

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – SEP 2022****NUMERICAL METHODS**

(Common to CE, EEE &amp; 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

		Marks	CO	BL								
Q.1	i. Find the first approximation to the root of the equation $x^2 + x - 1 = 0$ by the method of Regula-Falsi method.	1M	1	2								
	ii. Determine the iterative formula to the value of $\sqrt{N}$ by Newton-Raphson method.	1M	1	1								
	iii. Find $f(3)$ for the following data	1M	2	2								
	<table border="1" style="margin: auto;"><tr><td><math>x</math></td><td>1</td><td>2</td><td>4</td></tr><tr><td><math>y = f(x)</math></td><td>3</td><td>2</td><td>0</td></tr></table>				$x$	1	2	4	$y = f(x)$	3	2	0
	$x$	1	2	4								
	$y = f(x)$	3	2	0								
	iv. State Stirling's interpolation formula	1M	2	1								
	v. State the expression for $\left(\frac{d^2y}{dx^2}\right)_{x=x_n}$ using backward differences	1M	3	1								
	vi. Find the number of sub intervals for $\int_1^6 \frac{1}{x} dx$ with $h=0.5$	1M	3	2								
	vii. Find $y(1.1)$ by Euler's method, given that $y' = -xy$ with condition $y(1) = 1$ and $h=0.1$	1M	4	1								
viii. Define Taylor series formula for $y = f(x)$ about the point $x = x_0$	1M	4	2									
ix. Define the normal equations to best fit the parabola $y = a + bx$	1M	5	1									
x. Derive the normal equations to fit the curve of the form $y = ae^{bx}$	1M	5	2									

Q.2(A) Find the real root of the equation  $x \log_{10} x = 1.2$  using the Regula Falsi method correct up to 3 decimal places.

OR

Q.2(B) Apply Jacobi's method to solve  $27x + 6y - z = 85$ ;  $6x + 15y + 2z = 72$ ;  $x + y + 54z = 110$

Q.3(A) Find the value of  $f(1972)$  using Gauss Forward formula and  $f(1976)$  using Gauss Backward formula

$x$	1940	1950	1970	1980	1990	2000
$f(x)$	17	20	27	32	36	38

OR

Q.3(B) Find  $f(9)$  using Newton's divided difference formula

$x$	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

Q.4(A) Find the first and second derivatives of the function from the following table 10M 3 3  
at  $x=1.1$

x	1.0	1.2	1.4	1.6	1.8	2
y	0	0.128	0.544	1.296	2.432	4.000

OR

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

Q.5(A) Given that  $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0)=1$ . Find  $y(0.1)$  and  $y(0.2)$  by modified Euler's method. 10M 4 3

OR

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

Q.6(A) Fit a parabola to the following data 10M 5 3

x	1	1.5	2	2.5	3	3.5	4
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

OR

Q.6(B) Predict  $y$  at  $x=3.75$  by fitting a power curve  $y = ax^b$  to the given data 10M 5 4

x	1	2	3	4	5	6
y	2.98	4.26	5.21	6.10	6.80	7.50

\*\*\* END\*\*\*

OR

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

**B.Tech II Year II Semester (R20) Regular End Semester Examinations – AUG/SEP 2022**  
**ECONOMICS & FINANCIAL ACCOUNTING FOR ENGINEERS**

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

		Marks	CO	BL
Q.1	i. What is Demand?	1M	1	1
	ii. Outline the judgemental approach	1M	1	4
	iii. Define ISO Cost	1M	2	2
	iv. Short note on Explicit cost	1M	2	3
	v. Illustrate features of monopolistic	1M	3	4
	vi. What is Skimming Price	1M	3	1
	vii. Explain Trial Balance	1M	4	2
	viii. Rule of Nominal Account	1M	4	2
	ix. What is New worth?	1M	5	1
	x. Define Ratio	1M	5	2
Q.2(A)	What is economics? Elucidate the significance of economic	10M	1	1
<b>OR</b>				
Q.2(B)	How do you classify the elasticity of supply?	10M	1	4
Q.3(A)	Sales 5000 units @ Rs. 10 per unit Variable cost per unit Rs 7 Fixed cost Rs.10000 Evaluate 1) P/V Ratio 2) Margin of safety and 3) BEP in Rs & units	10M	2	3
<b>OR</b>				
Q.3(B)	What is production function? Examine production function with two variables.	10M	2	2
Q.4(A)	Define monopoly? Examine price output determination under monopoly.	10M	3	2
<b>OR</b>				
Q.4(B)	Explain pricing policies and objectives	10M	3	1

Q.5(A) Illustrate any five accounting concepts in detail 10M 4 4

OR

Q.5(B) Construct trading a/c, profit & loss a/c and balance sheet for the year ended 31-3-2018 10M 4 2

Particulars	Rs Dr	Rs. Cr
Capital		40000
Bank	4000	
Machinery	6000	
Creditors		8000
Purchases	5000	
Purchase returns		1000
Sales		10000
Sales returns	1000	
Rent	2000	
Wages	4000	
Salary	5000	
Discount	3000	
Office expenses	10000	
Debtors	12000	
Bills receivables	7000	
	59000	59000
Adjustments		
1. Closing stock Rs. 8000		
2. Outstanding salary Rs. 1000		
3. Prepaid rent Rs. 500		
4. Depreciation 10% on machinery		

---

Q.6(A) Explain advantages and limitations of ratio analysis 10M 5 2

OR

Q.6(B) Discuss different types of capital budgeting techniques 10M 5 3

\*\*\* END\*\*\*

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

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – SEP 2022**  
**FUNDAMENTALS OF FLUID MECHANICS**  
(Civil Engineering)

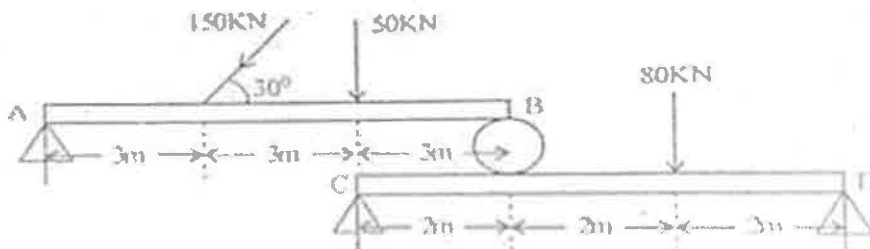
Time: 3Hrs

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

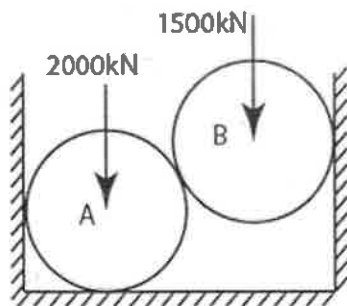
		Marks	CO	BL
Q.1	i. State Lami's theorem	1M	1	1
	ii. State Varignon's theorem	1M	1	1
	iii. Describe the classification of trusses	1M	2	1
	iv. What are the assumptions made in the analysis of trusses	1M	2	1
	v. Define coefficient of Friction	1M	3	1
	vi. What is static and dynamic friction	1M	3	1
	vii. Write the centre of gravity quarter circle along x axis and y axis	1M	4	2
	viii. Define Polar moment of Inertia	1M	4	1
	ix. Write work energy principle	1M	5	1
	x. Differentiate between Rectilinear motion and Curvilinear motion.	1M	5	4

Q.2(A) Determine the reactions at the support for the beam shown in Figure. 10M     1     4

