MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
NUMERICAL METHODS
(Common to CE, EEE, & ME)

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 the first approximation to the root of the equation $x^2 + 2x - 1 = 0$ by the method of bisection method.	1M	1	2
	ii.	Arrange the matrix $A = \begin{bmatrix} -1 & -2 & 10 \\ -1 & 9 & -6 \\ 9 & -4 & 1 \end{bmatrix}$ by diagonally dominant rule.	1M	1	2
	iii.	State Bessel's interpolation formula	1M	2	1
	iv	Find $f(3)$ for the following data	1M	2	2
	v.	State the expression for $\left(\dfrac{d^2 y}{dx^2}\right)_{x=x_n}$ using backward differences	1M	3	1
	vi	Find the number of sub intervals for $\int\limits_{1}^{7} e^{\sin x} dx$ with $h = 0.5$	1M	3	2
	vii.	State the iteration formula for Picard's method	1M	4	1
	viii.	Define Taylor series formula for $y = f(x)$ about the point $x = x_0$	1M	4	1
	ix.	Define the normal equations to best fit the parabola $y = a + bx + cx^2$	1M	5	1
	x.	Define the normal equations to best fit the $y = ax^b$	1M	5	2

Table for Q.1 iv:

x	1	2	5
$y = f(x)$	3	2	0

Q.2(A)	Find a root of the equation, $x^2 + e^x - 5 = 0$, using the Regula-Falsi method correct up to 3 decimal places.		10M	1	3

OR

Q.2(B)	Apply Gauss Seidel method to solve the following system of equations: $5x - 2y + 3z = -1; -3x + 9y + z = 2; 2x - y - 7z = 3.$		10M	1	3

Q.3(A)	Interpolate $f(1.9)$ for the given values		10M	2	3

x	1.7	1.8	2.0	2.35	2.5
(x)	5.42	5.89	6.71	7.46	7.29

OR

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

year	1891	1901	1911	1921	1931
population	46	66	81	93	101

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

x	-2	-1	0	1	2	3	4
y	2	-0.25	0	-0.25	2	15.75	56

OR

Q.4(B)	Evaluate $\int_0^6 \dfrac{e^x}{1+x} dx$ with the proper number of sub intervals by using (a) Simpson's $\dfrac{1}{3}$ rule and (b) Simpson's $\dfrac{3}{8}$ rule.	10M	3	3

Q.5(A)	Given that $\dfrac{dy}{dx} = \dfrac{y-x}{y+x}$, $y(0)=1$. Find $y(0.1)$ and $y(0.2)$ by modified Euler's method.	10M	4	4

OR

Q.5(B)	Determine $y(0.1)$ and $y(0.2)$ by fourth order Runge-Kutta method, given that $\dfrac{dy}{dx} = x^2 - y$ and $y(0)=1$.	10M	4	3

Q.6(A)	Fit a straight line equation $y = a + bx$ by the Least square method	10M	5	3

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	5

OR

Q.6(B)	Fit the curve of the form $y = ae^{bx}$ to the following data	10M	5	3

x	77	100	185	239	285
y	2.4	3.4	7.0	11.1	19.6

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
FUNDAMENTALS 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 law of parallelogram of forces?.	1M	1	1
	ii.	What is a free-body diagram?	1M	1	1
	iii.	Classify types of trusses depending on the determinacy.	1M	2	1
	iv	Write the methods of analysis of the pin-jointed truss.	1M	2	1
	v.	What is the angle of repose?.	1M	3	1
	vi	Write the laws of limiting friction	1M	3	1
	vii.	Define Moment of inertia	1M	4	1
	viii.	Define Polar Moment of inertia	1M	4	1
	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 = 200 kg.	10M	1	3
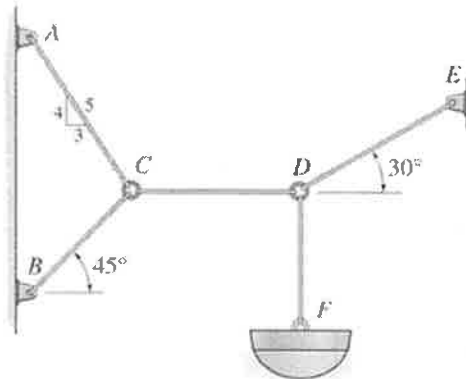
OR

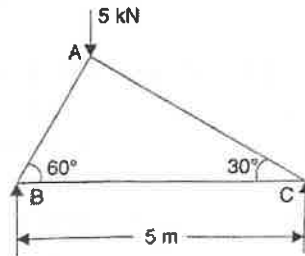| Q.2(B)	Draw the free-body diagrams for all cylinders. Find the reaction forces at all contact points. Cylinders A and B are resting on a horizontal channel of width 60 cm. The diameters of all the cylinders is 40 cm.	10M	1	4
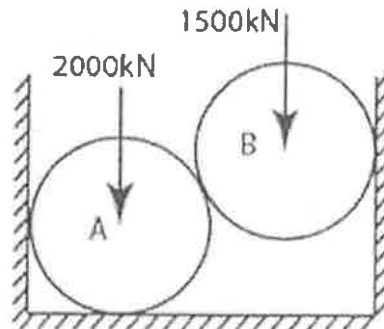
Q.3(A)	Find the support reactions and member forces in all members of the truss as shown in figure by method of joints.	10M	2	4

5 kN

A

60° 30°

B C

5 m

OR

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

20 kN

B → 12 kN

3 m

A C
D

4 m   4 m
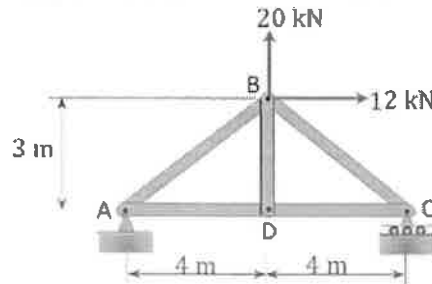
Q.4(A) A 400 kN block is resting on a rough horizontal surface for which the   10M   3   4
coefficient of friction is 0.30. Determine the force P required to cause
motion to impend if applied to the block (a) horizontally or (b)
downward at 30° with the horizontal. (c) What minimum force is
required to start motion?

400 kN
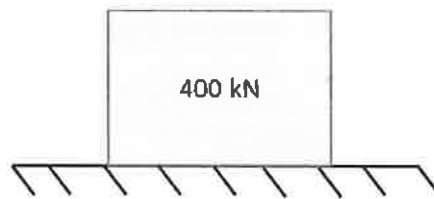
OR

Q.4(B) Find the least value of P required to cause the system of blocks shown   10M   3   4
in Fig. to have impending motion to the left. The coefficient of friction
under each block is 0.20.

P

α

30 kN

10 kN

30°
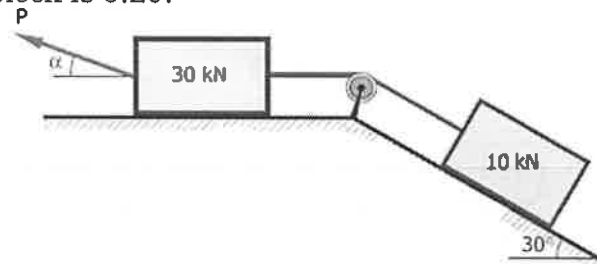
Q.5(A) Determine the centroids and moment of inertia of the symmetrical   10M   4   3
shown in Figure with respect to its centroidal axes.

15 mm

15 mm

150 mm

180 mm

15 mm

150 mm
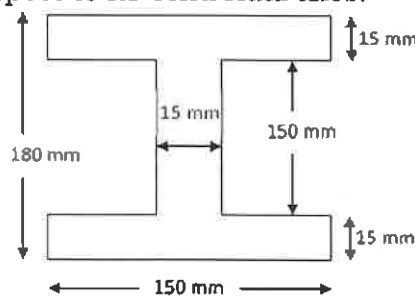
OR

Q.5(B) Determine the centroids and moment of inertia of the area shown in   10M   4   4
Figure with respect to its centroidal axes.
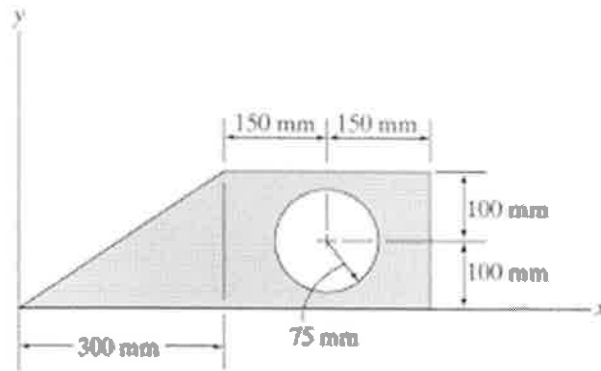
Q.6(A)　A block of mass 150 kg, resting on a horizontal surface is pulleyed by　10M　5　5
a force 350 N as shown in figure below. Calculate the inertia force,
acceleration, and velocity of the block, after it has travelled a distance
of 5 m, take μ = 0.3.

350 N

150 kg　30°
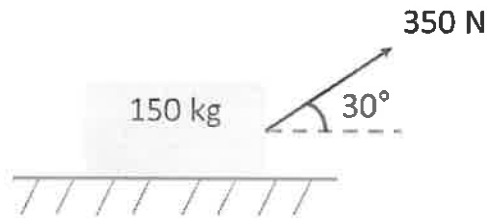
OR

Q.6(B)　A ball is dropped from the top of a tower 30 m high. At the same　10M　5　5
instant a second ball is thrown upward from the ground with an
initial velocity of 15 m/sec. When and where do they cross and with
what relative velocity? Solve the problem with neat diagram.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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.	What is unstable equilibrium in flotation?	1M	1	1
	ii.	Define Vapour pressure of fluid.	1M	1	1
	iii.	What is the use of orifice meter?	1M	2	1
	iv	Differentiate between uniform and non uniform flow.	1M	2	2
	v.	What is Minor loss in pipe flow?	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) Define Metacentre and Metacentric Height.	2M	1	1
		(ii) A rectangular log is 5m long, 3m wide and 1.3m high. The depth of immersion of the log is 0.85m in sea water. If the centre of gravity is 0.6m above the bottom of the log, determine the metacentric height. Density of sea water is 1025 kg/m³	8M	1	5
		OR			
Q.2(B)		(i) Discuss in detail the capillarity and surface tension.	4M	1	1
		(ii) Estimate the pressure due to a column of 0.75cm of the following fluids: (a) Water, (b) an oil of sp.gr. 0.8 and (c) mercury of sp.gr. 13.6. Take density of water, $\rho = 1000\,kg/m^3$.	6M	1	5
Q.3(A)		Venturimeter with inlet and throat diameters 20 cm and 10 cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and throat is 25 cm of mercury. Determine the rate of flow. Take C_d=0.62	10M	2	5
		OR			
Q.3(B)		(i) Explain stream function	3M	2	1
		(ii) A stream function is given by $\psi = 5x - 6y$ Calculate the velocity components and also magnitude and direction of resultant velocity at any point	7M	2	5
Q.4(A)		Find the head lost due to friction in a pipe of diameter 350mm and length 60m through which water is flowing at a velocity of 2.5m/s using i) Dacrcy's formula and ii) Chazy's formula. Take Chazy's C as 55	5M 5M	3 3	5 5

OR
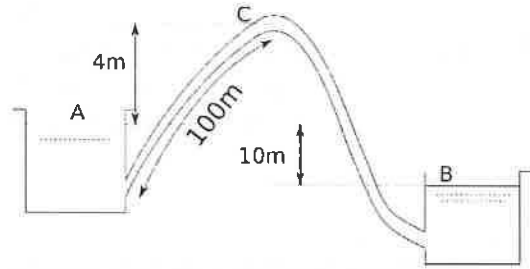
Q.4(B)	Find the rate of flow through the siphon pipe and also find pressure at point C. Diameter of the pipe is 20cm. Total length of pipe is 600m. Take f=0.006. Neglect minor losses.	10M	3	5

| Q.5(A) | (i)Draw the depth-energy relationship curve and describe it. From the same curve, explain the alternate depths and critical depth. | 2M | 4 | 1 |
| | (ii) Find the specific energy of flowing water through a rectangular channel of width 6m when the discharge is 20m³/s and depth of water is 5m | 8M | 4 | 5 |

OR

| Q.5(B) | (i) Classify flow in open channels. | 4M | 4 | 2 |
| | (ii) Find the discharge through a trapezoidal channel of width 7m and side slope 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 4500 | 6M | 4 | 5 |

| Q.6(A) | 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 2m³/s. Determine whether a hydraulic jump will occur and if so, find its height and loss of energy. | 10M | 5 | 5 |
| | | | 5 | 1 |

