Q.5(B)		Explain about Flynn's taxonomy of Parallel Processor architectures in detail.	10M	4	2

Q.6(A) What is RAID? Explain the various Levels of RAID with suitable sketches.   10M   5   2

OR

Q.6(B) Consider a machine with byte addressable main memory of 1 MB and   10M   5   4
block size of 16 bytes. If the cache memory is 1KB and assuming a direct
mapped cache;

i) Determine how the physical address bits are divided into tag, line
index and block offset bits.
ii) Into what cache line are the below physical address bits stored?
      i) 1101 1101 1111 1101 1001
      ii) 0011 1111 0100 1001 0101
      iii) 0111 1000 0110 1011 0001
iii) Suppose a byte with address "0001 1010 0001 1010 0000" is stored
in the Cache. What are the addresses of the other bytes in the same
block stored along with it?

*** END***

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

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

DATA STRUCTURES USING PYTHON
(Computer Science & Engineering (AI and 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.	List any four operations in Map ADT.	1M	1	1
	ii.	Differentiate between Array and List.	1M	1	2
	iii.	Mention merge sort's complexity	1M	2	1
	iv	Draw the structure of singly linked list	1M	2	1
	v.	Give two-way representation of sparse matrix with examples.	1M	3	1
	vi	List the applications of stack.	1M	3	1
	vii.	Write condition to check whether the circular queue is i) Full ii) Empty	1M	4	1
	viii.	List any two techniques to overcome hash collision.	1M	4	1
	ix.	Define the balance factor of node in AVL tree.	1M	5	1
	x.	Differentiate Binary tree and Binary Search Tree	1M	5	2
Q.2(A)		Write short note on the unique features of ADT's Bag, List, Matrix and Date in python.	10M	1	2
		OR			
Q.2(B)		Explain the importance of Set ADT with its implementation for following operations: i) add ii) remove iii) union iv) intersection v) difference and vi) iterator	10M	1	2
Q.3(A)		Given the following list of keys 56, 67, 44, 53, 14, 36, 59, 98, 74, 27 Show the working of Selection Sort with sufficient python code and perform complexity analysis on it.	10M	2	3
		OR			
Q.3(B)		i) Write python code to implement linear, binary search algorithms ii) Compare complexities of linear search and binary search.	10M	2	3
Q.4(A)		i) Write python code and then convert the given infix expression P * (Q + R) * S to postfix step-by-step by using stack. ii)Apply the concept of postfix expression evaluation using stack for evaluating 6 5 2 + * 4 *	10M	3	3
		OR			
Q.4(B)		Demonstrate the different types of operations used in Queue with examples.	10M	3	3
Q.5(A)		Given the values {2541, 3234, 4839, 730, 32, 327, 3120}, a hash table of size 6, and hash function h(x) = x mod 6, show the resulting table after inserting the values in the given order with each of the following collision strategies i. Separate chaining Double hashing with second hash function $h_1(x)=(2x-1) \bmod 6$	10M	4	3

OR

Q.5(B)	Illustrate different operations on doubly linked lists with necessary algorithms.	10M	4	3
Q.6(A)	Construct a Binary Search Tree by using the list of elements 30,10, 4, 19, 62, 35, 28, 73 . Show the results after deleting the nodes 4 and 62 one after the other of the constructed tree.	10M	5	3

OR

Q.6(B)	Write a routine for AVL Tree insertion. Insert the following elements in the empty tree and how do you balance the tree after each element in insertion. Elements: 2, 5, 4, 6, 7,9, 8, 3, 1, 10.	10M	5	3