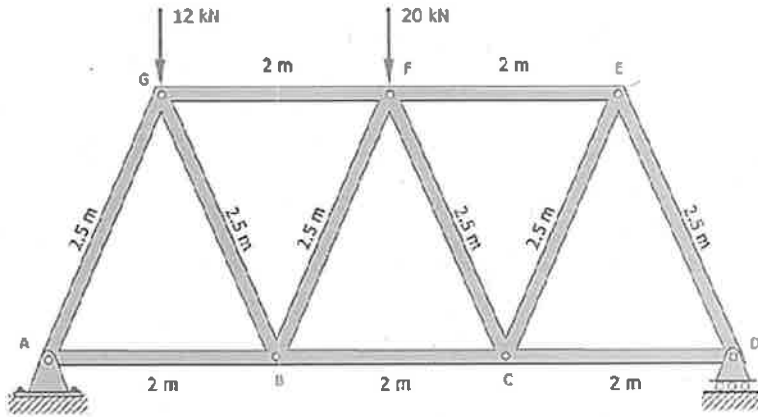


OR

Q.2(B) Draw 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 60cm. Diameter of all the cylinders is 40cm. Find contact pressure at surface of contact for the system. 10M     1     4

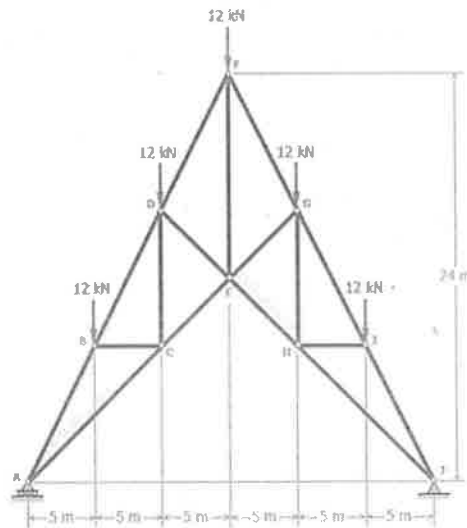


- Q.3(A) The structure in Figure below is a truss which is pinned to the floor at point A, and supported by a roller at point D. Determine the force to all members of the truss. Use method of joint. 10M 2 4

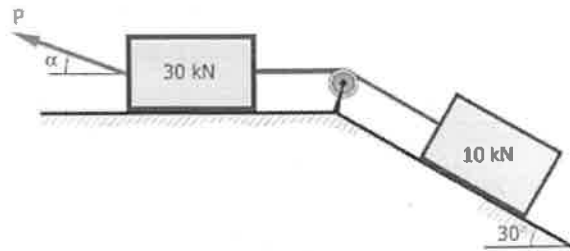


OR

- Q.3(B) Compute the force in bars GI, GH, EH, and HI for the scissors truss shown in Figure. 10M 2 4

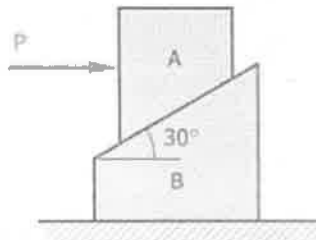


- Q.4(A) Find the least value of P required to cause the system of blocks shown in Fig. to have impending motion to the left. The coefficient of friction under each block is 0.20. 10M 3 4

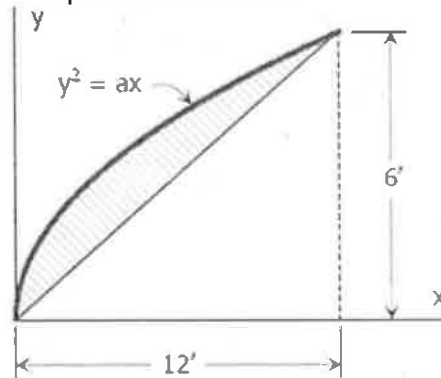


OR

- Q.4(B) In Fig. below, determine the minimum weight of block B that will keep it at rest while a force P starts blocks A up the incline surface of B. The weight of A is 100 lb and the angle of friction for all surfaces in contact is  $15^\circ$ . 10M 3 4

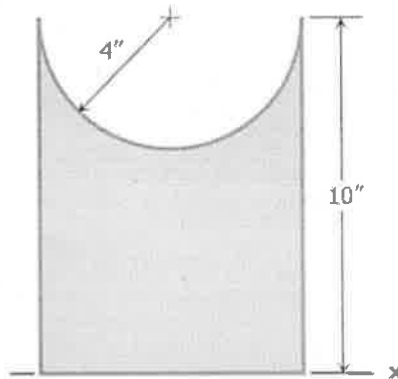


- Q.5(A) Locate the centroid of the shaded area enclosed by the curve  $y^2 = ax$  and a straight line shown in Fig. Hint: Observe that the curve  $y^2 = ax$  relative to is of the form  $y = kx^2$  with respect to the x-axis. 10M 4 3



OR

- Q.5(B) Find the moment of inertia about the indicated x-axis for the shaded area shown in Figure. 10M 4 4



- Q.6(A) A stone is dropped down a well and 5 sec later, the sounds of the splash is heard. If the velocity of sound is 1120 ft/sec (341.376 m/s), what is the depth of the well? 10M 5 3

OR

- Q.6(B) A bullet is fired at an initial velocity of 150 m/s and an angle of  $56^\circ$  at the top of a 120 m tall building. Neglecting air resistance, determine the following: 10M 5 3
1. The maximum height above the level ground that can be reached by the bullet.
  2. The time for the bullet to hit the ground.
  3. The velocity with which the bullet will hit the ground.

\*Solve the problem with neat diagram.

\*\*\* END\*\*\*

--	--	--	--	--	--	--	--	--	--

## MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Regular End Semester Examinations – SEPTEMBER 2022**

### 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

		Marks	CO	BL
Q.1	i. Define Surface Tension and write its units.	1M	1	1
	ii. Define meta centre and metacentric height.	1M	1	1
	iii. What do you mean by stream tube?	1M	2	1
	iv. Write the applications of Bernoulli's theorem.	1M	2	1
	v. What are the Minor Losses in pipe?	1M	3	1
	vi. What do you mean by lower and upper critical velocity?	1M	3	4
	vii. Differentiate between Rapidly varying flow and gradually varied flow	1M	4	4
	viii. Define Critical flow.	1M	4	1
	ix. Write the applications of Hydraulic Jump.	1M	5	1
	x. State the Buckingham's $\pi$ -theorem.	1M	5	1
Q.2(A)	i. Calculate the Specific weight, Density and Specific Gravity of one litre of a liquid which weighs 7N	5M	1	2
	ii. What do you mean by Capillarity? Derive an expression for Capillary Rise and Capillary Fall.	5M	1	2
Q.2(B)	i. Define the following terms and represent by means of a figure (a) Atmospheric Pressure (b) Absolute Pressure (c) Gauge Pressure (d) Vacuum Pressure	5M	1	3
	ii. A triangular body of base width 3m and height 3.3m is immersed such that the vortex is at a depth of 1.2m from the free surface and plane makes an angle of 30° with the free surface. Find Total pressure and Centre of pressure acting on the body.	5M	1	3
Q.3(A)	i. What do you mean by Flow net? Write its properties and uses of flow net	5M	2	4
	ii. Define velocity potential function and stream function	5M	2	4
OR				
Q.3(B)	Write the assumptions made in Euler's equation of motion? Derive Euler's equation of motion? How will you obtain Bernoulli's equation from it?	10M	2	4
Q.4(A)	i. How can you determine the lower and upper critical velocity by using Reynolds Experiment	5M	3	3
	ii. A fluid of viscosity 0.7 N-a/m <sup>2</sup> specific Gravity 1.3 is flowing through a circular pipe of diameter 100mm. Maximum shear stress at the pipe wall is given as 196.2N/m <sup>2</sup> . Find (a) Pressure gradient (b) Average Velocity and (c) Reynolds Number	5M	3	3



OR

- Q.4(B) (i). What is a compound pipe? What will be loss of head when pipes are Connected in series? 5M 3 3
- (ii) Two reservoirs separated by a distance of 250m with water level difference of 5m are connected by 2 pipes 10cm diameter for first 100m and 20cm diameter for the rest 150m. Calculate the discharge by considering minor losses also. Take  $f=0.015$ . 5M 3 3