OR

| Q.6(B) | A 1.8m rectangular channel carries a discharge of 1.8m³ /s at a bed slope of 0.004. At a certain section, the depth of flow is 1m. Predict the type of profile. Take n = 0.013. | 10M | 5 | 5 |

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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.	Write down the basic principles of surveying?	1M	1	1
	ii.	Define Surveying?	1M	1	2
	iii.	Define levelling.	1M	2	2
	iv	What are the sources of error in levelling?	1M	2	2
	v.	What is the least count of a theodolite?	1M	3	2
	vi	What is the role of telescope in theodolite?	1M	3	1
	vii.	Define Curve?	1M	4	2
	viii	What is degree of a curve?	1M	4	2
	ix.	Define EDM?	1M	5	2
	x.	What is GIS?	1M	5	2
Q.2(A)		Discuss in detail the various classifications of surveying.	10M	1	3

OR

Q.No	Question	Marks	CO	BL
Q.2(B)	Following are the bearing taken in a closed compass traverse	10M	1	3

Lines	F.B.	B.B.
AB	S37°30'E	N37°30'W
BC	S43°15'W	N44°15'E
CD	N73°00'W	S72°15'E
DE	N12°45'E	S13°15'W
EA	N60°00'E	S59°00'W

Compute the interior angle and correct them

Q.No	Question	Marks	CO	BL
Q.3(A)	Discuss in detail about the temporary and permanent adjustments of levelling?	10M	2	4

OR

Q.No	Question	Marks	CO	BL
Q.3(B)	The following readings were taken with a dumpy level and 4m levelling 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 100 m. Use rise and fall method. Apply arithmetic checks.	10M	2	3
Q.4(A)	i)What are the permanent adjustments that are to be done for a theodolite. ii)Define a) Direct angle b) Deflection angle	10M	3	4

OR

Q.4(B)	i)State any three uses of theodolite.	10M	3	4
	ii)State any three instrumental errors of theodolite.			
Q.5(A)	What are the elements of Compound curve? Explain in detail?	10M	4	4
	OR			
Q.5(B)	Two tangents AB and BC intersect at a point B at chainage 150.5 m calculate all the necessary data for setting out a circular curve of radius 100 m and deflection angle 30° by the method of offsets from the long chord.	10M	4	4
Q.6(A)	What is meant by total station? State the functions of total stations.	10M	5	3
	OR			
Q.6(B)	Write the advantages and applications of GPS?	10M	5	5

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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.	What is mean by Economics?	1M	1	1
	ii.	Demonstrate law of demand	1M	1	2
	iii.	Outline production function	1M	2	1
	iv	What is profit volume ratio?	1M	2	1
	v.	Write any Two features of oligopoly	1M	3	1
	vi	Define Market	1M	3	2
	vii.	Outline the Book-keeping	1M	4	1
	viii.	Define Ledger	1M	4	1
	ix.	Short note on Ratio	1M	5	2
	x.	What is NPV?	1M	5	1
Q.2(A)		Discuss the nature and scope of economics in detail	10M	1	2

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

Q.No	Question	Marks	CO	BL
Q.2(B)	What is elasticity of demand? Illustrative Types price elasticity of demand.	10M	1	2
Q.3(A)	Explain economies and diseconomies of scale	10M	2	2

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

Q.No	Question	Marks	CO	BL
Q.3(B)	List out Breakeven point assumptions and importance.	10M	2	3
Q.4(A)	State the features of perfect competition and price out-put determination under it	10M	3	3

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

Q.No	Question	Marks	CO	BL
Q.4(B)	Elucidate pricing objectives and methods in briefly	10M	3	2
Q.5(A)	Describe the classification of Accounts and its Golden rules	10M	4	2

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

Q.No	Question	Marks	CO	BL
Q.5(B)	Construct Trading, Profit and Loss a/c and balance sheet as on 31-3-2020 from the following balances of Mohan Lal (P) Ltd.	10M	4	4

Debit balances	Rs	Credit balances	Rs
Purchases	25000	Sales	62000
Furniture	3000	Capital	35000
Wages	3500	Creditors	4000
Machinery	20000	Purchase returns	1000
Opening stock	18000		
Sales returns	1000		
Debtors	10000		
Freight	500		
Salaries	10000		
Rent	1000		
Taxes	2000		
Cash at bank	8000		
	102000		102000

Adjustments
1. Closing Stock Rs 16000
2. Outstanding salary Rs.500
3. Prepaid rent Rs. 500
4. Depreciation 10% on Machinery

Q.6(A) How do you categorize different types of ratios and its standard   10M   5   3
norms.

OR

Q.6(B) A company is an investment proposal to install new milling controls.   10M   5   4
The project will cost Rs. 60000. The estimated cash flows before tax
are as follows:

Year	CFAT
1	8000
2	16000
3	18000
4	20000
5	22000

Cost of capital @10%
Years: 1-0.909, 2-0.826, 3-0.751, 4-0.683 and 5-0.621
Evaluate: 1. Payback period
2. NPV
3. IRR

*** END***

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

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

ELECTRICAL CIRCUIT ANALYSIS
(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

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Q.No		Question	Marks	CO	BL
Q.1	i.	State Compensation theorem	1M	1	1
	ii.	A load is connected to a network. At the terminals to which the load is connected, R_{Th} = 10Ω and V = 40V. Determine the maximum possible power supplied to the load.	1M	1	2
	iii.	A Series R-C circuit is connected across a Voltage source v(t)=10sin(ωt). The impedance value is 5-j9, find the real power absorbed by the resistor.	1M	2	2
	iv	What is the value of power factor for capacitive load	1M	2	1
	v.	Define time constant for series R-L circuit with DC excitation	1M	3	1
	vi	In one time constant, the current in RC series circuit with DC excitation, drops to _____ percent of its initial value?	1M	3	1
	vii.	Write down the condition for symmetry and reciprocity for two port network in terms of admittance parameters.	1M	4	1
	viii.	For a reciprocal network, the two port ABCD parameters are related as _____.	1M	4	1
	ix.	Define convolution integral.	1M	5	1
	x.	Draw the S-domain representation of an Inductor.	1M	5	1
Q.2(A)		Using mesh analysis find the currents I_1, I_2 and I_3.	10M	1	3
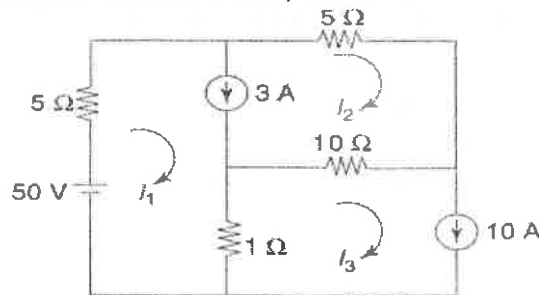
OR

Q.2(B)		Find the value of R for maximum power transfer in the circuit. Find the maximum power.	10M	1	3
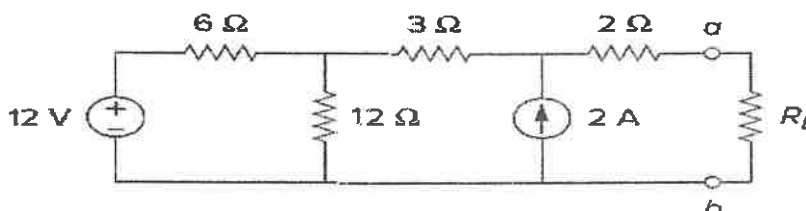
| Q.3(A) | Three impedances 12 Ω, (5+j8) Ω and −j7 Ω are connected in parallel. This parallel combination is connected in series with an impedance of (4+j6) Ω across a 230 V source. Determine the current through each branch. | 10M | 2 | 3 |

OR

| Q.3(B) | An unbalanced Delta connected load has impedances Z_{RY} =20+j15Ω, Z_{YB} = 5-10j Ω, Z_{BR}=10 Ω is connected to a 500V,50 Hz three phase balanced supply. Calculate the phase currents, line currents, power absorbed by each phase. Assume RYB phase sequence. | 10M | 2 | 3 |

| Q.4(A) | The network in below is under steady state with switch at the position 1. At t = 0, switch is moved to position 2. Find i(t). | 10M | 3 | 3 |
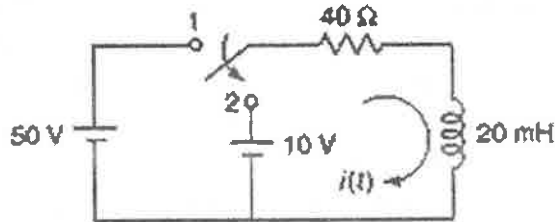
OR

| Q.4(B) | Using classical approach, derive the expression for current i(t) for a series RL circuit with DC voltage source. | 10M | 3 | 3 |

| Q.5(A) | Determine Z and h-parameters for the network shown below. | 10M | 4 | 3 |
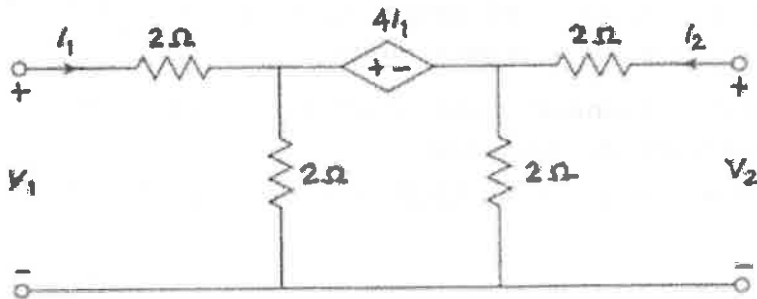
OR

| Q.5(B) | Obtain h parameters in terms of Z, Y and ABCD parameters. | 10M | 4 | 3 |

| Q.6(A) | Derive the Laplace transform of some common forcing functions with neat sketch. | 10M | 5 | 3 |

OR

| Q.6(B) | A sinusoidal voltage 25 Sin 10 t is applied at time t = 0 to a circuit shown. Find the current i(t) by Laplace Transform Method. Take R = 5 Ω and L = 1 H. | 10M | 5 | 3 |
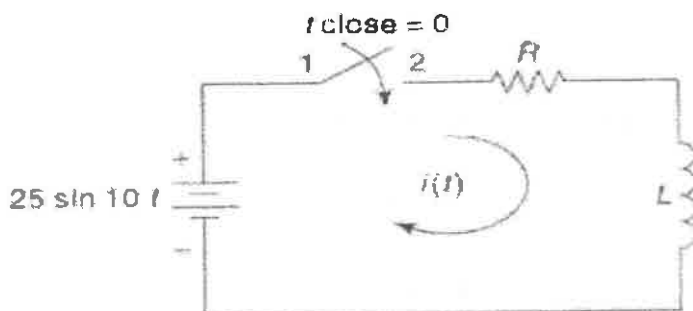
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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations – Dec' 2023
ANALOG ELECTRONICS
(EEE)