*** END***

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

B.Tech II Year I Semester (R20) Regular& Supplementary End Semester Examinations, February - 2023
FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE
(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.	List any two advantages of rational agent-based AI approach	1M	1	1
	ii.	Define problem formulation	1M	1	2
	iii.	Define abstraction in formulation of real world problems	1M	2	2
	iv	Give the time complexities of BFS, DFS search strategies	1M	2	1
	v.	Define global constraint	1M	3	2
	vi	What is Min–Max Strategy?	1M	3	1
	vii.	What is the difference between Syntax and semantics?	1M	4	1
	viii.	For the given sentence "All Pompeian's were Romans" write a well formed formula in predicate logic.	1M	4	3
	ix.	List any two components of planning system	1M	5	1
	x.	State the concept of Uncertainty.	1M	5	2
Q.2(A)		Write short notes on rationality and omniscience.	10M	1	2
		OR			
Q.2(B)		"Intelligent agents are supposed to maximize their performance measure", briefly describe how problem solving agents maximize their performance.	10M	1	2
Q.3(A)		Explain with examples the following and give their time complexities 1. Breadth-first search, 2. Depth first search	10M	2	3
		OR			
Q.3(B)		How an algorithm's performance is evaluated? Compare different uninformed search strategies in terms of the four evaluation criteria.	10M	2	5
Q.4(A)		Explain A* algorithm with example. Identify the major differences between A* and AO* algorithms?	10M	3	3
		OR			
Q.4(B)		With a neat algorithm and game tree explain how Alpha-Beta Cutoffs (Pruning) is applied on multi-player games	10M	3	3
Q.5(A)		"As per the law, it is a crime for an American to sell weapons to hostile nations. Country A, an enemy of America, has some missiles, and all the missiles were sold to it by Robert, who is an American citizen." Construct FOL and Prove that "Robert is criminal" using resolutions.	10M	4	5

Q.5(B)	Describe the process of resolution, including the use of clauses and resolution steps.	10M	4	2

Q.6(A)	Briefly explain the ABSTRIPS approach of problem solving?	10M	5	2

Q.6(B)	Write brief notes about reasoning done using Fuzzy logic.	10M	5	2

*** END***

Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐ Question Paper Code: 20CAI105 / 20CSD105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular& Supplementary End Semester Examinations, February - 2023
OBJECT ORIENTED PROGRAMMING – JAVA
(CSE (Artificial Intelligence) and 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.	Differentiate between class and object.	1M	1	2
	ii.	Why Java is not a purely Object-Oriented Language?	1M	1	3
	iii.	Differentiate between interface to abstract class	1M	2	2
	iv	What is inheritance? Give example.	1M	2	1
	v.	List out Java's built in exceptions.	1M	3	1
	vi	Write a short note on life cycle of thread.	1M	3	1
	vii.	What is Tree set?	1M	4	1
	viii.	Differentiate between Byte Stream Classes and Character Stream Classes.	1M	4	2
	ix.	What are the limitations of AWT?	1M	5	1
	x.	What are the various event sources in swing?	1M	5	1
Q.2(A)		Elaborate the main principles of OOPS.	10M	1	2
		OR			
Q.2(B)		Elaborate the process of Method and Constructor Overloading with examples.	10M	1	2
Q.3(A)		Illustrate inheritance concept with an example.		2	2
		OR			
Q.3(B)		How can we add a class to a package? Write about relative and absolute paths.	10M	2	3
Q.4(A)		Demonstrate the concept of thread synchronization with an example.	10M	3	2
		OR			
Q.4(B)		Illustrate exception handling in the case of division by zero.	10M	3	3
Q.5(A)		Discuss in detail about Hierarchy of collection framework.	10M	4	2
		OR			
Q.5(B)		Write a program for file manipulation and discuss about the byte stream classes and methods.	10M	4	2
Q.6(A)		Explain in detail about Event Handlers.	10M	5	2
		OR			
Q.6(B)		Create a simple applet to display a smiley picture using Graphics class methods.	10M	5	2

*** END***

Hall Ticket No: ⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜　　Question Paper Code: 20CSC106