- 
- Q.5(A) (i) Define the term most economical section of a channel. What are the Conditions for the trapezoidal channel of the best section? 5M 4 3
- (ii) Find the bed slope of trapezoidal channel of bed width 4m, depth of water 3m and side slope of 2 horizontal to 3 vertical, when the discharge through the channel is  $20\text{m}^3/\text{sec}$ . Take Manning's  $N=0.03$  in manning's formula. 5M 4 3

OR

- Q.5(B) (i). What is specific energy curve? Draw specific energy curve, and define Critical depth and Critical velocity. 5M 4 3
- (ii). The specific energy for a 3m wide channel is to be  $3\text{kg-m/kg}$ . What would be the maximum possible discharge? 5M 4 3

- 
- Q.6(A) (i) Define Hydraulic jump? Explain different types of hydraulic jump 5M 5 3
- (ii) A Hydraulic jump forms at the downstream end of spillway carrying  $17.93\text{m}^3/\text{sec}$  discharge. If the depth before jump is 0.80m, determine the depth after the jump and energy loss. 5M 5 3

OR

- Q.6(B) (i) Write short note on distorted model and undistorted model. 5M 5 2
- (ii) list various dimensionless numbers and explain any two of them. 5M 5 3

\*\*\* END\*\*\*

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – SEP 2022****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

		Marks	CO	BL
Q.1	i. What are the different kinds of errors in survey work ?	1M	1	1
	ii. Distinguish plan and map ?	1M	1	1
	iii. What are the advantages of dumpy level over Wye level ?	1M	2	1
	iv. Define Reciprocal levelling ?	1M	2	1
	v. Define Centring?	1M	3	1
	vi. Define Transiting ?	1M	3	1
	vii. Where the Vertical curves are used?	1M	4	1
	viii. How to measure of length of simple curve ?	1M	4	1
	ix. What is the full form of GPS?	1M	5	1
	x. What is GIS?	1M	5	1
Q.2(A)	Write about the classification based upon the nature of the field survey?	10M	1	2
	OR			
Q.2(B)	What are the sources of errors in compass survey and what precautions will you take to eliminate them ?	10M	1	1
Q.3(A)	Discuss in detail about the temporary adjustments of a Level ?	10M	2	6
	OR			
Q.3(B)	In levelling between two points A and B on opposite banks of a river, the level was set up near A, and the staff readings on A and B were 1.285 and 2.860 m respectively. The level was then moved and set up near B and the respective readings on A and B were 0.860 and 2.220. Find the true difference of level between A and B.	10M	2	1
Q.4(A)	How to apply and measure the vertical angles in theodolite surveying ?	10M	3	3
	OR			
Q.4(B)	Analyze the measurement of horizontal angle by Repetition Method?	10M	3	4
Q.5(A)	What are the elements of simple curve? Explain in detail ?	10M	4	1
	OR			
Q.5(B)	Summarize the Setting out compound curve ?	10M	4	2
Q.6(A)	Briefly explain about the different parts of Total Station with neat sketch?	10M	5	5
	OR			
Q.6(B)	Explain the different types of EDM instruments ?	10M	5	5

\*\*\* END\*\*\*

## MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech. II Year I Semester (R20) Supplementary End Semester Examinations – SEP 2022

### ELECTRICAL CIRCUIT ANALYSIS

(EEE)

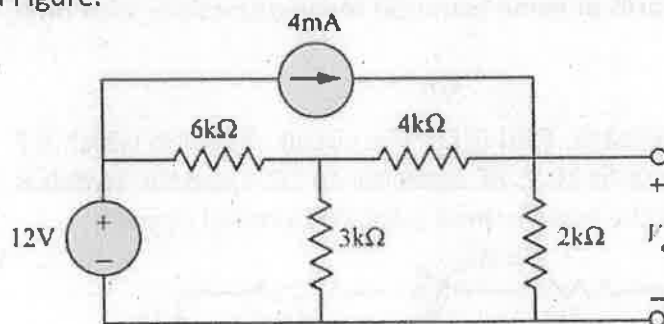
Time: 3Hrs

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 Part-A or B only

			Marks	CO	BL
Q.1	i.	State Norton's theorem	1M	1	1
	ii.	From a linear network with DC Voltage source, the maximum power transferred to a load is 100 W. When the load is shorted, 2A DC current flows. Find open circuit voltage.	1M	1	2
	iii.	If an R-C load is drawing 8 kW at a power factor of 0.8 (leading) from a single-phase A.C. supply, find the apparent power drawn by the load.	1M	2	2
	iv.	If the phase voltage of a three phase delta connected system is $230\sin(314t)$ . Find line voltages.	1M	2	2
	v.	Define time constant?	1M	3	1
	vi.	What is the condition of inductance under steady state condition?	1M	3	1
	vii.	Why z-parameters are called as open circuit impedance parameters?	1M	4	1
	viii.	Write down the condition of symmetry for two port network in terms of admittance parameters.	1M	4	1
	ix.	What is transfer function?	1M	5	1
	x.	What is the condition of inductance under steady state condition?	1M	5	2

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



OR

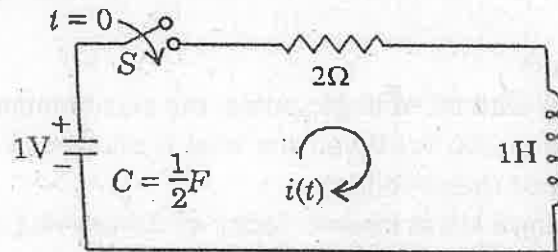
Q.2(B) State and explain the procedural steps to solve Maximum Power Transfer theorem with neat diagram. Also derive the condition for maximum power. 10M 1 2

Q.3(A) Two coils A and B are connected in series across a 240 V, 50 Hz single phase supply. The resistance of A is  $5 \Omega$  and the inductance of B is  $0.015\text{H}$ . If the input from the supply is 3 kW and 2kVAR, find the inductance of A and the resistance of B. Calculate the voltage across each coil. 10M 2 3

OR

Q.3(B) i) Write the Advantages of three phase system. 4M 2 1  
 ii) Derive the relation between line voltage and phase voltage in star connection with the help of phasor diagram. 6M 2 2

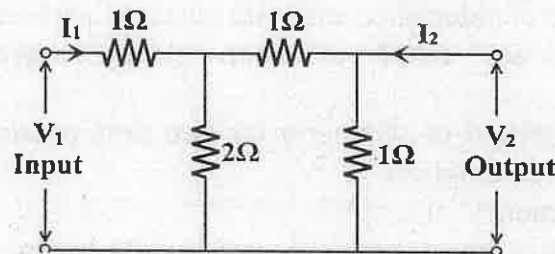
Q.4(A) For the series RLC Circuit shown in Figure, with the capacitor initially charged to voltage of 1 V as indicated. Find the expression for  $i(t)$  using time domain analysis. 10M 3 3



OR

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

Q.5(A) Find the Z and Y parameters for the circuit shown in Figure. 10M 4 3



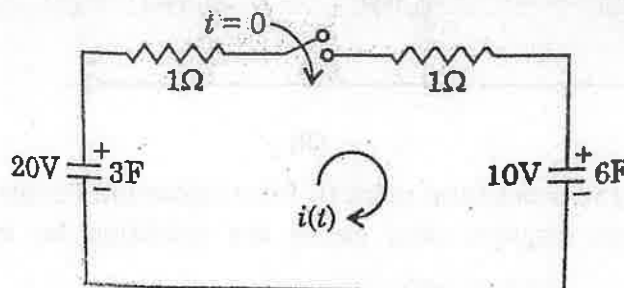
OR

Q.5(B) Derive ABCD parameters in terms of Z-parameters and Y-parameters. 10M 4 2

Q.6(A) Derive the Laplace transform of some common forcing functions with neat sketch. 10M 5 2