Time: 3Hrs   Max Marks: 60

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

| Q.No		Question	Marks	CO	BL
Q.1	i.	List the applications of Zener diode.	1M	1	1
	ii.	Define PIV.	1M	1	1
	iii.	Explain the ideal characteristics of OP-AMP.	1M	2	2
	iv	What are the advantages of FET compare to BJT.	1M	2	1
	v.	List the applications of OP-AMP.	1M	3	1
	vi	Define capture range in PLL.	1M	3	1
	vii.	Which pin is used for output pin in 555 timer?	1M	4	1
	viii.	Write the expression for frequency in RC phase shift Oscillator.	1M	4	1
	ix.	What are advantages of Successive approximation?	1M	5	1
	x.	Define conversion time.	1M	5	1
Q.2(A)	i) Explain the operation of PN junction diode with help of diagram.		5M	1	2
	ii) Make use of diode current equation and find the reverse saturation current for a silicon PN junction diode which passes a current of 15 mA at 27^0 C when the forward bias voltage is 680 mV.		5M	1	2
		OR			
Q.2(B)	Explain the operation of Fixed bias circuit and calculate the stability factor.		10M	1	2
Q.3(A)	i) Compare BJT, JFET and MOSFET in all respects.		5M	2	2
	ii) The fixed bias configuration of FET is having $R_G = 1M\Omega$, $R_D = 1k\Omega$, $I_{DSS} = 10mA$, $V_P = -4V$ and $V_{DD} = 8V$. Calculate V_{GS}, I_D and V_D.		5M	2	2
		OR			
Q.3(B)	Explain the Construction and operation of Enhancement N-Channel MOSFET and hence draw its drain and transfer characteristics.		10M	2	2
Q.4(A)	(i) Discuss the integrator circuit using op amp		5M	3	2
	(ii) Explain the series voltage regulator.		5M	3	2
		OR			
Q.4(B)	i) Discuss the operation of Schimtt trigger.		5M	3	2
	ii) Explain the operation of PLL with help of diagram.		5M	3	2
Q.5(A)	Explain Wien bridge oscillator and derive expression for oscillating Frequency.		10M	4	
		OR			
Q.5(B)	i) Explain the Astable operation using 555 timer.		5M	4	2
	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.		5M	4	3
Q.6(A)	Explain the operation of (i) MEM (ii) IC sensors		5M	5	2
				5M	5	2
		OR			
Q.6(B)	Illustrate the Successive Approximation analog to digital converter with a neat diagram.		10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations – Dec' 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 flux and Reluctance	1M	1	1
	ii.	Write the expression for energy stored in the magnetic circuit and electric circuit	1M	1	2
	iii.	Define critical resistance of DC shunt generator	1M	2	1
	iv	What are the types of armature windings of a dc generator	1M	2	1
	v.	Explain the necessity of stator	1M	3	2
	vi	List out the types of DC Motors	1M	3	1
	vii.	Draw the equivalent circuit of single phase transformer	1M	4	6
	viii.	Define voltage regulation of transformer	1M	4	1
	ix.	Which type of connection is best suited for 3 phase 4 wire system of 3 phase transformer	1M	5	1
	x.	Explain Scott connection of 3 phase transformer	1M	5	2
Q.2(A)		Discuss the influence of highly permeable materials on the magnetic flux lines and magnetic circuits	10M	1	6
		OR			
Q.2(B)		Explain the torque as a partial derivative of stored energy with respect to angular position of rotating element	10M	1	2
Q.3(A)		A compound generator suppling a load of 250 lamps each rated at 100 Watts at 250V, the armature, series and shunt windings having resistance of 0.06Ω, 0.04 Ω and 50 Ω respectively. Determine the generated emf when the machine is connected as i) Long shunt compound generator ii) Short shunt compound generator.	10M	2	4
		OR			
Q.3(B)		Draw and explain the open circuit characteristics of DC shunt generator with neat circuit diagram	10M	2	2
Q.4(A)		i)Explain the different speed control methods of a D.C.Shunt motor	5M	3	2
		ii) Draw the neat sketch of a 3-point starter and explain the features of each component in it.	5M		
		OR			
Q.4(B)		Explain the Swinburnes test with neat circuit diagram in detail	10M	3	2
Q.5(A)		(i)Derive an EMF equation of single phase transformer	5M	4	3
		(ii)Discuss the losses and efficiency of single phase transformer	5M	4	6
		OR			
Q.5(B)		Explain open circuit and short circuit test of single phase transformer with neat circuit diagram	10M	4	2

| Q.6(A) | (i) What are the different types of connections of 3 phase transformer | 5M | 5 | 1 |
| | (ii) List out the comparative feature of different connections of 3 phase transformer | 5M | 5 | 1 |

OR

| Q.6(B) | A load of 1400kVA at 0.866 power factor lagging supplied by two 3-phase transformers of 1000kVA and 500kVA operating in parallel. The ratio of transformation is same on both: 6600/400V Δ-Y. If the equivalent secondary impendences are (0.001+j0.003) and (0.0028+j0.005) ohms per phase respectively. Calculate load And power factor of each transformer. | 10M | 5 | 2 |

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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**

Q.No		Question	Marks	CO	BL
Q.1	i.	What is a resultant?	1M	1	1
	ii.	Define Equilibrium & Equilibrant?	1M	1	1
	iii.	Define Beam & List the different types of beams	1M	2	1
	iv	What are the assumptions of a perfect truss?	1M	2	2
	v.	Define the term Moment of Inertia.	1M	3	1
	vi	Write the projectile formula for an Equation of Trajectory, Maximum height,	1M	3	2
	vii.	Define Kinematics	1M	4	1
	viii	Distinguish between Rectilinear motion and curvilinear motion.	1M	4	2
	ix.	What is conservation of momentum	1M	5	1
	x.	State D'Alembert's principle	1M	5	2
Q.2(A)		Three forces of magnitude 40kN,15kN and 20kN are acting at a point O as shown in figure. The angles made by 40kN,15kN forces with X-axis are 60^0, 120^0 and 240^0 respectively.determine the magnitude and direction of the resultant force.	10M	1	3
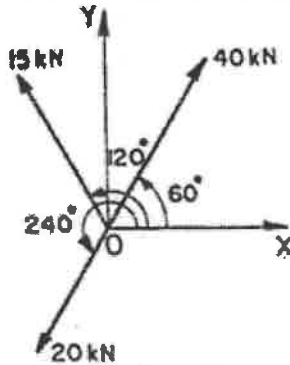
OR

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.	10M	1	3
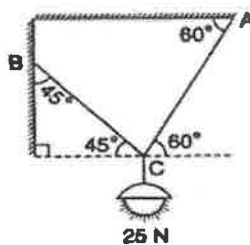
Q.3(A)	Calculate the support reactions for the beam as shown in the figure	10M	2	3
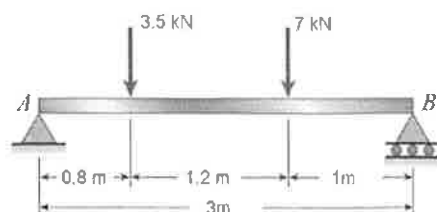
Q.3(B)   Find the forces in all the members of the truss shown in figure.   10M   2   4

40 kN   40 kN
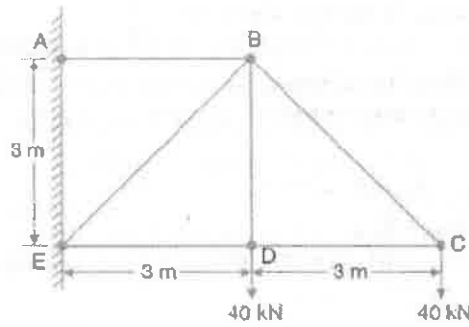
Q.4(A)   Find the Centroid for the Shaded Part with respect to reference X &   10M   3   3
Y axis
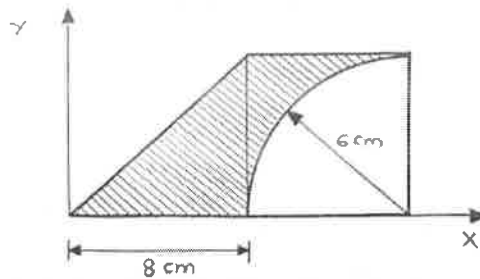
OR

Q.4(B)   Find the moment of inertia about the centroidal axes XX and YY of   10M   3   4
the section shown in Fig
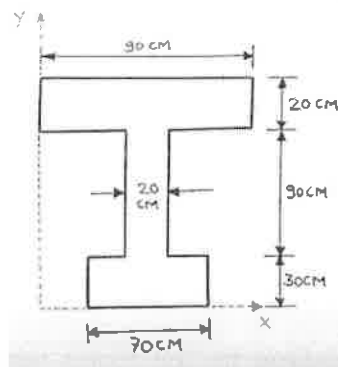
Q.5(A)   A particular move along a straight line so that its displacement in   10M   4   4
meter from a fixed point is given by, $S = t^3 + 3t^2 + 4t + 5$.
Determine:
i)Velocity at start and after 6 seconds
ii)Acceleration at Start and after 6 seconds

OR

Q.5(B)   A player kicks the football with a velocity of 24 m/sec at an angle of   10M   4   4
36 degree from the ground.
Determine for this projectile:
(i) total time of flight
(ii) maximum height attained by football

(iii) velocity of football after 1.2 sec and 2 sec

(iv) range of football
(v) maximum range of football it could attain

Q.6(A) A sphere 'A' weights 100 N moves on the X-axis in its positive   10M   5   5
        direction with a velocity of 4 m/s. Another sphere 'B' of weight 80 N
        moving on the same axis but in the opposite direction approaches it
        with a velocity of 6 m/s and impinges on it. If the coefficient of
        restitution is 0.7. Calculate the velocities of the two spheres after
        impact. Also calculate the loss of K.E. that take place.
                                        OR

Q.6(B) A body of Weighing 196N under the action of applied force 300N   10M   5   4
        acting. The body moves from rest.
        Determine
        i)acceleration of the body,
        (ii) distance travelled by body in four seconds,
        (iii) velocity of body after four seconds,
        (iv) kinetic energy of the body after four seconds
        v) Impulse force applied on a body after four seconds.
                                *** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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**

Q.No		Question	Marks	CO	BL
Q.1	i.	Define thermodynamics.	1M	1	1
	ii.	What is the difference between intensive and extensive properties?	1M	1	1
	iii.	What is a pure substance?	1M	2	1
	iv	Write the formula to determine enthalpy of wet steam.	1M	2	1
	v.	State Kelvin-Plank statement of second law of thermodynamics.	1M	3	2
	vi	Define thermal reservoir.	1M	3	1
	vii.	What is the difference between ideal gas and real gas?	1M	4	2
	viii.	State Dalton's law of partial pressure.	1M	4	1
	ix.	Define compression ratio.	1M	5	1
	x.	What are the different processes in Rankine cycle.	1M	5	1
Q.2(A)		What are the types of non-flow processes. Derive the expression for work done during the different non-flow processes.	10M	1	2
		OR			
Q.2(B)		A gas undergoes a thermodynamic cycle consisting of the following processes: Process 1–2: Constant pressure P = 1.4 bar, V1 = 0.028 m3, W1-2 = 10.5kJ Process 2–3: Compression with PV = constant, U3 = U2 Process 3–1: Constant volume, U1 – U3 = – 26.4 kJ. There are no significant changes in KE and PE. (a) Sketch the cycle on a p–V diagram (b) Calculate the network for the cycle in kJ (c) Calculate the heat transfer for process 1–2 (d) Show that $\sum_{cycle} Q = \sum_{cycle} W$	10M	1	3
Q.3(A)		Explain the phase change process of water at atmospheric pressure with T-v diagram.	10M	2	2
		OR			
Q.3(B)		With neat sketch draw and explain the P-V diagram for a pure substance. Also discuss in detail about saturated solid, liquid & vapour lines in the diagram	10M	2	2
Q.4(A)		Explain the working of Carnot heat engine with P-V and T-S diagrams and derive the expression for its thermal efficiency.	10M	3	2
		OR			
Q.4(B)		Derive the expression for Clausius inequality	10M	3	2

		10M	4	2

Q.5(A) Using Maxwell's equations and TDS equations derive the expression for difference in heat capacities. Also derive the same expression for an ideal gas.

OR

Q.5(B) Explain Joule-Kelvin effect with the help of a neat sketch. Draw T-S diagram for constant enthalpy curves and discuss about inversion curve and its significance.

10M 4 2

Q.6(A) Explain the working principle of Otto cycle with P-V & T-S diagrams. Also derive the expression for efficiency of the cycle.

10M 5 2

OR

Q.6(B) Explain the working principle of Brayton cycle with P-V & T-S diagrams. Also derive the expression for efficiency of the cycle.