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

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

DATABASE FUNDAMENTALS FOR SECURITY
(Computer Science &Engineering (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 is the need of DBMS?	1M	1	1
	ii.	List the DDL Commands.	1M	1	1
	iii.	Define Functional Dependency?	1M	2	1
	iv	What is Multi-Valued Functional Dependency?	1M	2	1
	v.	What is Concurrency control in DBMS?	1M	3	1
	vi	Define Exclusive lock.	1M	3	1
	vii.	Define Access control.	1M	4	1
	viii.	What is the need of Security in DBMS?	1M	4	1
	ix.	What is Database Auditing?	1M	5	1
	x.	What is water Marking?	1M	5	1
Q.2(A)		Write SQL Statements for following:	10M	1	5

Q.2(A) Write SQL Statements for following:

Student (Roll no, name, course_id, e-mail id, phone_no)

Course(course_id, course_name, duration)

i) Add a column city in student table.

ii) Find out List of students who have enrolled in "Computer" course.

iii) List name of all students starts with 'a'.

iv) List e-mail id and phone no of all mechanical engineering students.

v) Apply insert, update, delete commands on student table.

OR

Q.No	Question	Marks	CO	BL
Q.2(B)	What is Entity set? And also define Relationship set. List and explain the symbols used to draw ER Diagram with example.	10M	1	3
Q.3(A)	Explain in detail about Hashing and types of Hashing?	10M	2	2

OR

Q.No	Question	Marks	CO	BL
Q.3(B)	Explain the following: i) Primary key ii) super key iii) Candidate key, foreign key with syntax and examples?	10M	2	2
Q.4(A)	Define a Transaction. List and explain desirable properties of Transaction.	10M	3	1

OR

Q.No	Question	Marks	CO	BL
Q.4(B)	What are LOCK & its types along with detail about the two-phase locking protocol?	10M	3	1

Q.5(A)	Discuss Grant and Revoke on Views and Integrity Constraints		10M	4	2
	OR				
Q.5(B)	Explain the following: i) Authorization and access control ii) SQL Injection		10M	4	1
Q.6(A)	Explain in detail about Virtual Private Databases.		10M	5	2
	OR				
Q.6(B)	Discuss in details about Multilevel Secure Relational model?		10M	5	2

*** END***

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

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

COMPUTER SYSTEM ARCHITECTURE
(Computer Science & Engineering (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.	Draw the block diagram of 4x1 multiplexer?	1M	1	1
	ii.	Outline the block diagram of 2-4 and 3-8 decoders?	1M	1	1
	iii.	Explain the need of data transfer and manipulation?	1M	2	2
	iv	Extract decimal equivalent of 1001110?	1M	2	2
	v.	Define Addressing Mode?	1M	3	1
	vi	Explain the characteristics of RISC?	1M	3	2
	vii.	Define the operations of Array Processors?	1M	4	1
	viii.	list advantages and disadvantages of parallel processing?	1M	4	1
	ix.	Describe volatile and non volatile memories?	1M	5	2
	x.	Describe Cache memory principles?	1M	5	2
Q.2(A)		Solve the given function $F(w, x, y,z)=\sum m(0,3,4,5,8,11,12,13,14,15)$.List all Prime Implicants and find the minimum product of sum expression?	10M	1	3
		OR			
Q.2(B)		Solve the given function $F(A,B,C,D)=\sum 0,2,4,5,6,7,8,10,13,15$ using 4-variable K-Map?	10M	1	3
Q.3(A)		Describe the algorithm for addition and subtraction operations using signed 2's complement representation?	10M	2	2
		OR			
Q.3(B)		Demonstrate Booth's Multiplication Algorithm?	10M	2	3
Q.4(A)		Demonstrate ARM and x86 addressing modes?	10M	3	3
		OR			
Q.4(B)		Describe Register organization in detail?	10M	3	2
Q.5(A)		Explain Arithmetic pipelining concept in detail with suitable example?	10M	4	2
		OR			
Q.5(B)		Explain FLYNN's Classification?	10M	4	2
Q.6(A)		Classify Associative mapping and Set Associative Mechanism?	10M	5	2
		OR			
Q.6(B)		Demonstrate Memory Hierarchy system?	10M	5	3