OR

Q.6(B) Using Laplace domain approach, Find  $i(t)$  in the circuit shown in which 3 F capacitor is initially charged to 20 V, 6F capacitor to 10 V and the switch is closed at  $t = 0$ . Also draw the transformed (Laplace Domain) circuit. 10M 5 3



\*\*\* END\*\*\*

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

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – SEPTEMBER 2022**

**ANALOG ELECTRONICS**

(EEE)

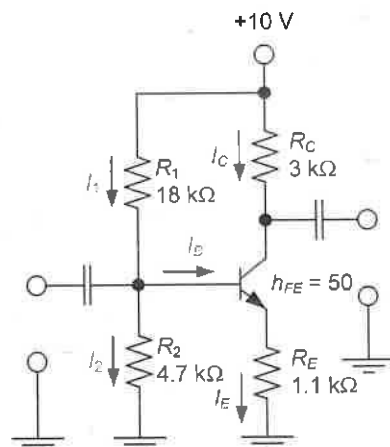
Time: 3Hrs

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 Part-A or B only

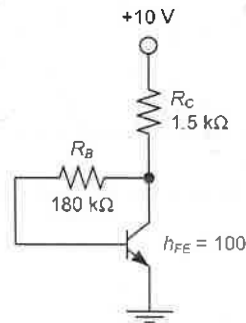
Q.1	i.	Write the expression for PN diode current.	1M	1	1			
	ii.	If the current gain $\alpha = 0.94$ , then what is value of CE- amplifiers current gain $\beta$ ?	1M	1	2			
	iii.	Define drain resistance in Junction Field Effect Transistor	1M	2	1			
	iv.	What are the ideal dc characteristics of an operational amplifier?	1M	2	1			
	v.	What is programmable gain amplifier?	1M	3	1			
	vi.	Draw the circuit diagram for integrator. write its output voltage equation.	1M	3	2			
	vii.	Draw the I order high pass active filter using operation amplifier.	1M	4	2			
	viii.	What are the advantages of active filter?	1M	4	1			
	ix.	Define resolution of ADC. Give its formula	1M	5	1			
	x.	Calculate the number of bits required to represent a full scale voltage of 10V with a resolution of 5mv approximately.	1M	5	2			

Q.2(A)	(i)	Explain the operation of PN diode under forward and reverse bias condition. Draw its V-I characteristics	4M	1	2
	(ii)	Compute the values of $I_C$ and $V_{CE}$ for the below voltage divider bias circuit for CE- Bipolar Junction Transistor. Given the current gain $h_{FE} = \beta = 50$	6M	1	3



OR

Q.2(B)	(i)	Explain the Fixed bias circuit for BJT and hence derive the stability factor	5M	1	2
	(ii)	Compute the values of $I_C$ and $V_{CE}$ (Quiescent point) for the below collector to base bias circuit for CE- Bipolar Junction Transistor. Given the current gain $h_{FE} = \beta = 100$	5M	1	3



Q.3(A)	(i) Explain the construction and operation of Junction Field Effect Transistor (JFET) and hence discuss its drain and Transfer characteristics. Also write relationship between drain current and Gate to source voltage	8M	2	2
	(ii) Explain the small signal mode for JFET	2M	2	2
OR				
Q.3(B)	i) Explain the construction and operation of Depletion type MOSFET and hence draw its drain and transfer characteristics.	5M	2	2
	ii) Explain the following characteristics of Operational amplifier 1. CMRR 2. Bandwidth 3. Slew rate 4. Gain bandwidth Product 5. Input and output resistance	5M	2	2
Q.4(A)	i) Explain instrumentation amplifier and derive the output voltage expression for three op-amp instrumentation amplifier.	5M	3	2
	ii) Explain the operation of Schmitt trigger and draw transfer characteristics showing hysteresis.	5M	3	2
OR				
Q.4(B)	i) Explain about practical differentiator using operation amplifier and hence derive its transfer function $V_o(s) / V_i(s)$ . What is the effect of frequency on voltage gain?	3M	3	2
	ii) Explain sample and Hold circuit using operation amplifier	4M	3	2
	iii) Explain about series voltage regulator	3M	3	2
Q.5(A)	i) Draw the circuit of first order HPF and derive its transfer function?	5M	4	2
	ii) Design an II order HPF circuit for the cutoff frequency $f_c = 10\text{kHz}$ , choose $C = 0.02\mu\text{f}$ .	5M	4	6
OR				
Q.5(B)	i) Explain Sinusoidal – RC phase shift – Sine wave generator in detail.	5M	4	2
	ii) Design Wein Bridge oscillator with sustained oscillation frequency of 200 Hz .	5M	4	6
Q.6(A)	i) Explain about temperature sensor (LM 35)	3M	5	2
	ii) Explain the four-bit R-2R DAC with circuit diagrams and derive output voltage expressions.	7M	5	2
OR				
Q.6(B)	i) Explain the operation of weighted resistor DAC?	5M	5	2
	ii) What output voltage would be produced by a D/A converter whose output range is 0 to 10V and whose input binary number is 1. 11(for a 2bit D/A converter) 2. 0110(for a 4 bit DAC) 3. 10111100(for a 8 bit DAC)	5M	5	2

\*\*\* END\*\*\*

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

B.Tech. II Year I Semester (R20) Supplementary End Semester Examinations – SEPTEMBER 2022

**DC MACHINES & TRANSFORMERS**

(EEE)

Time: 3Hrs

Max Marks: 60

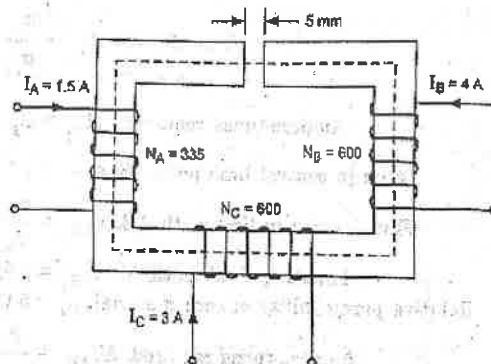
Attempt all the questions. All parts of the question must be answered in one place only.  
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q.1	i.	Highly _____ materials have property to attract more and more magnetic field lines into themselves.	1M	1	1				
	ii.	$\frac{\text{Number of turn} \times \text{current}}{\text{flux}}$ i) Permeability ii) MMF iii) Reluctance iv) Inductance	1M	1	1				
	iii.	Draw the external characteristics of DC shunt wound generator.	1M	2	2				
	iv	What do you mean by armature reaction in DC generator?	1M	2	1				
	v.	When does the maximum efficiency of a dc machine takes place?	1M	3	1				
	vi	How will the eddy current losses change if the thickness of laminations is increased?	1M	3	1				
	vii.	Distinguish between voltage ratio and current ratio.	1M	4	2				
	viii.	How are the iron losses of a transformer measured?	1M	4	1				
	ix.	What is an autotransformer?	1M	5	1				
	x.	What are the types of tap changing transformer?	1M	5	1				

Q.2(A)	i.	With neat diagrams explains that a bar magnet is an inherent dipole source.	7M	1	2
	ii.	Explain the difference between linear and nonlinear magnetic circuit.	3M	1	2

OR

Q.2(B)	A rectangular iron core in the figure 1 has mean length of a magnetic circuit of 100 cm, cross section of 2 cm x 2 cm and relative permeability of 1,450. A cut of size 5 mm in the core has been made. The coils A, B and C on the core have number of turns $N_A = 335$ , $N_B = 600$ and $N_C = 600$ and the respective current flowing are 1.5 A, 4 A and 3A. The direction of currents is as presented. Find the air gap flux.	10M	1	2
--------	---	-----	---	---