10M 5 2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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.	What is APF of BCC	1M	1	1
	ii.	State important of Miller indices	1M	1	2
	iii.	What is mean by Ficks law of diffusion?	1M	2	1
	iv	Write an equation of eutectoid reaction	1M	2	2
	v.	What do you mean by work hardening	1M	3	1
	vi	What is plastic deformation?	1M	3	2
	vii.	What is S-N diagram? What is the significance of it?	1M	4	1
	viii	Define iso thermal transformation	1M	4	1
	ix.	Write down the Gibbs phase equation	1M	5	1
	x.	List out applications of composites	1M	5	2
Q.2(A)		Find out APF of SC, BCC, and FCC crystalline structures.	10M	1	2
		OR			
Q.2(B)		What are solid solutions? How are they classified? Explain each in detail.	10M	1	3
Q.3(A)		Distinguish between elastic and plastic deformation of a solid	10M	2	2
		OR			
Q.3(B)		State and explain Gibbs phase rule and explain cooling curves equilibrium diagram.	10M	2	3
Q.4(A)		Draw the complete isothermal transformation diagram (TTT plot) for an iron-carbon alloy of the eutectoid composition	10M	3	3
		OR			
Q.4(B)		Explain the method of testing the materials for fatigue and how is the fatigue data presented.	10M	3	3
Q.5(A)		Draw iron-iron carbide equilibrium diagram and mention the important composition and temperature	10M	4	3
		OR			
Q.5(B)		What is the effect of the grain size on the mechanical properties of the materials?	10M	4	3
Q.6(A)		Discuss the influence of each of the following alloying elements on the properties of steel: (a) Molybdenum (b) Chromium (c) Manganese (d) Vanadium (e) Titanium (f) Tungsten.	10M	5	3
		OR			
Q.6(B)		Write short notes on non - ferrous materials and their applications	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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.	State Viscosity and units of dynamic viscosity.	1M	1	1
	ii.	Define streamlines and path lines	1M	1	1
	iii.	What is Buoyancy?	1M	2	1
	iv	State the limitations of Bernoulli equation	1M	2	1
	v.	Differentiate laminar and turbulent flow	1M	3	2
	vi	List out various minor losses	1M	3	2
	vii.	Define displacement thicknesses	1M	4	1
	viii	How the specific speed of turbine defined?	1M	4	1
	ix.	Classify the centrifugal pumps	1M	5	2
	x.	Define slip of a reciprocating pump	1M	5	1
Q.2(A)		Calculate the capillary effect in millimetres in a glass tube of 4 mm diameter, when immersed in (i) water and (ii) mercury. The temperature of the liquid is 20°C and the values of surface tension of water and mercury at 20°C in contact with air are 0.0735 N/m and 0.51 N/m respectively. The contact angle for water θ = 0° and for mercury θ = 130°. Take specific weight of water at 20°C as equal to 9790 N/m³.	10M	1	3

OR

		Fig. shows a differential manometer connected at two points A and B. At 'A' air pressure is 100 kN/m². Find the absolute pressure at 'B'.	10M	1	3

Q.2(B)

Q.3(A)		Derive Bernoulli's equation for the flow of an incompressible frictionless fluid.	10M	2	3

OR

Q.3(B)	Water is flowing through a pipe having diameters 600 mm and 400 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 350 kN/m² and the pressure at the upper end is 100 kN/m². Determine the difference in datum head if the rate of flow through the pipe is 60 litres/sec.	10M	2	3

Q.4(A)	A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20 cm of mercury. Determine the rate of flow. Take C_d = 0.98	10M	3	3

OR

Q.4(B)	A pipe of diameter 225 mm is attached to a 150 mm diameter pipe by means of a flange in such a manner that the axes of the two pipes are in a straight line. Water flows through the arrangement at the rate of 0·05 m³/s. The pressure loss at the transition as indicated by differential gauge length on a water-mercury manometer connected between two pipes equals 35 mm. Calculate: (i) The loss of head due to contraction, and (ii) The co-efficient of contraction.	10M	3	3

Q.5(A)	A nozzle of 60 mm diameter delivers a stream of water at 24 m/s perpendicular to a plate that moves away from the jet at 6 m/s. Find: (i) The force on the plate, (ii) The work done, and (iii) The efficiency of the jet.	10M	4	3

OR

Q.5(B)	In an inward flow reaction turbine the head on the turbine is 32 m. The external and internal diameters are 1.44 m and 0.72 m respectively. The velocity of flow through the runner is constant and equal to 3m/s. The guide blade angle is 10° and the runner vanes are rigid at inlet. If the discharge at outlet is radial, determine: (i) The speed of the turbine, (ii) The vane angle at outlet of the runner, and (iii) Hydraulic efficiency.	10M	4	3

Q.6(A)	Explain the working principle and main parts of a centrifugal pump	10M	5	2

OR

Q.6(B)	A single-acting reciprocating pump operating at 120 r.p.m. has a piston diameter of 200 mm and stroke of 300 mm. The suction and delivery heads are 4 m and 20 m, respectively. If the efficiency of both suction and delivery strokes is 75 percent, determine the power required by the pump.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
(Electronics & Communication Engineering)

Time: 3Hrs   Max Marks: 60
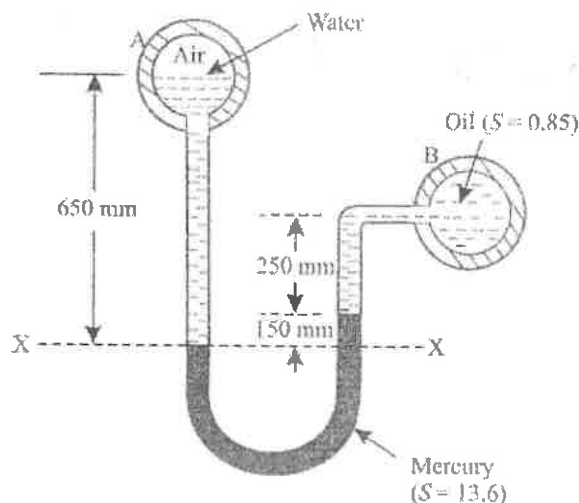
> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No		Question	Marks	CO	BL
Q.1	i.	State the first shifting property of Laplace transforms?	1M	1	1
	ii.	Find the inverse Laplace transform of $\dfrac{2}{(p+3)^4}$	1M	1	2
	iii.	Define Fourier transform of a function?	1M	2	1
	iv	State the scale property on Fourier transforms?	1M	2	1
	v.	State the 'Damping rule on Z-transform'?	1M	3	1
	vi	Find the Z- transform of a Unit impulse function.	1M	3	1
	vii.	Form the PDE by eliminating arbitrary constants a and b from $z = ax - by$	1M	4	2
	viii.	Solve $p - q = 1$	1M	4	2
	ix.	Write the form of one dimensional wave equation?	1M	5	2
	x.	Write assumed solution form in method of separation of variables?	1M	5	1
Q.2(A)		(i) Find the Laplace transforms of $\int_0^\infty \dfrac{e^{-ax} - e^{-bx}}{x} dx$ (ii) Find $L^{-1}\left(\dfrac{1}{p^2(p^2+1)}\right)$ using Convolution theorem.	10M	1	3
		OR			
Q.2(B)		Solve the following differential equation: $y'' + 2y' + 5y = 3e^{-x}\sin x$; $y(0) = 0, y'(0) = 3$	10M	1	3
Q.3(A)		Express $f(x)= \begin{cases} 1 & \text{for } 0 \leq x \leq \pi \\ 0 & \text{for } x > \pi \end{cases}$ as a Fourier sine integral and hence evaluate $\int_0^\infty \frac{1-\cos(\pi\lambda)}{\lambda}\sin(x\lambda)\,d\lambda$	10M	2	4
		OR			
Q.3(B)		Find the Fourier transform of $f(x)= \begin{cases} 1 - x^2 & \text{for } |x| \leq 1 \\ 0 & \text{for } |x| > 1 \end{cases}$ Hence evaluate $\int_0^\infty \frac{x\cos x - \sin x}{x^3}\cos\frac{x}{2}\,dx$	10M	2	4
Q.4(A)		(i) Find the Z-transform of the following: (a) $\cos n\theta$ (b) $\dfrac{1}{(n+2)!}$ (ii)Use Convolution theorem on Z-transforms, show that $\dfrac{1}{n!} * \dfrac{1}{n!} = \dfrac{2^n}{n!}$	10M	3	2
		OR			
Q.4(B)		Solve $y_{n+2} + 4y_{n+1} + 3y_n = 2^n$ with $y_0 = 0, y_1 = 1$, using Z-transforms.	10M	3	3

Q.5(A)   (i) Form the PDE by eliminating the arbitrary constants from   10M   4   2
$(x-a)^2 + (y-b)^2 + z^2 = c^2$

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

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

Q.5(B)   Solve the following non-linear equation by Charpit's method: 10M   4   3
$(p^2 + q^2)y = qz$

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

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

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

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) $y(0) = 0$, $y(\dfrac{\pi}{2}) = 0$ (ii) $y(-L) = 0$, $y(L) = 0$ when $L > 0$

<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 – Dec' 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.	State Superposition Theorem.	1M	1	1
	ii.	Write the formulae's for twig and link?	1M	1	1
	iii.	Define Bandwidth.	1M	2	1
	iv	Derive the expression for resonance frequency of series RLC circuit.	1M	2	1
	v.	Find out the Laplace transform of $e^{-2t} \cos(8t)$.	1M	3	2
	vi	Define initial and final value theorems.	1M	3	1
	vii.	Write the reciprocity and symmetrical conditions of Transmission parameters	1M	4	1
	viii.	Write Y parameters in terms of h parameters	1M	4	1
	ix.	What is Ladder network?	1M	5	1
	x.	Define Neper.	1M	5	1
Q.2(A)		(a) State and Prove Maximum Power Transfer Theorem	4M	1	1
		(b) Find the Load current through 1Ω resistor using Thevenin's theorem	6M	1	2
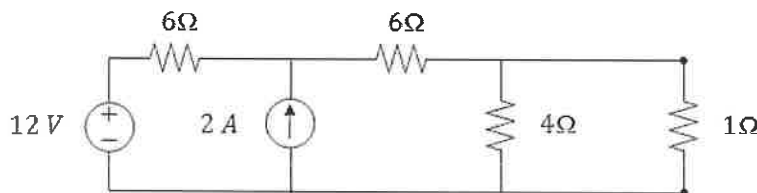
OR

Q.2(B)	Find the fundamental tie-set and cut-set matrix for the graph shown in below. Select 2, 3, 6 as tree branches.	10M	1	2

Q.3(A)	(a) Derive the expression of bandwidth in series RLC circuit.	5M	2	3
	(b) A 50µF Capacitor, when connected in series with 40Ω resistance, resonates at 1000Hz.Find the Inductance of the Coil. Also calculate voltage across capacitor and coil at resonance.	5M	2	3

OR

Q.3(B) Derive the expression for resonance frequency of the circuit shown below.   10M   2   3
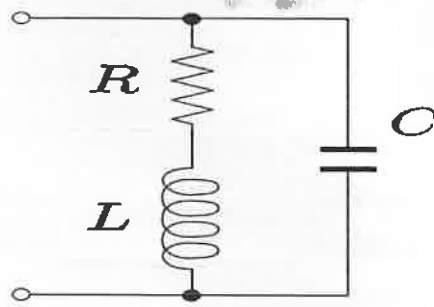
Q.4(A) For the circuit shown, with zero inductor current the switch is closed on to   10M   3   3
position S1 at time t = 0. At one milli second it is moved to position S2. Obtain
the equation for the currents in both the intervals using Laplace transforms.
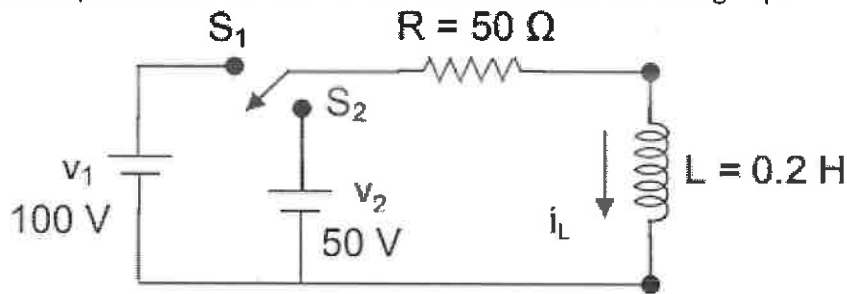
OR

Q.4(B) Describe the Step response of a series RL and RC circuit using Laplace   10M   3   3
transform.

Q.5(A) (a) Derive the conditions for symmetry and reciprocity for Z parameters.   5M   4   2

(b) Determine h-parameters for the network given below.   5M   4   2
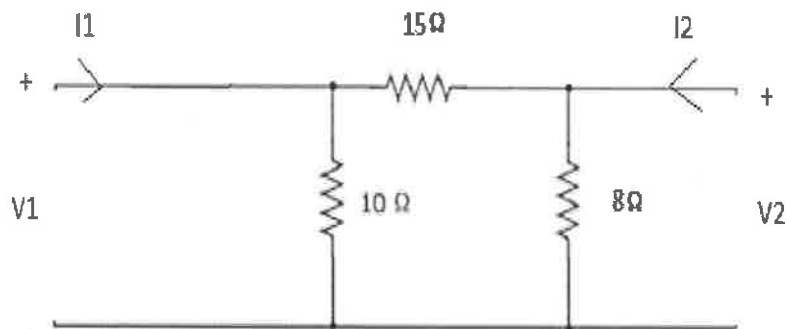
OR

Q.5(B) The h parameters of a circuit are given by   10M   4   2

$$\begin{bmatrix} 4 & 1 \\ 3 & 3 \end{bmatrix}$$

Obtain the transmission and admittance parameters.

Q.6(A) Explain the properties of symmetrical T and π network   10M   5   2

OR

Q.6(B) Derive the characteristic impedance and propagation constant of symmetrical   10M   5   3
T network.