*** END***

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

B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations,
February/March - 2023

OBJECT ORIENTED PROGRAMMING USING C++
(Computer Science & Engineering (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 is an encapsulation?	1M	1	1
	ii.	List out features of OOPS.	1M	1	2
	iii.	Define friend function.	1M	2	1
	iv	What is overriding.	1M	2	1
	v.	Differentiate between static and dynamic binding.	1M	3	3
	vi	What is pure virtual function in C++?	1M	3	1
	vii.	What is a stream?	1M	4	1
	viii.	List out the different file modes in C++.	1M	4	1
	ix.	What is an exception?	1M	5	1
	x.	What is the need for template functions in C++? What are their advantages?	1M	5	1
Q.2(A)		(i) Compare break and continue keyword in C++ with suitable program.	5M	1	4
		(ii) Write a C++ program that outputs a complete multiplication table of any integer number.	5M	1	3
		OR			
Q.2(B)		What is the need of data types in C++? Describe different data types along with their representations and size in C++.	10M	1	2
Q.3(A)		What is function overloading? Explain with an example program.	10M	2	2
		OR			
Q.3(B)		Explain in detail about different of types of Constructor with example.	10M	2	4
Q.4(A)		What is virtual functions? Explain their needs using a suitable example. What are the rules associated with virtual functions?	10M	3	2
		OR			
Q.4(B)		With suitable example explain how the polymorphism is achieved at compile time and run time.	10M	3	3
Q.5(A)		Write a C++ program to copy the contents of one file to another file.	10M	4	2
		OR			
Q.5(B)		Discuss on file stream classes with a suitable example	10M	4	3
Q.6(A)		Write down a detailed C++ program to demonstrate the use of try, catch and throw	10M	5	4
		OR			
Q.6(B)		Explain with example, how Function Templates are implemented?	10M	5	3

*** END***

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

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

DATA STRUCTURES USING PYTHON
(Computer Science &Engineering (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.	Define data structure.	1M	1	1
	ii.	Write about Iterator ADT.	1M	1	1
	iii.	Explain the complexity analysis of a algorithm.	1M	2	2
	iv	Write about Set ADT.	1M	2	1
	v.	Define stack.	1M	3	1
	vi	Write about priority queue.	1M	3	1
	vii.	Explain Circularly Linked List.	1M	4	2
	viii.	Define Recursion.	1M	4	1
	ix.	Define binary tree.	1M	5	1
	x.	Explain how the balance factor is calculated for a node?	1M	5	1
Q.2(A)		Explain the usage of Date and Bag ADT with its modules. Explain Date ADT with an example program.	10M	1	2
		OR			
Q.2(B)		Discuss about Map ADT in detail with an example program.	10M	1	2
Q.3(A)		Explain how complexity analysis will be done for an algorithm and explain evaluation procedure of python Lists considering an example program.	10M	2	2
		OR			
Q.3(B)		Memorize the working method of insertion sort and write a program for selection sort.	10M	2	1
Q.4(A)		Explain Bag ADT using Singly Linked List and write a program for Bag using Singly Linked List.	10M	3	2
		OR			
Q.4(B)		Explain how Queue ADT is implemented using List. Explain it with an example program.	10M	3	2
Q.5(A)		Discuss how multi-linked list are useful in attaching multiple nodes for a single node.	10M	4	2
		OR			
Q.5(B)		Determine how Hashing is efficient in searching? Justify with your answer and explain it with a hashing program.	10M	4	4
Q.6(A)		Illustrate the working principle of Quick sort and write a program for Quick sort.	10M	5	3
		OR			
Q.6(B)		Explain working principle of AVL tree by considering an appropriate example. Justify how it overcomes the drawbacks of binary search tree.	10M	5	4

*** END***

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

B.Tech II Year I Semester (R20) Supplementary End Semester Examinations, February - 2023