Q.3(A)	How is the voltage build up in a DC shunt generator? Sketch the magnetization curve. From the characteristics, give the expression for the critical resistance and critical speed.	10M	2	2
--------	--	-----	---	---

OR

Q.3(B) A series generator of total resistance  $0.5 \Omega$  is running at 1,000 rpm and delivering 5 kW at a terminal voltage of 100 V. If the speed is raised to 1,500 rpm and the power is adjusted to 8 kW, find the new current and terminal voltage. Assume that the machine is working on the starting portion of the characteristic such that the flux is proportional to the current and the emf generated is proportional to the product of flux and speed. 10M 2 2

Q.4(A) How the back emf is induced in a dc motor? Also, derive an expression for this emf. 10M 3 2

OR

Q.4(B) Enumerate the factors that influence the speed of a dc motor and explain how the speed of a dc motor may be varied above and below the speed at which it runs with full-load current. 10M 3 2

Q.5(A) i. Draw the complete phasor diagram for a 1-ph transformer when the load pf is leading? 6M 4 2

ii. Differentiate the autotransformer with ordinary transformer. 4M 4 2

OR

Q.5(B) A 10 kVA, 200V/400V, 50 Hz, 1-ph transformer gave the following test result:  
SC Test: 200 V, 30 A, 200 W  
OC Test: 200 V, 1.3 A, 120 W  
Find the equivalent circuit parameters as referred to LV winding. 10M 4 2

Q.6(A) Draw the physical connections and phasor diagrams of i) Dz0 and ii) Yd11 10M 5 2

OR

Q.6(B) Two transformers A and B are connected in parallel to a load of  $2 + j 1.5 \Omega$ . The impedances in secondary are  $Z_A = 0.15 + j 0.5 \Omega$  and  $Z_B = 0.1 + j 0.6 \Omega$ . Their no-load terminal voltages are  $E_A = 205 \text{ V}$  and  $E_B = 207 \text{ V}$ . Find the power output 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) Supplementary End Semester Examinations – SEPTEMBER 2022****ENGINEERING MECHANICS**

(Mechanical Engineering)

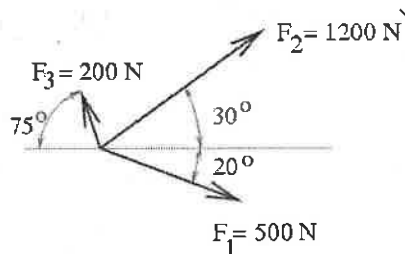
Time: 3Hrs

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 Part-A or B only

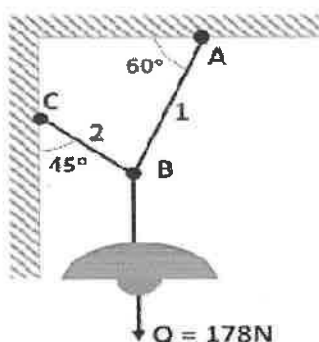
		Marks	CO	BL
Q.1	i. What is a resultant force?	1M	1	1
	ii. Write the equilibrium condition equations of a rigid body.	1M	1	2
	iii. What are the assumptions of a perfect truss?	1M	1	1
	iv. State the laws of friction.	1M	2	1
	v. Define the term Moment of Inertia.	1M	4	1
	vi. What is Radius of Gyration?	1M	2	1
	vii. Define Kinematics	1M	2	1
	viii. Distinguish between Rectilinear motion and curvilinear motion.	1M	4	2
	ix. What is conservation of momentum	1M	4	1
	x. State the impulse momentum principle	1M	4	1

Q.2(A) Find the magnitude and direction of the resultant force as shown in the figure. 10M 2 4



OR

Q.2(B) An electric light fixture of weight  $Q = 178\text{ N}$  is supported as shown in the figure. Find the tensile forces "S1" and "S2" in the wire BA and BC. 10M 2 3



Q.3(A) A load of 500 N is lying on an inclined plane, whose inclination with the horizontal is  $30^\circ$ . If the coefficient of friction between the load and the plane is 0.4, find the minimum and maximum horizontal force, which will keep the load in equilibrium. 10M 2 3

Q.5(B) A car weighing 60KN and moving at 72 kmph along the main road collides with a truck of weight 120 KN which emerges at 18 kmph from a crossroad at right angles to the main road. If two vehicles lock after collision, what will be the magnitude and direction of the resulting velocity according to momentum impulse method. 10M 4 3

---

Q.6(A) A block of weight 2000N rests on a level horizontal plane for which coefficient friction is 0.2. The block is pulled by a force of 1000N acting at an angle of 30° to the horizontal. Find the velocity of the block after travelling a distance of 50m from the rest. If the force of 1000N is removed, how far will it move before coming to stop according to work energy principle. 10M 5 3

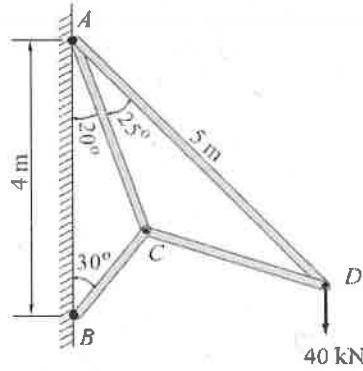
OR

Q.6(B) The rotation of a flywheel is governed by the equation  $\dot{\omega} = 3t^2 - 2t + 2$  where  $\dot{\omega}$  is radian per second and time is in second. After one second from the rest, the angular displacement was 4 radians. Determine the angular displacement, angular velocity and acceleration of the flywheel after travelling 3 seconds. 10M 5 3

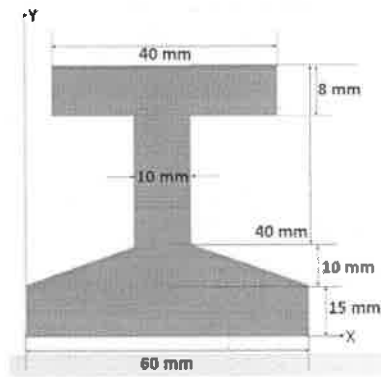
\*\*\* END\*\*\*

OR

Q.3(B) Find the force and its nature in member AD and BC for given cantilever truss loaded by 40 kN as shown (AB = 4 m and AD = 5 m) in Fig. 10M 2 3

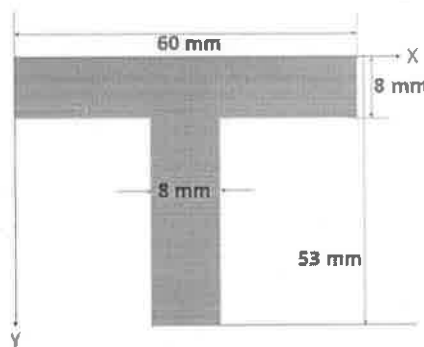


Q.4(A) Locate the position of the centroid of the I-section as shown in figure 10M 3 3



OR

Q.4(B) Determine the moment of inertia of the T-section as shown in figure 10M 3 3



Q.5(A) (i) A car has an initial speed of 25m/s and a constant deceleration of  $3\text{m/s}^2$ . Determine the velocity of the car when  $t=4\text{s}$ . What is the displacement of the car during the 4s time interval? How much time is needed to stop the car? 5M 4 3

(ii) A projectile is fired with an initial velocity of 250m/s at a target located at a horizontal distance of 4km and vertical distance of 700 m above the gun. Determine the value of firing angle to hit the target. Neglect air resistance. 5M 4 3

OR

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations –SEP 2022****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.  
In Q.no 1 to 5 answer either Part A or Part B only. Q.no 6 which is a case study is compulsory.