*** END ***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations – Dec' 2023
DIGITAL SYSTEM DESIGN
(ECE)

Time: 3Hrs   Max Marks: 60

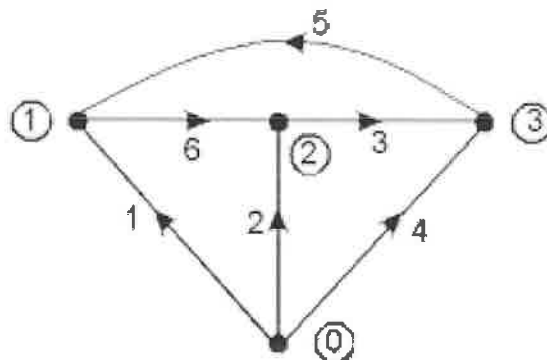| Attempt all the questions. All parts of the question must be answered in one place only. |
| :-- |
| **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only** |

Q.No		Question	Marks	CO	BL
Q.1	i.	Convert $(101101101100)_2$ to $(\ )_{16}$	1M	1	2
	ii.	Convert $(FAB)_{16}$ to $(\ )_2$	1M	1	2
	iii.	State De-Morgan's laws.	1M	2	1
	iv	Draw the logic circuit of Half adder	1M	2	1
	v.	What is the difference between latch and Flip flop?	1M	3	1
	vi	What is meant by race around condition in flip-flops?	1M	3	2
	vii.	What is difference between RAM and ROM	1M	4	2
	viii.	Define Fan out of an integrated circuit.	1M	4	1
	ix.	List different modelling styles in VHDL.	1M	5	1
	x.	What is RTL in VLSI design	1M	5	2
Q.2(A)		For the given minterms build a logic circuit with i) basic gates and ii) NAND gates $F=\sum m(0,1,2,3,4,5,6,9,12,13,14)$	10M	1	4
		OR			
Q.2(B)		i) Convert the given decimal number $(496)_{10}$ to Binary, Octal, Hexadecimal and BCD Equivalent. ii) Why NAND and NOR is called as Universal Gate? Design all logic gates using NAND.	10M	1	3
Q.3(A)		Explain the construction of 4 bit parallel adder with a look ahead carry scheme.	10M	2	3
		OR			
Q.3(B)		i) Implement a Boolean Function $F(x, y, z) = \Sigma m(1, 3, 5, 7)$ with a 4×1 Multiplexer ii) Draw and explain the 4 x 1 line multiplexer.	10M	2	4
					2
Q.4(A)		Design a synchronous Mod-6 counter using JK flip flops and explain the operation.	10M	3	4
		OR			
Q.4(B)		Design a Decade Ripple counters using JK flip-flop	10M	3	4
Q.5(A)		Explain open collector TTL gate with suitable circuit diagram for NAND operation.	10M	4	3
		OR			
Q.5(B)		i) Draw CMOS NAND and NOR gates and explain their operation. ii) Explain different types of Read Only Memory.	10M	4	2
Q.6(A)		i) Write the VHDL code for Half adder. ii) Explain different data types and objects in VHDL.	10M	5	4
		OR			
Q.6(B)		Write VHDL code for 8x1 Multiplexer and 1x8 Demultiplexer.	10M	5	4

*** END***

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

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

ELECTRONIC DEVICES AND 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.	Where does the Fermi level exist in p-type and n-type semiconductors?	1M	1	1
	ii.	State Mass action law and write its expression.	1M	1	1
	iii.	Define cut-in voltage of a diode.	1M	2	1
	iv	List out the applications on LED.	1M	2	1
	v.	Draw the circuit symbols for N-Channel Enhancement mode and Depletion mode MOSFETs.	1M	3	1
	vi	Explain the need of biasing.	1M	3	2
	vii.	Define ripple factor. Mention the ideal value of ripple factor.	1M	4	2
	viii.	What is another name for a clamper circuit?	1M	4	1
	ix.	Find the operating region of n-channel MOSFET with V_{GS} = 1.5V, V_t = 1.28V and V_{DS} = 1.3V.	1M	5	3
	x.	What is the relationship between drain resistance transconductance and amplification factor?	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)		Derive the expressions for electron and hole concentrations in semiconductors under thermal equilibrium.	10M	1	2
Q.3(A)		(i) Analyse the working of PN diode in forward and reverse bias with the neat characteristic curve. (ii) Derive the expression for Diffusion Capacitance of PN diode.	10M	2	2
		OR			
Q.3(B)		Derive expressions for Eber's-Moll equations for a BJT and also draw the basic Eber's –Moll equivalent circuit.	10M	2	2
Q.4(A)		(i) Explain the constructional features of a depletion mode MOSFET and explain its basic operation. (ii) Why Field Effect Transistor is called a Voltage Controlled Device?	10M	3	2
		OR			
Q.4(B)		Explain the different biasing techniques of JFET with neat sketches.	10M	3	2
Q.5(A)		Explain the working of a two-level diode clipper with the help of Circuit waveform and transfer characteristics.	10M	4	2
		OR			
Q.5(B)		i) What is a Zener diode? Draw the equivalent circuit of an ideal Zener diode in the breakdown region. Explain how Zener diode maintains constant voltage across the load.	10M	4	3

ii) In the circuit shown in figure, the voltage across the load is to be maintained at 12 V as load current varies from 0 to 200 mA. Design the regulator. Also find the maximum wattage rating of Zener diode.
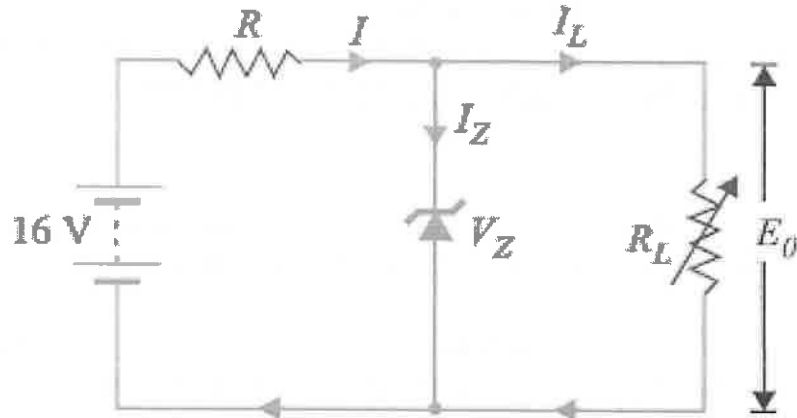
Q.6(A)	Explain the operation of common source (CS) amplifier circuit and derive the expressions for its small-signal voltage gain, current gain, input impedance and output impedance.	10M	5	2

OR

Q.6(B)	Draw the h-parameter model of CE amplifier and derive the expressions for Current gain, Voltage 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 & Supplementary End Semester Examinations, December– 2023
PROBABILITY AND STATISTICS FOR COMPUTER SCIENCE
(Common to CSE, CST, CSE-DS, CSE-AI, CSE-CS)

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	2
	ii.	Define probability density function of a continuous random variable X	1M	1	1
	iii.	The mean of poisson distribution is 4 then, find P(X=2)	1M	2	1
	iv	Write the moment generating function of Normal distribution	1M	2	1
	v.	Define the conditional density of X given Y=y	1M	3	1
	vi	Define Covariance between X and Y.	1M	3	1
	vii.	If $Q_1 = 6$, $Q_3 = 10$ and $Sk_B = 0.5$ find median.	1M	4	2
	viii.	If $b_{YX} = \dfrac{4}{5}$ and $b_{XY} = \dfrac{9}{20}$ the find coefficient of Correlation between X and Y?	1M	4	2
	ix.	Define Standard Error of a sampling distribution.	1M	5	1
	x.	Write a t -statistic for one sample mean.	1M	5	1
Q.2(A)		In a bolt factory machines M_1, M_2, M_3 manufacture 25%, 35% and 40% of the total. Of their output 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B, C	10M	1	2

OR

Q.2(B)	Let X denotes the length in minutes of a long-distance telephone conversation. The density for X is given by $f(x) = \dfrac{1}{10} e^{-\frac{x}{10}}; \quad x > 0$. Find the following: (i) $p(X \geq 10)$ (ii) $p(5 \leq X \leq 20)$ (iii) mean (iv) variance	10M	1	3

Q.3(A)	Derive the moment generating function of binomial distribution and then find mean and variance.	10M	2	3

OR

Q.3(B)	Assume that during seasons of normal rainfall, let X denote water level in feet at a particular lake follows normal distribution with mean 140 feet and standard deviation 10 feet. During such a season, find the probability that one can observe a water level (i) will exceeds 155 feet (ii) will be between 130 feet and 140 feet (iii) will be less than 125 feet. (iv) will be more than 135 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	10M	3	4

X\Y	1	2	3	4
0	0.059	0.100	0.050	0.001
1	0.093	0.120	0.082	0.003
2	0.065	0.102	0.100	0.010
3	0.050	0.075	0.070	0.020

OR

Q.4(B)	The joint density for (X,Y) is given by $f(x,y) = xye^{-x}e^{-y}$; $x>0, y>0$	10M	3	3

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

    (ii)   Find Cov (X,Y)

    (iii)   Are X and Y independent?

    (iv)   Find $p(X \leq 1)$

Q.5(A)	Calculate coefficient of Skewness based on quartiles and comment on the nature of the data.	10M	4	4

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f_i	52	68	85	92	100	95	70	28

OR

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

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

Q.6(A)	A random sample of 40 hot drinks from dispenser A had a mean volume of 202 ml and standard deviation of 3 ml. A random sample of 50 hot drinks from dispenser B gave the corresponding values of 208 ml and 5 ml. The amount dispensed by each machine may be assumed to be normally distributed. Test at 5% level of Significance, whether there is any significant difference between quantities dispensed by two machines.	10M	5	3

OR

Q.6(B)	Two independent sample of sizes 7 and 6 have the values:	10M	5	4

Sample A: 28   30   32   33   33   29   34

Sample B: 29   30   30   24   27   29

Examine whether the samples have been drawn from normal populations having the same variance?

*** END***

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

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

COMPUTER SYSTEM ARCHITECTURE
(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.	Convert $(115)_{10}$ into hexadecimal numbers.	1M	1	2
	ii.	Compare encoder and decoder.	1M	1	2
	iii.	What is fixed point representation?	1M	2	1
	iv	Define guard bits.	1M	2	1
	v.	Mention the three categories of the bus.	1M	3	1
	vi	List out the advantages and drawbacks of condition codes.	1M	3	1
	vii.	What is the difference between multi-processor and uniprocessor?	1M	4	2
	viii	List out the advantages of instruction pipeline.	1M	4	1
	ix.	What is locality of reference?	1M	5	1
	x.	Define the terms spatial locality and temporal locality.	1M	5	1
Q.2(A)		Explain the working of a D Flip Flop with a neat logic diagram.	10M	1	2
		OR			
Q.2(B)		Simplify the following expression using K- Map $Y(A, B, C) = =\sum m(0, 1, 3, 5, 6) + d(2, 4)$.	10M	1	3
Q.3(A)		Describe in detail about the restoring division algorithm with a suitable example.	10M	2	2
		OR			
Q.3(B)		Draw the flowchart for the Booths algorithm and illustrate the process of signed multiplication for the given data: $(-17)_{10} * (14)_{10}$.	10M	2	3
Q.4(A)		What is an addressing mode? Illustrate the most common addressing techniques with suitable examples.	10M	3	2
		OR			
Q.4(B)		Categorize in the detail about the concepts of microprogrammed control unit.	10M	3	4
Q.5(A)		Explain in detail about symmetrical multiprocessors and clusters.	10M	4	5
		OR			
Q.5(B)		What are pipeline hazards? Explain the various types of pipeline hazards with suitable examples.	10M	4	2
Q.6(A)		Infer the concepts of cache memory and list the various cache memory mapping techniques in detail.	10M	5	4
		OR			
Q.6(B)		What is RAID? Explain the various levels of RAID scheme with suitable illustrations.	10M	5	5