ANALOG & DIGITAL ELECTRONICS
(Computer Science & Engineering (Internet of Things))

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 stability factor for Bipolar Junction transistor.	1M	1	1
	ii.	Draw the Hybrid model for CE- Bipolar Junction Transistor.	1M	1	2
	iii.	Write the relationship between drain current and Gate to source voltage in JFET.	1M	2	1
	iv	What are the values of dc characteristics of ideal Operational Amplifier?	1M	2	1
	v.	What is meant by resolution of 8 bit DAC?	1M	3	1
	vi	Draw the truth table for EX -OR gate.	1M	3	2
	vii.	Simplify $Y(A, B, C) = \sum m(1, 3, 5, 7)$.	1M	4	1
	viii.	Compare decoder and demultiplexer	1M	4	3
	ix.	What is difference between latch and flip-flop?	1M	5	1
	x.	What is a flip flip?	1M	5	1
Q.2(A)		i) Explain the operation of TUNNEL diode under forward condition and hence draw its V-I characteristics.	5M	1	2
		ii) Explain the voltage divider bias for CE- Bipolar Junction Transistor and hence derive stability factor and operation quiescent point.	5M	1	2
		OR			
		i) Explain the input and output characteristics of CE- Bipolar Junction Transistor and compare its characteristics , applications with CE and CC.	5M	1	2
		ii)) Compute the values of collector current(I_c) , Collector to emitter voltage (V_{ce})and stability factor for the fixed bias – CE- Bipolar Junction transistor shown in figure . The current gain is $h_{fe}=\beta= 50$.	5M	1	3

Q.2(B)
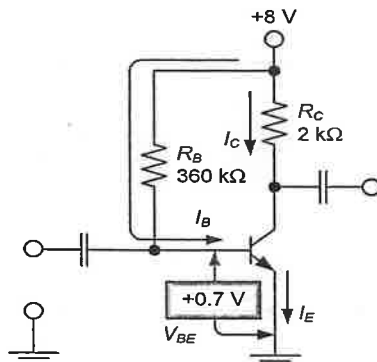
Q.3(A)	i) Explain about gain control of Instrumentation amplifier using 3 op amp.	5M	2	2
	ii) Explain Junction Field Effect Transistor parameters and hence write the relationship between drain current and Gate to Source voltage.	5M	2	2

Q.3(B)	i) Explain the operation of depletion MOSFET and hence draw its drain and transfer characteristics.	5M	2	2
	ii) Explain the following dc characteristics of Operational amplifier.	5M	2	2
Q.4(A)	i)What output voltage would be produced by a D/A converter whose ouput range is 0 to 10V and whose input binary number is 1. 10(for a 2bit D/A converter) 2.0110(for a 4 bit DAC) 3.10111100(for a 8 bit DAC)	4M	3	3
	ii) Explain the operation of Successive approximation.	6M	3	2

OR

Q.4(B)	i) Explain the TTL logic in detail along with its types.	5M	3	2
	ii)State and verify De Morgan Laws.	5M	3	2
Q.5(A)	Express the following function in sum of minterms and product of max terms$f$(A,B,C,D)=B'D+A'D+BD	10M	4	4

OR

Q.5(B)	Implement the following Boolean function F no more than two NOR gatesF=(A,B.C,D)=$\sum$(0,1,2,9,11)+d(8,10,14,15)	10M	4	4
Q.6(A)	Explain detail about different shift resisters.	10M	5	2

OR

Q.6(B)	Explain the operation involved using RAM and compare static RAM and Dynamic RAM.	10M	5	2

*** END***

Hall Ticket No: 　　　　　　　　　　　　　　　Question Paper Code: 20CSO105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular End Semester Examinations, February- 2023
DATA STRUCTURES AND ALGORITHMS
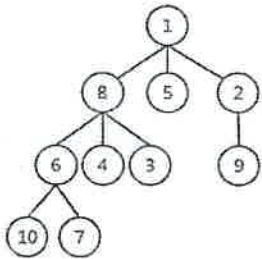### (Computer Science & Engineering (IoT))