		Marks	CO	BL
Q.1	i. During a heating process, the temperature of a system rises by 10°C. Express this rise in temperature in Kelvin scale.	1M	1	2
	ii. Compare the work and heat transfer with sign conventions.	1M	1	2
	iii. What is Triple point of a pure substance?	1M	2	1
	iv. What is a saturation state for a pure substance?	1M	2	1
	v. What is the difference between a reversible process and an irreversible process?	1M	3	1
	vi. Define the coefficient of performance of a refrigerator and a heat pump.	1M	3	1
	vii. What is the law of corresponding states?	1M	4	2
	viii. What is reduced parameter?	1M	4	2
	ix. Name any one cycle used to approximate the working of refrigeration systems.	1M	5	1
	x. Define the term mean effective pressure.	1M	5	1
Q.2(A)	Derive an expression for the work done during expansion and compression of gasses undergoing a polytropic process.	10M	1	3
OR				
Q.2(B)	Air enters an adiabatic nozzle steadily at 300 kPa, 200°C, and 30 m/s and leaves at 100 kPa and 180 m/s. The inlet area of the nozzle is 80 cm <sup>2</sup> . Determine (i) the mass flow rate through the nozzle, (ii) the exit temperature of the air, and (iii) the exit area of the nozzle.	10M	1	3
Q.3(A)	A vessel of volume 0.04 m <sup>3</sup> contains a mixture of saturated water and saturated steam at a temperature of 250°C. The mass of the liquid present is 9 kg. Find the pressure, the mass, the specific volume, the enthalpy, the entropy and the internal energy.	10M	2	3
OR				
Q.3(B)	Steam initially at 0.3 MPa, 250°C is cooled at constant volume, (i) At what temp. will the steam become saturated vapor? (ii) What is the quality at 80°C? What is the heat transferred per kg of steam in cooling from 250°C to 80°C	10M	2	3
Q.4(A)	A cyclic heat engine operates between a source temperature of 800°C and a sink temperature of 30°C. What is the least rate of heat rejection per kW net output of the engine?	10M	3	3

OR

Q.4(B) One kg of ice at  $-5^{\circ}\text{C}$  is exposed to the atmosphere, which is at  $20^{\circ}\text{C}$ . The ice melts and comes into thermal equilibrium with the atmosphere. (i) Determine the entropy increase of the universe, (ii) What is the minimum amount of work necessary to convert the water back into ice at  $-5^{\circ}\text{C}$ ?  $C_p$  of ice is  $2.093 \text{ kJ/kg K}$  and the latent heat of fusion of ice is  $333.3 \text{ kJ/kg}$ . 10M 3 3

---

Q.5(A) Write short notes on: (i) Helmholtz free energy, (ii) Gibbs free energy, (iii) Isothermal Compressibility and (iv) coefficient of volume expansion. 10M 4 3

OR

Q.5(B) 0.5 kg of air compressed reversibly and adiabatically from  $80 \text{ kPa}$ ,  $60^{\circ}\text{C}$  to  $0.4 \text{ MPa}$  and is then expanded at constant pressure to the original volume. Sketch these processes on the  $p$ - $v$  and  $T$ - $s$  planes. Compute the heat transfer and work transfer for the whole path. 10M 4 3

---

Q.6(A) List down the assumptions made for the analysis of vapor compression refrigeration cycle. Derive an expression for the coefficient of performance of a vapor compression refrigeration cycle. 10M 5 3

OR

Q.6(B) A diesel engine has a state before compression of  $95 \text{ kPa}$ ,  $290 \text{ K}$ , and a peak pressure of  $6000 \text{ kPa}$ , a maximum temperature of  $2400 \text{ K}$ . Find the volumetric compression ratio and the thermal efficiency. 10M 5 3

\*\*\* END\*\*\*

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

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations -SEPT 2022**  
**MATERIALS 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.1 are compulsory. From Q.2- Q.6 answer either part-A or part-B.

		Marks	CO	BL
Q.1	i. What is a lattice?	1M	1	1
	ii. List out the primary bonds.	1M	1	1
	iii. Write Fick's law.	1M	2	1
	iv. How would you classify various imperfections in solids?	1M	2	2
	v. What do you understand by necking?	1M	3	2
	vi. What is process annealing?	1M	3	1
	vii. Write Gibb's phase rule by stating each term.	1M	4	1
	viii. Mention the eutectic temperature and composition for a binary Cu-Ag system.	1M	4	1
	ix. Write three applications of HSLA.	1M	5	1
	x. Write the two desirable characteristics of glasses.	1M	5	1
Q.2(A)	Explain various bonds in solids with neat sketches.	10M	1	2
OR				
Q.2(B)	Derive atomic packing factor (APF) for FCC and BCC Structures.	10M	1	2
Q.3(A)	What is meant by an imperfection in a crystal? Briefly discuss about the various crystal defects.	10M	2	2
OR				
Q.3(B)	Write about different diffusion mechanisms.	10M	2	1
Q.4(A)	Define hardness. Describe briefly the 3 types of hardness testing methods.	10M	3	1
OR				
Q.4(B)	Explain plastic deformation in metals and discuss about tensile strength, ductility, resilience and toughness with appropriate stress-strain curve.	10M	3	2
Q.5(A)	Explain the Fe-Fe <sub>3</sub> C system.	10M	4	2
OR				
Q.5(B)	Explain the transformation of austenite to bainite with the isothermal transformation diagram.	10M	4	2
Q.6(A)	List the four classification of steels. Briefly describe the properties and typical applications of each.	10M	5	1
OR				
Q.6(B)	Discuss the distinctive features, limitations, and applications of the following alloy groups: titanium alloys, refractory metals, superalloys, and noble metals.	10M	5	2

\*\*\* END\*\*\*

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – SEPTEMBER 2022****FLUID MECHANICS AND HYDRAULIC MACHINERY**

(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 Part-A or B only

		Marks	CO	BL
Q.1	i. What is cavitation? What causes it?	1M	1	1
	ii. What is vapor pressure? How is it related to saturation pressure?	1M	1	1
	iii. What is Bernoulli's energy equation per unit weight of a fluid.	1M	2	1
	iv. State the assumption made to derive the Bernoulli equations	1M	2	1
	v. Define Momentum thickness	1M	3	1
	vi. What are minor losses in pipe flow?	1M	3	1
	vii. Define unit speed of a hydraulic turbine.	1M	4	1
	viii. What is the function of a governor in a hydraulic power plant?	1M	4	1
	ix. Define the Overall efficiency of a centrifugal pump.	1M	5	1
	x. What is the difference between single acting and double acting pump	1M	5	1
Q.2(A)	i. What is the capillary effect? What is its cause? How is it affected by the contact angle?	4M	1	2
	ii. Is the capillary rise greater in small- or large-diameter tubes?	3M	1	2
	iii. A small-diameter tube is inserted into a liquid whose contact angle is $110^\circ$ . Will the level of liquid in the tube be higher or lower than the level of the rest of the liquid? Explain.	3M	1	2
OR				
Q.2(B)	Consider a 0.15-mm diameter air bubble in a liquid. Determine the pressure difference between the inside and outside of the air bubble if the surface tension at the air-liquid interface is (a) 0.080 N/m and (b) 0.12 N/m.	10M	1	2
Q.3(A)	Derive Bernoulli equation from Euler's equation .	10M	2	3
	OR			
Q.3(B)	Air flows steadily at low speed of 10 m/s through a horizontal nozzle, discharging to atmosphere. The area at the nozzle inlet is $0.5 \text{ m}^2$ . At the nozzle exit the area is $0.1 \text{ m}^2$ . Determine the gauge pressure required at the nozzle inlet to produce an outlet speed of 90 m/s.	10M	2	3
Q.4(A)	For the velocity profile for laminar boundary layer on a flat plate is:	10M	3	3
	$\frac{u}{U} = \frac{2y}{\delta} - \frac{2y^3}{\delta^3} + \frac{y^4}{\delta^4}$			
Obtain an expression for displacement thickness, momentum thickness and shear stress.				
OR				