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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.	Define time complexity.	1M	1	1
	ii.	Compare between singly linked list and doubly linked list.	1M	1	2
	iii.	Differentiate between stack and queue.	1M	2	2
	iv	Convert the given infix expression (A + B) / (C + D) – (D * E) into postfix & prefix .	1M	2	2
	v.	Define full binary tree and complete binary tree.	1M	3	1
	vi	Define heap and heapify.	1M	3	1
	vii.	What do you mean by quadratic probing?	1M	4	1
	viii	What do you meant by divide and conquer technique?	1M	4	1
	ix.	List down the properties of Red-Black Tree.	1M	5	1
	x.	Define AVL Tree.	1M	5	1
Q.2(A)		Define time complexity and differentiate between Big O, Omega Ω and Theta Θ symbols in time complexity.	10M	1	2
		OR			
Q.2(B)		Define array. Explain the insertion and deletion operations with pseudocode which can be carried out in an array.	10M	1	2
Q.3(A)		Define queue. Write algorithm to implement the operations of queue using array.	10M	2	4
		OR			
Q.3(B)		Write an algorithm to convert infix to postfix expression and evaluate the given expression A - (B / C + (D % E * F) / G) * H).	10M	2	4
Q.4(A)		Construct max heap using the following values 1,3,5,4,6,13,10,9,8,15,17 and explain the insertion algorithm.	10M	3	4
		OR			
Q.4(B)		What is binary search tree? State the properties of binary search tree. Construct BST for the following values: 34, 61, 87, 84, 97, 27, 11, 9, 5, 10, 23, 53.	10M	3	4
Q.5(A)		Explain about quick sort algorithm with an example.	10M	4	2
		OR			
Q.5(B)		What is a collision in hashing? Explain open hashing and closed hashing with an example.	10M	4	2
Q.6(A)		Construct a AVL tree with the following values. 15, 20, 24, 10, 13, 7, 30, 36, 25, 35, 42, 50, 18.	10M	5	4
		OR			
Q.6(B)		Explain the graph traversal techniques with an example.	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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.	How could you compare Structure and Union?	1M	1	2
	ii.	State the difference between Runtime and Compile time Polymorphism.	1M	1	1
	iii.	Can a class be a member of another class? Justify your answer.	1M	2	2
	iv	Define the Base and Derived classes.	1M	2	1
	v.	What is the main feature of Inheritance?	1M	3	1
	vi	Outline the difference between Static and Dynamic Binding.	1M	3	2
	vii.	What are the different types of File modes?	1M	4	1
	viii	What are the several special functions that are used to perform formatted IO operations located in iomanip header file.	1M	4	1
	ix.	Write the syntax for declaring class and function template.	1M	5	2
	x.	Compare and contrast error and exception.	1M	5	2
Q.2(A)		Explain about various C++ statements with example program.	10M	1	2
		OR			
Q.2(B)		Develop a program for 5 students marks in Chemistry, Mathematics and Physics (each out of 100) using a structure named Marks having elements roll no., name, chem_marks, maths_marks and phy_marks and then display the percentage of each student.	10M	1	4
Q.3(A)		Explain the salient features of friend function and friend class with an example program.	10M	2	2
		OR			
Q.3(B)		(i). Design a class Bank with Account number, Name and Balance as attributes. Then define function to withdraw, Deposit and Check balance. Use constructor to initialize the variables.	5M	2	3
		(ii). Write a C++ program to swap two integers using reference parameter.	5M		
Q.4(A)		Discuss with examples, the implications of deriving a class from an existing class by the 'public', 'private' and 'protected' access specifiers.	10M	3	2
		OR			
Q.4(B)		What are abstract classes? Give an example program to illustrate the use of abstract classes.	10M	3	2
Q.5(A)		What is role of manipulators in C++? Write down different manipulators in C++ with example program.	10M	4	2
		OR			
Q.5(B)		Explain String streams with example.	10M	4	2

Q.6(A)   Write about Template and its types with example.   10M   5   2

                                            OR

Q.6(B)   What is Exception Handling? How Exception handling is   10M   5   2
          implemented using multiple catch statements for a try block in the
          C++ program?

                                      *** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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.	List the Components of ER Model?	1M	1	2
	ii.	"Employee works for the department". Identify entities and possible attributes in the given statement?	1M	1	3
	iii.	List out different types of keys?	1M	2	2
	iv	What is the difference between stored procedure and function?	1M	2	1
	v.	What is Database Anomaly?	1M	3	1
	vi	Define loss less join decomposition with example?	1M	3	1
	vii.	What is serializability?	1M	4	1
	viii	List the properties of B-Tree?	1M	4	2
	ix.	Compare immediate and deferred update?	1M	5	3
	x.	List the types of database failures?	1M	5	2
Q.2(A)		Develop an ER diagram that captures the information about the Hotel Management System?	10M	1	3
		OR			
Q.2(B)		Explain types of Database Architectures with neat diagrams?	10M	1	2
Q.3(A)		Explain the Tuple relational calculus (TRC) and Domain relational calculus (DRC) with examples?	10M	2	2
		OR			
Q.3(B)		For the following relation schema, Give an expression in SQL for each of the following queries:	10M	2	4

For the following relation schema, Give an expression in SQL for each of the following queries:

        employee (employee-name, street, city)
        works (employee-name, company-name, salary)
        company (company-name, city)
        manages (employee-name, manager-name)

a) Find the names, street address, and cities of residence for all employees who work for 'First Bank Corporation' and earn more than $1000.

b) Find the names of all employees in the database who live in the same cities as the companies for which they work.

c) Find the names of all employees who earn more than the average salary of all employees of their company. Assume that all people work for at most one company.

d) Find the name of the company that has the smallest payroll.

| Q.4(A) | | What is Functional Dependency? Explain types of functional Dependencies with appropriate example? | 10M | 3 | 2 |
| | | OR | | | |

Q.4(B)	What is normalization? Explain the types of normalization with suitable example?	10M	3	2
Q.5(A)	Discuss about different Concurrency control techniques with an example?	10M	4	2
	OR			
Q.5(B)	Analyze the three types of conflicts occur with the Concurrent Execution of the operations?	10M	4	4
Q.6(A)	Discuss in detail about Database recovery techniques in DBMS	10M	5	2
	OR			
Q.6(B)	Discuss different types of NOSQL data models.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December- 2023
COMPUTER SYSTEM ARCHITECTURE
(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.	State Demorgan's Law.	1M	1	1
	ii.	convert $(19.125)_{10}$ to Binary.	1M	1	2
	iii.	A number is represented in 2's complement form is 1011 then find its decimal equivalent.	1M	2	2
	iv	Mention the advantage of representation for floating point numbers.	1M	1	1
	v.	Mention the purpose of Flag Register in assembly language programming.	1M	3	1
	vi	Explain the characteristics of Multiprocessors .	1M	3	2
	vii.	what do you mean by hazards in pipelining	1M	4	1
	viii	List out the advantages of Pipelining.	1M	4	1
	ix.	Explain HIT and MISS in cache memory.	1M	5	1
	x.	Differentiate between SRAM and DRAM.	1M	5	1
Q.2(A)		Explain Multiplexer with a neat logic diagram and truth table.	10M	1	2
		OR			
Q.2(B)		For the given function $F(w,x,y,z)=\sum m(0,3,4,5,8,11,12,13,14,15)$. Find the minimum SOP expression.	10M	1	3
Q.3(A)		what do you mean by signed and unsigned representation of a number? Perform (5+4) using 2's complement operation.	10M	2	2
		OR			
Q.3(B)		Represent minus 8 in signed , 1's complement and 2's complement form.Discuss how to convert binary numbers into octal and hexadecimal number.	10M	2	3
Q.4(A)		Explain the addressing modes of x86 with suitable examples.	10M	3	2
		OR			
Q.4(B)		Illustrate the Instruction Formats of ARM processor.	10M	3	2
Q.5(A)		What are pipeline hazards? Explain the various types of pipeline hazards with suitable examples.	10M	4	2
		OR			
Q.5(B)		The instruction pipeline of a RISC processor has the following stages : Instruction Fetch (IF) , Instruction decode (ID), Operand Fetch (OF), Perform operation (PO) and Write back (WB). The IF,ID,OF and WB stages take 1 clock cycle each For every instruction . Consider a sequence of 100 instructions. In the PO stage , 40 instruction take 3 clock cycle each, 35 Instructions take 2 clock Cycles each and remaining 25 instruction take 1 clock cycle each . Assume that there are no data hazard and no control hazards. The number of clock cycles required for completion of the execution of sequence of instruction is ....?	10M	4	4

| Q.6(A) | Explain cache mapping (direct ,associative and set associative mapping) in detail. | 10 M | 5 | 3 |

OR

| Q.6(B) | Explain DMA controller in detail. | 10M | 5 | 3 |

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
DATA STRUCTURES USING PYTHON
(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.	Write about Iterator ADT	1M	1	1
	ii.	Define Bag ADT.	1M	1	1
	iii.	Define Amortized Cost.	1M	2	1
	iv	Explain the complexity analysis of a algorithm	1M	2	1
	v.	Explain the working principle of Queue.	1M	3	2
	vi	Define sparse matrix	1M	3	2
	vii.	How doubly linked list is effective than singly linked list.	1M	4	1
	viii	Define Quadratic Probing	1M	4	1
	ix.	Define Height balanced Trees.	1M	5	1
	x.	List the rotations of AVL trees.	1M	5	1
Q.2(A)		Discuss about Map ADT in detail with an example program.	10M	1	2
		OR			
Q.2(B)		Briefly explain about Arrays and its structure. Write a python program for two-dimensional Arrays.	10M	1	2
Q.3(A)		You are sorting the following array in ascending order using Insertion Sort. [6, 2, 7, 1, 3] Show the contents of the array after every iteration of the sort (Iteration 0 is the input array) with a program.	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	4
Q.4(A)		Explain Bag ADT using Singly Linked List and write a program for Bag using Singly Linked List.	10M	3	3
		OR			
Q.4(B)		Illustrate how Queue ADT is implemented using Linked List. Explain it with an example program.	10M	3	3
Q.5(A)		Briefly discuss about different types of hashing techniques in data structures.	10M	4	2
		OR			
Q.5(B)		Explain the working principle of Multi-Linked List and write a program for sparse matrix.	10M	4	2
Q.6(A)		Explain AVL tree in detail and explain how it overcomes the drawbacks of binary search tree.	10M	5	2
		OR			
Q.6(B)		Explain Binary search tree ADT in detail.	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
OBJECT ORIENTED PROGRAMMING – JAVA
(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.	Define Class and Object	1M	1	1
	ii.	Distinguish between throw and throws?	1M	3	1
	iii.	List the type of Streams based on the type of operations	1M	4	1
	iv	Java is a Platform Dependent – Justify your answer?	1M	1	1
	v.	Expand MVC and Explain	1M	5	1
	vi	Mention the states of Life Cycle of Thread?	1M	4	1
	vii.	Write the uses of 'super' keyword?	1M	2	1
	viii	List out the access specifiers?	1M	2	1
	ix.	Is try with multiple catch block is possible?	1M	3	1
	x.	List any four AWT components in Java	1M	5	1
Q.2(A)	a.	Explain briefly about the java Buzzwords?	5M	1	2
	b.	Write a java program to find the Reverse of a given number.	5M		
		OR			
Q.2(B)		What is Constructor? Write a java program to "Constructor Overloading".	10M	1	2
Q.3(A)		Using examples provide a brief description of the creation and access of packages.	10M	2	5
		OR			
Q.3(B)		Categorize and implement types of Inheritance with example	10M	2	4
Q.4(A)		Discuss an **ArrayIndexOutOfBoundsException** and **ArithmeticException** with an suitable program	10M	3	3
		OR			
Q.4(B)		How many ways thread can be created? Explain with implementation?	10M	3	5
Q.5(A)		Illustrate briefly about Linked List with the example program?	10M	4	2
		OR			
Q.5(B)		Draw and Explain Hierarchy of Collection Framework	10M	4	3
Q.6(A)		Create an application that uses a GUI (Graphical User Interface) that replicates the division of two integers.	10M	5	5
		OR			
Q.6(B)		Create a simple login page using various components of java swings.	10M	5	5

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE
(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.	Define the Artificial intelligence	1M	1	1
	ii.	Interpret how a Bidirectional search is performed.	1M	1	2
	iii.	State Multiple-state Problem	1M	2	1
	iv	List the various uninformed search strategies	1M	2	1
	v.	Compare Uninformed Search and Informed Search	1M	3	2
	vi	Show the Diagrammatic representation of Generate and test	1M	3	1
	vii.	List the properties of Forward chaining	1M	4	1
	viii	What are the Basic elements of First Order logic	1M	4	1
	ix.	Infer semantic nets	1M	5	2
	x.	Outline State Space Search	1M	5	2
Q.2(A)		Illustrate the state space search with suitable example	10M	1	2
		OR			
Q.2(B)		Interpret the types of techniques of knowledge representation in AI	10M	1	2
Q.3(A)		Analyze the problem formulation and write a program to implement the 8 -puzzle problem using Python	10M	2	4
		OR			
Q.3(B)		Distinguish the BFS and DFS with neat Diagram	10M	2	4
Q.4(A)		Compare the difference between A* and AO* algorithms with neat diagram	10M	3	2
		OR			
Q.4(B)		Explain the Min-Max search algorithm with an example.	10M	3	2
Q.5(A)		Compare the Forward and Backward Chaining in First Order Logic	10M	4	2
		OR			
Q.5(B)		Illustrate the steps of Reasoning and Explain any four types of Reasoning	10M	4	2
Q.6(A)		Explain about reasoning done using fuzzy logic	10M	5	2
		OR			
Q.6(B)		Illustrate how inference can be achieved in Bayesian Network	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations – Dec' 2023
COMPUTER SYSTEM ARCHITECTURE
(CSE-AI)