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.	Identify the data structure suitable to store file system in a computer	1M	1	3
	ii.	What is the time complexity of Linear Search method?	1M	1	1
	iii.	Name any two applications of stacks	1M	2	1
	iv	Justify the statement, "Queues are used in CPU scheduling"	1M	2	5
	v.	What is a complete binary tree?	1M	3	1
	vi	Construct a MaxHeap from the elements{4, 10, 3, 5, 1}	1M	3	3
	vii.	Determine the time complexity of inserting the elements {12, 13, 14, 15, 16} into a hash table of size 10.	1M	4	5
	viii.	List the order of nodes that get visited when Depth First Search starts with vertex 1	1M	4	5

	ix.	Give any three applications of Pattern Matching?	1M	5	1
	x.	How many unique colors are required for proper vertex coloring of a complete graph that has 10 vertices?	1M	5	3
Q.2(A)		What is an Algorithm? How does one determine the efficiency of an algorithm? Explain various Asymptotic notations	10M	1	2
		OR			
Q.2(B)		Write an algorithm for finding the penultimate node in a singly linked list where the last element is indicated by a null *next* pointer	10M	1	3
Q.3(A)		Explain the process of evaluating a post-fix expression (5 3 + 8 2 - *) using stack and write an algorithm.	10M	2	3
		OR			
Q.3(B)		What is double-ended queue? Explain various operations performed on dequeues	10M	2	2
Q.4(A)		What is a Heap? Write an algorithm to insert an element into a MaxHeap	10M	3	2
		OR			
Q.4(B)		Analyze the time complexities of insertion, deletion and search operations of a Binary Search Tree	10M	3	4

Q.5(A)	What is collision? Explain various collision resolution techniques	10M	4	2
	OR			
Q.5(B)	What is a weighted graph? Give the adjacency matrix representation of a weighted graph	10M	4	2
Q.6(A)	What is the importance of pattern matching in search engines? Briefly explain how Google works?	10M	5	5
	OR			
Q.6(B)	Explain how backtracking addresses N-Queen's problem	10M	5	2

*** END ***

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

B.Tech II Year I Semester (R20) Supplementary End Semester Examinations, February - 2023

OBJECT ORIENTED PROGRAMMING – JAVA
(Computer Science & Engineering (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.	Differentiate between class and object.	1M	1	2
	ii.	Why Java is not a purely Object-Oriented Language?	1M	1	3
	iii.	Differentiate between interface to abstract class	1M	2	2
	iv	What is inheritance? Give example.	1M	2	1
	v.	List out Java's built in exceptions.	1M	3	1
	vi	Write a short note on life cycle of thread.	1M	3	1
	vii.	What is Tree set?	·1M	4	1
	viii.	Differentiate between Byte Stream Classes and Character Stream Classes.	1M	4	2
	ix.	What are the limitations of AWT?	1M	5	1
	x.	What are the various event sources in swing?	1M	5	1
Q.2(A)		Elaborate the main principles of OOPS.	10M	1	2
		OR			
Q.2(B)		Elaborate the process of Method and Constructor Overloading with examples.	10M	1	2
Q.3(A)		Illustrate inheritance concept with an example.		2	2
		OR			
Q.3(B)		How can we add a class to a package? Write about relative and absolute paths.	10M	2	3
Q.4(A)		Demonstrate the concept of thread synchronization with an example.	10M	3	2
		OR			
Q.4(B)		Illustrate exception handling in the case of division by zero.	10M	3	3
Q.5(A)		Discuss in detail about Hierarchy of collection framework.	10M	4	2
		OR			
Q.5(B)		Write a program for file manipulation and discuss about the byte stream classes and methods.	10M	4	2
Q.6(A)		Explain in detail about Event Handlers.	10M	5	2
		OR			
Q.6(B)		Create a simple applet to display a smiley picture using Graphics class methods.	10M	5	2

*** END***