Q.4(B)	A Venturi meter equipped with a differential pressure gage is used to measure the flow rate of water at 15°C ( $\rho = 999.1 \text{ kg/m}^3$ ) through a 5 cm-diameter horizontal pipe. The diameter of the Venturi neck is 3 cm, and the measured pressure drop is 5 kPa. Taking the discharge coefficient to be 0.98, determine the volume flow rate of water and the average velocity through the pipe.	10M	3	3
Q.5(A)	Sketch the layout of a PELTON wheel turbine showing the details of nozzle, buckets and wheel when the turbine axis is horizontal.	10M	4	2
OR				
Q.5(B)	Explain the impulse momentum principle. show that the efficiency of jet striking normally on series of flat plate mounted on the periphery of the wheel is 50%.	10M	4	2
Q.6(A)	Differentiate between the centrifugal and reciprocating pump.	10M	5	2
OR				
Q.6(B)	The cylinder bore diameter of a single-acting reciprocating pump is 150 mm and its stroke is 300 mm. The pump runs at 50 rpm and lifts water through a height of 25 m. The delivery pipe is 22 m long and 100 mm in diameter. Find the theoretical discharge and the theoretical power required to run the pump. If the actual discharge is 4.2 liters/s, find the percentage slip	10M	5	2

\*\*\* END\*\*\*



**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations –September 2022****TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS**

(Electronics and 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

S.No	Question	Marks	CO	BL
Q.1	i. What is the Laplace transform of Unit-Step function?	1M	1	1
	ii. Find the inverse Laplace transform of $\frac{2}{(p+3)^4}$	1M	1	1
	iii. State the scale property on Fourier transforms?	1M	2	1
	iv. Express the inversion formula?	1M	2	1
	v. Find $Z(na^n)$ ?	1M	3	1
	vi. State the convolution theorem on Z-transforms.	1M	3	1
	vii. Define a Partial differential equation?	1M	4	1
	viii. Define singular integral of the Partial differential equation?	1M	4	1
	ix. Write the form of Laplace equation?	1M	5	1
	x. Write the solution form of the one dimensional heat equation?	1M	5	1
Q.2(A)	State and prove Convolution theorem on Laplace transforms?	10M	1	3
	OR			
Q.2(B)	Solve the following differential equation: $y'' - 4y' + 4y = 0$ $y(0) = 0; y'(0) = 3$	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 finite Fourier sine and cosine transforms of $f(x) = 2x$ ; $0 < x < 4$	10M	2	4
Q.4(A)	(i) Find the Z-transform of the following: (i) $\frac{1}{(n+2)!}$ (ii) $\sin(n+1)\theta$	6M	3	3
	(ii) If $U(z) = \frac{2z^2 + 5z + 14}{(z-1)^4}$ , evaluate $u_2$	4M	3	
	OR			
Q.4(B)	Using Z-transform solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ with $u_0 = 0, u_1 = 1$ .	10M	3	3
Q.5(A)	Form the PDE by eliminating the arbitrary functions from (i) $z = f(x) + e^y g(x)$ (ii) $z = yf(x) + xg(y)$ (iii) $z = f(x+at) + g(x-at)$	10M	4	3

OR

Q.5(B) Solve the non-linear equations by Charpit's method:

10M 4 4

(i)  $pxy + pq + qy = yz$  (ii)  $2xz - px^2 - 2qxy + pq = 0$

Q.6(A)

Using the method of separation of variable, solve  $\frac{\partial u}{\partial x} = 4 \frac{\partial u}{\partial y}$ , where

10M 5 3

$u(0, y) = 8e^{-3y}$ .

OR

Q.6(B)

Find the eigenvalues  $\lambda_n$  and eigenfunctions  $y_n(x)$  for the equation  $y'' + \lambda y = 0$  in each of the following cases:

10M 5 4

(i)  $y(0) = 0, y(2\pi) = 0$  (ii)  $y(0) = 0, y(L) = 0$  when  $L > 0$

(iii)  $y(-L) = 0, y(L) = 0$  when  $L > 0$  (iv)  $y(a) = 0, y(b) = 0$  when  $a < b$

\*\*\* END\*\*\*

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022**

**NETWORK THEORY**

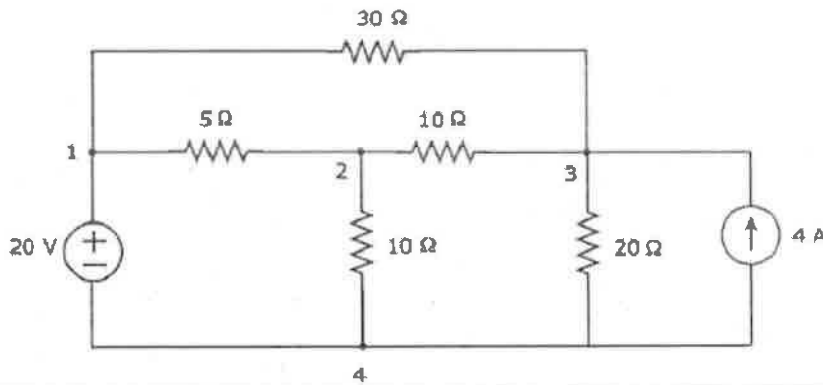
(ECE)

Time: 3Hrs

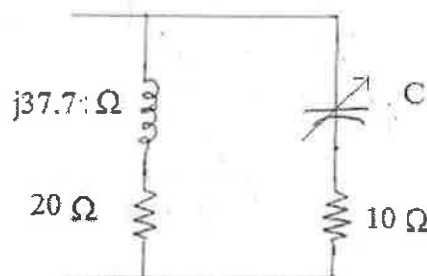
Max Marks: 60

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

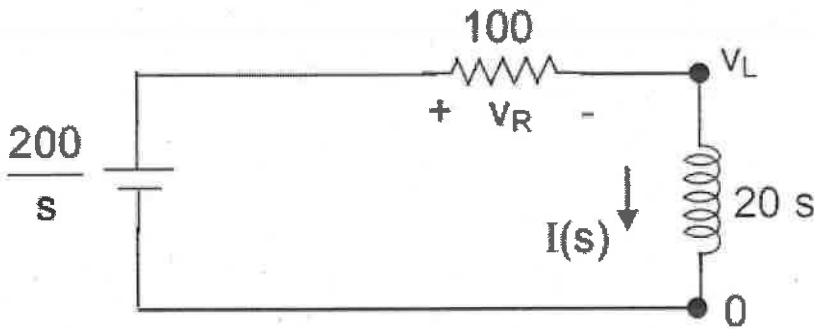
Q.No	Question	Marks	CO	BL
Q.1	i. Define Superposition theorem	1M	1	1
	ii. Define an Oriented Graph	1M	1	1
	iii. Define Q factor	1M	2	3
	iv. Determine the resonance frequency of the parallel R,L,C circuit consisting of R=25Ω, L=0.3H and C=5μF.	1M	2	1
	v. Define initial value theorem.	1M	3	2
	vi. Find the Laplace transform of sinωt.	1M	3	2
	vii. Write Z parameters in terms of Y parameters.	1M	4	1
	viii. Write h parameters equations	1M	4	1
	ix. Define decibel.	1M	5	1
	x. Write any two uses of filters.	1M	5	2
<hr/>				
Q.2(A)	State and Explain Thevenin's Theorem.	10M	1	2
<b>OR</b>				
Q.2(B)	i) Write the properties of Tie set and cut set Matrix	6M	1	2
	ii) For the graph shown in fig. Write down the incidence matrix.	4M	1	3



Q.3(A)	Derive the expression for $V_L$ becomes maximum in series RLC circuit	10M	2	2
<b>OR</b>				
Q.3(B)	Determine the variable values of inductance for the network given below for a resonance frequency of 50Hz.	10M	2	3