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 Demorgan's Law.	1M	1	1
	ii.	Convert $(347.7)_8$ to its equivalent decimal number.	1M	1	2
	iii.	Mention the advantage of using biased representation for floating point numbers.	1M	2	2
	iv	Enumerate the IEEE 754 rounding modes.	1M	2	2
	v.	How many segment registers are available in 8086 microprocessor?	1M	3	1
	vi	Specify the purpose of Program Counter (PC).	1M	3	1
	vii.	List out the advantages and drawbacks of instruction pipeline.	1M	4	1
	viii.	What are the advantages and drawbacks of clusters?	1M	4	1
	ix.	Differentiate between SRAM and DRAM.	1M	5	2
	x.	Given Cache memory is 64kb and block size is 256 bytes, find the number of lines in the cache memory.	1M	5	1
Q.2(A)		For 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 SOP and POS expression.	10M	1	4
		OR			
Q.2(B)		i) Explain the working of a JK Flip Flop with a neat logic diagram.	5M	1	2
		ii) Design 8-line to 3-line encoder with suitable logic gates.	5M		2
Q.3(A)		Draw the flowchart for the Booths algorithm and illustrate the process of signed multiplication for the given data: $(-7)_{10} * (15)_{10}$	10M	2	4
		OR			
Q.3(B)		Demonstrate Binary Addition and Subtraction for signed and unsigned integers with a suitable example.	10M	2	2
Q.4(A)		What is an addressing mode? Illustrate the x86 addressing modes with suitable examples.	10M	3	2
		OR			
Q.4(B)		Explain in detail about Hardwired Control Unit with necessary diagrams.	10M	3	2
Q.5(A)		What are pipeline hazards? Explain the various types of pipeline hazards with suitable examples.	10M	4	2
		OR			
Q.5(B)		Discuss in detail about the concepts of Multithreading.	10M	4	2
Q.6(A)		A computer system with a word length of 32 bits has a 16 MB byte addressable main memory and 64 KB, 4-way set associative cache memory with a block size of 256 bytes. Consider the following physical addresses. A1=$(42C786)_{16}$, A2=$(5F625B)_{16}$, A3=$(6A761B)_{16}$. Determine the sets in the cache to which these physical addresses are mapped.	10M	5	4
		OR			
Q.6(B)		What is RAID? Explain the various Levels of RAID scheme with suitable illustrations.	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
DATA STRUCTURES USING PYTHON
(CSE-Artificial Intelligence)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Define Sparse Matrix.	1M	1	1
	ii.	How the data will be stored in a Map Data Structure?	1M	1	2
	iii.	Explain about Big-O notation.	1M	2	2
	iv	What is meant by Searching? What is the importance of a key in the searching process?	1M	2	2
	v.	Name any two applications of stack.	1M	3	1
	vi	Write about Priority Queue.	1M	3	2
	vii.	Write a note on Multiple chains.	1M	4	1
	viii.	Describe Towers of Hanoi Problem.	1M	4	1
	ix.	Define and What is the time complexity of merge sort.	1M	5	1
	x.	What is binary tree and its properties.	1M	5	1
Q.2(A)		Implement the Bag ADT using python list and explain its operations in detail.	10M	1	3
		OR			
Q.2(B)		Explain about the Multi Array ADT implementation using python.	10M	1	2
Q.3(A)		List out the various classes of algorithms and evaluate their time complexities with an example.	10M	2	2
		OR			
Q.3(B)		Define Sparse Matrix and explain the implementation of Sparse Matrix ADT.	10M	2	2
Q.4(A)		Define single linked list? Explain the below operations with an example program: i) Creating a node ii) Inserting a node at middle position iii) Display	10M	3	3
		OR			
Q.4(B)		Describe about stack ADT and its operations with syntax.	10M	3	2
Q.5(A)		Define recursion. Explain the properties of recursion with an example.	10M	4	2
		OR			
Q.5(B)		What is Clustering in Hashing? Explain how to overcome primary clustering with examples.	10M	4	3
Q.6(A)		Explain the radix sort for the following integers: 132, 543, 783, 63, 7, 49, 898, 6, 100, 999.	10M	5	3
		OR			
Q.6(B)		Construct the concept of heapify techniques in details.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
OBJECT ORIENTED PROGRAMMING – JAVA
(CSE-Artificial Intelligence)

Time: 3Hrs   Max Marks: 60

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

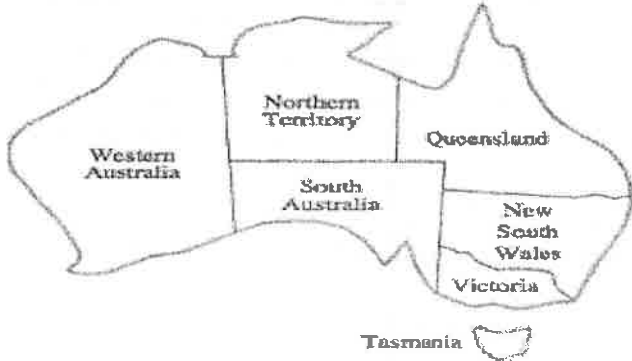| Q.No		Question	Marks	CO	BL
Q.1	i.	Highlight the features of Java.	1M	1	1
	ii.	What is Constructor?	1M	1	1
	iii.	Define Package.	1M	2	1
	iv	What is the use of 'super' keyword?	1M	2	2
	v.	Mention the role of sleep( ) in multithreading.	1M	3	2
	vi	What is the difference between multiprocessing and multithreading?	1M	3	2
	vii.	Define HashSet.	1M	4	1
	viii	What is Iterator?	1M	4	1
	ix.	State the limitations of AWT.	1M	5	2
	x.	What is use of ActionEvent class?	1M	5	2
Q.2(A)		Explain the OOPS concepts in detail.	10M	1	2
		OR			
Q.2(B)		i) Illustrate "Constructor Overloading" with an example program.	5M	1	4
		ii) Illustrate "Method Overloading" with an example program.	5M	1	
Q.3(A)		Illustrate Abstract class with an example Program.	10M	2	3
		OR			
Q.3(B)		What is interface? How to create and access it? Explain with example program.	10M	2	2
Q.4(A)		Define Exception. How do you create the Custom Exception in java.	10M	3	2
		OR			
Q.4(B)		Illustrate the thread priorities with an example program.	10M	3	4
Q.5(A)		Write a java program to implement operations on set using HashSet?	10M	4	3
		OR			
Q.5(B)		Define Stream. Write about InputStream and OutputStream class with an example program?.	10M	4	2
Q.6(A)		Explain Event handling in swings with suitable example.	10M	5	3
		OR			
Q.6(B)		Create a login screen window using swings.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

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

FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

(CSE-Artificial Intelligence)

'Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Define Artificial Intelligence	1M	1	1
	ii.	List any four Environments with suitable examples	1M	1	1
	iii.	Define the terms "BFS" and "DFS," and describe how they differ in the way they traverse and search a graph.	1M	2	2
	iv	How a Bidirectional search is performed?	1M	2	1
	v.	Define Generate and Test algorithm	1M	3	1
	vi	Draw the corresponding Constraint Graph for the following map.	1M	3	2

	vii.	Define Syntax and Semantics and give suitable examples	1M	4	1
	viii	What is Quantifier and list its types?	1M	4	1
	ix.	Distinguish between Search & Planning.	1M	5	2
	x.	What is the need of Partial Order Planning algorithms?	1M	5	1
Q.2(A)		Define Agent and explain the different Types of Agents.	10M	1	2

OR

Q.2(B)		State the PEAS factors for the following:	10M	1	2
	(i)	Taxi Driver			
	(ii)	Part-picking robot			
	(iii)	Interactive English Tutor			
	(iv)	Playing Soccer			
	(v)	Knitting a sweater			
Q.3(A)		Explain the following uninformed search strategies with examples.	5M	2	2
	(i)	Breadth First Search.	5M		
	(ii)	Depth First Search.			

OR

| Q.3(B) | Explain in detail about Sensor-less problems. | 10M | 2 | 2 |

| Q.4(A) | Explain A* algorithm with the given example. | | | |

| | | 10M | 3 | 2 |
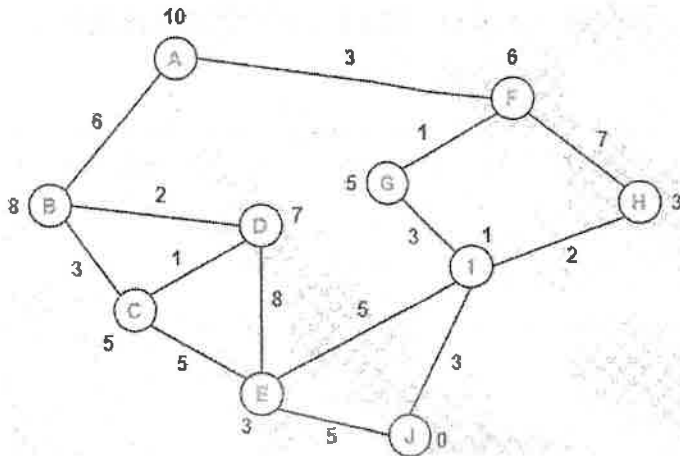
OR

| Q.4(B) | Illustrate Alpha-Beta algorithm with suitable example | 10M | 3 | 3 |

Q.5(A)   Give resolution proof for the following problem statement: The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American.

You can make use of the following facts:

   (i)   It is a crime for an American to sell weapons to the enemy   10M   4   3
           of America.
   (ii)   Country Nono is an enemy of America.
   (iii) Nono has some missiles.
   (iv) All the missiles were sold to No by Colonel West.
   (v)   Missile is a weapon.
   (vi) Colonel West is American.

Prove that Colonel West is a criminal.

OR

| Q.5(B) | Compare and contrast the differences between Forward chaining and Backward chaining | 10M | 4 | 3 |

| Q.6(A) | Define the term "Fuzzy Logic" and explain how it is used to represent and reason about Uncertainty and Imprecision in Decision-Making. | 10M | 5 | 2 |

OR

| Q.6(B) | Explain in detail about Hierarchical planning method with example? | 10M | 5 | 2 |

*** END***

Hall Ticket No: ⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜ Question Paper Code: 20CSC103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
COMPUTER SYSTEM ARCHITECTURE
(CSE-Cyber Security)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Which gate is called Coincidence gate? Why?	1M	1	1
	ii.	Convert $(25)_{10}$ into Binary format.	1M	1	1
	iii.	Difference between fixed and floating point number	1M	2	2
	iv	Why Computer does not accept the data in decimal form?	1M	2	1
	v.	Mention the purpose of Accumulator Register.	1M	3	1
	vi	Give Examples of One address instructions.	1M	3	2
	vii.	How structure hazard is generated?	1M	4	1
	viii	List drawback of executing multi threads?	1M	4	2
	ix.	What is meant by Temporal locality and Spatial locality?	1M	5	1
	x.	Why CPU often Communicates with Cache memory? Why?	1M	5	1
Q.2(A)		Explain about SR flip-flop with necessary truth tables.	10M	1	2
		OR			
Q.2(B)		Minimize the following SOP Expression using K-Map, $f=\sum m(0,1,2,5,6,7,8,12,13,17,19,22,26,27,29,30)$ and also draw logic circuit for simplified expression.	10M	1	4
Q.3(A)		Obtain the Floating Point Decimal value from the given binary number 110110111000.010110010. And Round off the values to 3 digits after Decimal.	10M	2	3
		OR			
Q.3(B)		Discuss the floating point Addition algorithm with suitable example.	10M	2	2
Q.4(A)		Illustrate how an Instruction Cycle performs execution of instruction with an Example.	10M	3	3
		OR			
Q.4(B)		Explain about the Operation of load and store instructions with suitable example programs	10M	3	2
Q.5(A)		What is pipelining and discuss how NO OPERATION approach reduces the delay in Execution of instructions? Explain	10M	4	2
		OR			
Q.5(B)		Define the term multithread. Differentiate between Super scalar process and simultaneous multithread process execution in brief.	10M	4	3
Q.6(A)		Discuss about cache principles and its role during CPU Execution.	10M	5	2
		OR			
Q.6(B)		Explain briefly about DMA controller with neat diagram.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
DATA STRUCTURES USING PYTHON
(CSE-Cyber Security)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Define Set ADT.	1M	1	1
	ii.	Write the four categorizations of set of operations in ADT.	1M	1	1
	iii.	Define Searching and list out the types of Searching methods.	1M	2	1
	iv	Define Bubble Sort.	1M	2	1
	v.	What are the methods to implement Queue?	1M	3	1
	vi	How the Singly linked List can be represented?	1M	3	1
	vii.	List out the different types of Hashing Functions.	1M	4	1
	viii	What is a Circular Linked List?	1M	4	1
	ix.	List out the steps involved in deleting a node from Binary Search Tree.	1M	5	1
	x.	Define Non – Linear Data Structure	1M	5	1
Q.2(A)		Explain the various operations of the list ADT with examples.	10M	1	2
		OR			
Q.2(B)		Define Matrix ADT. Explain the operations and implementation of Matrix ADT.	10M	1	2
Q.3(A)		Define Amortized Cost and the Aggregate method in the Amortized cost with a suitable example.	10M	2	3
		OR			
Q.3(B)		a. Create an algorithm to perform a Binary Search.	10M	2	3
		b. Develop an algorithm for Selection Sort with an example.			
Q.4(A)		Explain the operations of Singly Linked List with an example.	10M	3	2
		OR			
Q.4(B)		State the rules to be followed when converting infix expression to postfix expression with an example.	10M	3	2
Q.5(A)		Define Recursion. Explain the types of recursion and its properties.	10M	4	2
		OR			
Q.5(B)		Explain in detail about Separate Chaining with an example.	10M	4	2
Q.6(A)		Explain three standard ways of traversing a Binary Tree T with a recursive algorithm.	10M	5	2
		OR			
Q.6(B)		Explain any two sorting algorithms with an example.	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
OBJECT ORIENTED PROGRAMMING USING C++
(CSE-Cyber Security)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	List out the access modifier in C++.	1M	1	1
	ii.	Compare union with structure	1M	1	2
	iii.	What do you mean copy constructor?	1M	2	1
	iv	List the operators that cannot be overloaded.	1M	2	1
	v.	What is function overriding?	1M	3	1
	vi	Define object pointer.	1M	3	1
	vii.	What are the file stream classes used for creating input and output files?	1M	4	1
	viii	What are the different types of File modes?	1M	4	1
	ix.	Define Templates.	1M	5	1
	x.	Rephrase the meaning of class template.	1M	5	2
Q.2(A)		Explain about various C++ statements with example program.	10M	1	3
		OR			
Q.2(B)		Write a C++ program for the following. a. Call by Reference and Call by Value. b. Find the factorial of a given number.	10M	1	2
Q.3(A)		Develop a C++ program to demonstrate a function can be a member of one class and a friend of another.	10M	2	4
		OR			
Q.3(B)		What is Constructor? Explain the types of constructors with example program.	10M	2	2
Q.4(A)		Explain the types of inheritance with suitable examples.	10M	3	4
		OR			
Q.4(B)		What are virtual functions? Explain their needs using a suitable example. What are the rules associated with virtual functions?	10M	3	2
Q.5(A)		Write a program using get and get line member functions to explain stream input	10M	4	2
		OR			
Q.5(B)		Write a C++ program to read and print employee details using Files.	10M	4	4
Q.6(A)		How would you overload the template functions? Explain with example program	10M	5	3
		OR			
Q.6(B)		Describe the exception handling mechanism in C++ with an example.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
DATABASE FUNDAMENTALS FOR SECURITY
(CSE- Cyber Security)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Define ACID properties.	1M	1	1
	ii.	List the components of DBMS?	1M	1	1
	iii.	Write a short note on shrinking phase.	1M	2	1
	iv	What is key? Different types of keys?	1M	2	1
	v.	What is transaction?	1M	3	1
	vi	Draw the states of transaction diagram.	1M	3	1
	vii.	Define is authentication?	1M	4	1
	viii	What is SQL injection?	1M	4	1
	ix.	List the advantages of VPD.	1M	5	1
	x.	Define water marking.	1M	5	1
Q.2(A)		Write the SQL commands –DDL, DML. Explain with syntax and examples?	10M	1	3
		OR			
Q.2(B)		Differentiate Tuple relational calculus and Domain relational calculus?	10M	1	3
Q.3(A)		Define functional dependency. Write the Rules of Functional Dependency. And types of functional dependency.	10M	2	2
		OR			
Q.3(B)		Explain hashing Techniques? Briefly Describe the types of hashing?	10M	2	2
Q.4(A)		Explain lock-based protocol? Describe 2 phase Locking.	10M	3	2
		OR			
Q.4(B)		Differentiate Discretionary Access Control and Mandatory Access Control.	10M	3	3
Q.5(A)		Describe the process behind the SQL injection.	10M	4	2
		OR			
Q.5(B)		a) Explain the access modes model with static and dynamic modes.	5M	4	2
		b) Explain the client/ server application and web application.	5M	4	2
Q.6(A)		Write about database Auditing models.	10M	5	2
		OR			
Q.6(B)		How watermarking is done? What are two different categories of water marking techniques?	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 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.	Convert $(13.39)_{10}$ intoits binary equivalent number.	1M	1	1
	ii.	Which gate is called as a basic comparator? Why?	1M	1	1
	iii.	The bubbled X-OR and X-NOR gate is represented as -----&----- --	1M	2	1
	iv	Write the Four Variable Map.	1M	2	1
	v.	What are the advantages of decoder?	1M	3	1
	vi	What is binary multiplication in logic gates?	1M	3	1
	vii.	Difference between Combinational circuit and sequential circuits	1M	4	3
	viii.	List the applications of counter and register.	1M	4	1
	ix.	Define Algorithmic State Machine.	1M	5	1
	x.	What is the difference between PAL and PLA?	1M	5	1
Q.2(A)		(i) Perform the following using BCD arithmetic $(79)10 + (177)10=?$ $(56)10 + (170)10=?$	4M	1	3
		(ii) Convert the decimal number $(123456)_{10}$ to binary, octal and hexadecimal.	6M	1	
		OR			
Q.2(B)		i).Express the product of maxterms F = (A+B) (B+C).	2M	1	2
		ii).Express the following function as a sum of minterms F(A,B,C,D)= B'D+A'D+BD.	2M	1	
		iii). Explain Basic gates with logic diagram and truth table.	6M	1	
Q.3(A)		i) Design the circuit by Using NAND gates F= ABC'+ DE+ AB'D'.	6M	2	3
		ii) Discuss the procedure and rules to construct the K-map.	4M	2	
		OR			
Q.3(B)		i) Minimize the following function using K-map. $F=(\sum m(0,1,2,4,5,7,9,10,13)+\sum d(3,8,11,14,15)$	6M	2	4
		ii) Discuss the procedure and rules to construct the K-map .	4M	2	
Q.4(A)		What is decoder? Construct a BCD decoder with truth table and write its expression.	10M	3	3
		OR			
Q.4(B)		Design 4-bit parallel adder with example.	10M	3	3
Q.5(A)		Design 4-bit Ripple down counter using JK flip-flop.	10M	4	3
		OR			
Q.5(B)		Design SR flip flop and JK flip-flop using logic gates.	10M	4	3

Q.6(A) Explain the Memory Hierarchy. List and explain the different types of   10M   5   2
        memories.

                                              OR

Q.6(B) Implement the following boolean functions using PAL with four inputs   10M   5   3
        and 3-wide AND-OR structure. Also write the PAL programming table.
        F1(A,B,C,D)=$\sum$m(2,12,13)
        F2(A,B,C,D)=$\sum$m(7,8,9,10,11,12,13,14,15)
        F3(A,B,C,D)=$\sum$m(0,2,3,4,5,6,7,8,10,11,15)
        F4(A,B,C,D)=$\sum$m(1,2,8,12,13)

                                      *** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year I Semester (R20) Regular & Supplementary End Semester Examinations, December– 2023
DATA STRUCTURES AND ALGORITHMS
(Computer Science & Technology)

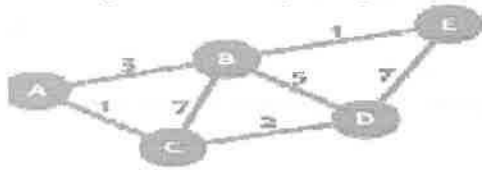Time: 3Hrs   Max Marks: 60

> 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.	Define ADT.	1M	1	1
	ii.	Address the applications of linked list.	1M	1	1
	iii.	What are the applications of stack?	1M	2	1
	iv	Write a function to insert an element into a queue.	1M	2	2
	v.	Write a short note on Merge sort.	1M	3	1
	vi	What is dictionary?	1M	3	1
	vii.	What is an AVL tree?	1M	4	1
	viii	List out the Collision Resolution technique in hash table using linear open addressing.	1M	4	1
	ix.	Differentiate between tree and graph.	1M	5	2
	x.	Define Graph.	1M	5	1
Q.2(A)		Differentiate between linear and non linear data structures. How does a node is inserted after a specified node in a circular linked list? Explain.	10M	1	3
		OR			
Q.2(B)		Explain the steps involved in insertion and deletion into a singly linked list.	10M	1	2
Q.3(A)		Illustrate the procedure to evaluate postfix expression. Evaluate the following postfix expression 7 3 4 + - 2 4 5 / + * 6 / 7 +?	10M	2	3
		OR			
Q.3(B)		Explain in detail about operations of Stacks using arrays.	10M	2	2
Q.4(A)		Explain the merge sort algorithm to sort the following elements: 12, 25, 5, 9, 1, 84, 63, 7, 15, 4, 3.	10M	3	2
		OR			
Q.4(B)		Elaborate the working of a hash table with an example.	10M	3	3
Q.5(A)		Elaborate the need for rotation of AVL trees. Construct an AVL Tree for the list 8,9,11,6,5,7,10 by using successive insertion. Illustrate the steps Clearly.	10M	4	3
		OR			
Q.5(B)		Construct binary search tree for the following elements (23, 12, 45, 36, 5, 15, 39, 2, 19). Discuss about the height of the above binary search tree.	10M	4	3

Q.6(A) Explain Depth First Search and Breadth First Search algorithms in detail. 10M 5 2

OR

Q.6(B) Apply Dijkstra's shortest path algorithm for the given graph. Explain its 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, December– 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.	Define Database Management Systems. Write its applications.	1M	1	1
	ii.	What are the different levels of abstraction?	1M	1	1
	iii.	Differentiate between primary key and foreign key.	1M	2	1
	iv	List different types of JDBC drivers.	1M	2	1
	v.	What is functional dependency?	1M	3	1
	vi	Compare lossy and lossless decomposition.	1M	3	1
	vii.	List the properties of transaction.	1M	4	1
	viii	What is meant by durability?	1M	4	1
	ix.	What is SQL injection?	1M	5	1
	x.	Compare authentication and authorization.	1M	5	2
Q.2(A)		With a neat block diagram, explain the architecture of a typical DBMS.	10M	1	2
		OR			
Q.2(B)		Describe the following with an example: (i) Weak entity type (ii) participation constraint (iii)cardinality ratio (iv) recursive relationship (v) specialization	10M	1	2
Q.3(A)		Consider the following COMPANY database EMP(Name,SSN,Salary,SuperSSN,Dno) DEPT(DNum,Dname,MgrSSN,Dno) DEPT_LOC(Dnum,Dlocation) DEPENDENT(ESSN,Dep_name,Sex) WORKS_ON(ESSN,Pno,Hours) PROJECT(Pname,Pnumber,Plocation,Dnum) Write the SQL queries for the following: (i) Retrieve the name of the employee who works with same department as Rama (ii)Retrieve the number of dependents for an employee "Rama" (iii)Retrieve the name of the managers working in location "DELHI"who has no female dependents (iv)List female employees from Dno=20 earning more than 50000 (v)List "CSE" department details	10M	2	4
		OR			
Q.3(B)		i. How triggers are defined in SQL? Explain with example.	5M	2	3
		ii. Explain stored procedures in SQL with example.	5M	2	3

Q.4(A)	Explain briefly about 3NF and BCNF with suitable examples?	10M	3	3
	OR			
Q.4(B)	Consider the universal relation R={A,B,C,D,E,F,G,H,I,J} and the set of functional dependencies F= {AB→C, A→DE, B→F,F→GH, D→IJ}.Determine whether the following decompositions has loss less join property with respect to F or not. D1={R1,R2,R3} R1={A,B,C,D,E} R2={B,F,G,H} R3={D,I,j}	10M	3	4
Q.5(A)	How Concurrency control can be achieved with locking methods? Explain with example.	10M	4	3
	OR			
Q.5(B)	Discuss how multi-level indexes are constructed using B trees? Explain.	10M	4	2
Q.6(A)	Discuss about different types of Access control models.	10M	5	2
	OR			
Q.6(B)	Explain SQL injection and prevention in detail.	10M	5	2

*** END***