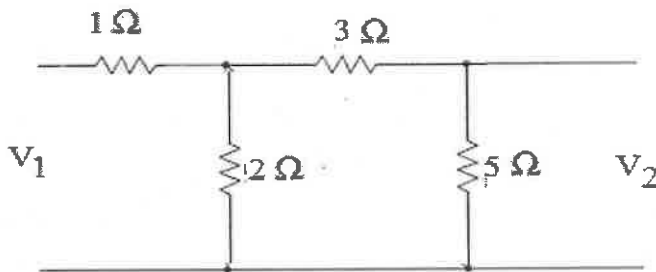


- |        |   |     |   |   |
|--------|---|-----|---|---|
| Q.4(A) | Initially relaxed series RL circuit with $R = 100 \Omega$ and $L = 20 \text{ H}$ has dc voltage of $200 \text{ V}$ applied at time $t = 0$ . Find (a) the equation for current and voltages across different elements (b) the current at time $t = 0.5 \text{ s}$ and $1.0 \text{ s}$ . | 10M | 3 | 3 |
|--------|---|-----|---|---|



OR

- |        |  |     |   |   |
|--------|--|-----|---|---|
| Q.4(B) | Describe the impulse response of a parallel RC circuit using Laplace transform | 10M | 3 | 2 |
|--------|--|-----|---|---|
- 
- |        |  |     |   |   |
|--------|--|-----|---|---|
| Q.5(A) | Derive h parameters in terms of Z and Y Parameters | 10M | 4 | 2 |
|--------|--|-----|---|---|
- OR
- |        |   |     |   |   |
|--------|---|-----|---|---|
| Q.5(B) | Find the ABCD parameters of the two-port shown in Figure. | 10M | 4 | 3 |
|--------|---|-----|---|---|



- |        |   |     |   |   |
|--------|---|-----|---|---|
| Q.6(A) | Design a m-derived low pass filter having cut-off frequency of $1 \text{ kHz}$ , design impedance of $400 \Omega$ , and the resonant frequency $1100 \text{ Hz}$ . Finally draw the filter. | 10M | 5 | 4 |
|--------|---|-----|---|---|
- OR
- |        |  |     |   |   |
|--------|--|-----|---|---|
| Q.6(B) | Derive the characteristic impedance and propagation constant of symmetrical $\pi$ network. | 10M | 5 | 4 |
|--------|--|-----|---|---|

\*\*\* END\*\*\*

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

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022**  
**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. Perform the following operation using 2's complement method 1111.10 – 0101.11	1M	1	3
	ii. Draw the logic diagram and truth table of Universal gates.	1M	1	1
	iii. List the demerits of Half Adder.	1M	2	1
	iv. Define Multiplexer and demultiplexer.	1M	2	1
	v. Compare Combinational and sequential circuits.	1M	3	2
	vi. Write the characteristic table of JK Flip-Flop.	1M	3	1
	vii. Expand SRAM and DRAM and discuss.	1M	4	2
	viii. Draw the basic configuration of PAL.	1M	4	1
	ix. Write the various data types used in VHDL.	1M	5	1
	x. List any two basic symbols for register transfer logic.	1M	5	1
Q.2(A)	Convert the following to Binary and then to Gray code: i) (AB33) <sub>16</sub> ii) (3323) <sub>8</sub>	10M	1	3
<b>OR</b>				
Q.2(B)	Simplify the following Boolean expression: (i) Using laws of Boolean algebra (a) $ABC' + ABC + A'BC$ (b) $A'B' + AB' + AB$ (ii) Using K-map $F(w,x,y,z) = \sum(1,3,7,11,15) + \sum d(0,2,5)$	10M	1	3
Q.3(A)	Design a Decimal to BCD Encoder & Binary to octal Decoder.	10M	2	6
<b>OR</b>				
Q.3(B)	Explain 3x8 Decoder and 8x3 Encoder with truth table and logic diagram.	10M	2	4
Q.4(A)	Explain master slave JK flip-flop with neat timing diagram.	10M	3	4
<b>OR</b>				
Q.4(B)	Design a BCD Ripple Asynchronous counters. Explain SISO shift register using D flip flop.	10M	3	6
Q.5(A)	What is programmable array logic (PAL)? Discuss the design of a combinational circuit using PAL with suitable example.	10M	4	2
<b>OR</b>				
Q.5(B)	Differentiate between RAM & ROM. Explain 1T1C DRAM with the help of circuit diagram.	10M	4	4
Q.6(A)	Write the VHDL code for Half adder and Full Adder.	10M	5	3
<b>OR</b>				
Q.6(B)	Describe the VLSI Design flow in detail & also draw the Y-chart.	10M	5	2

\*\*\* END\*\*\*

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022****ELECTRONIC DEVICES & CIRCUITS**

(ECE)

Time: 3Hrs

Max Marks: 60

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

Q.No	Question	Marks	CO	BL
Q.1	i. Write about energy level and energy band.	1M	1	1
	ii. What is drift current?	1M	1	1
	iii. Compare ideal diode as a switch.	1M	2	4
	iv. List the applications of LED.	1M	2	3
	v. Why BJT is calling as current controlled device?	1M	3	1
	vi. What is pinch-off voltage?	1M	3	1
	vii. What is the need of rectifier?	1M	4	2
	viii. What is voltage regulator? Which device is used as voltage regulator?	1M	4	2
	ix. What is an amplifier?	1M	5	1
	x. Why the input impedance of FET is very high?	1M	5	1
Q.2(A)	Discuss about drift and diffusion currents with relevant equations.	10M	1	2
<b>OR</b>				
Q.2(B)	Derive the expressions for mobility, current density and conductivity in semiconductors.	10M	1	3
Q.3(A)	Define diffusion and transition capacitance of p-n junction diode. Prove that diffusion capacitance is proportional to current I.	10M	2	3
<b>OR</b>				
Q.3(B)	Explain the following: i) Zener and Avalanche breakdowns      ii) Working principle of photo diode	10M	2	4
Q.4(A)	Draw the circuit diagram for finding the common base I/O characteristics of a transistor and explain briefly?	10M	3	4
<b>OR</b>				
Q.4(B)	Discuss the MOSFET characteristics in enhancement mode.	10M	3	4
Q.5(A)	(i) Derive the expression for ripple factor for half wave rectifier.	10M	4	4
	(ii) A 230V, 50Hz voltage is applied to the primary of a 5:1 step down, centre tapped transformer used in a FWR having a load of 900Ω. If the diode resistance and the secondary coil resistance together has a resistance of 100 Ω, determine i) dc voltage across the load ii) dc current flowing through the load iii) dc power delivered to the load.			
<b>OR</b>				
Q.5(B)	(i) How zener diode acts as voltage regulator.	5M+	4	2
	(ii) Explain positive clipper and negative clipper circuits without biasing.	5M		
Q.6(A)	Draw the h parameter equivalent circuit for a typical common emitter amplifier and derive expressions for $A_i$ , $R_i$ , and $A_v$ .	10M	5	3
<b>OR</b>				
Q.6(B)	Discuss the following: a. MOSFET as voltage control device. b. Small signal model of MOSFET.	10M	5	4

**\*\*\* END\*\*\***

## MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – SEP 2022**

### PROBABILITY AND STATISTICS FOR COMPUTER SCIENCE

(Common to CSE, CST, CSE(IOT), CSE(DS), CSE(CS) & 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

		Marks	CO	BL
Q.1	i. Define independent events.	1M	1	1
	ii. If $P(X) = \frac{1}{n}$ ; for $X=0,1,2,3,-----n$ then what is the mean of the distribution	1M	1	1
	iii. The mean of poisson distribution is 4 then, find $P(X=3)$	1M	2	1
	iv Write the moment generating function of exponential distribution.	1M	2	1
	v. Define discrete joint density function	1M	3	1
	vi Define Co-variance	1M	3	1
	vii. What is the coefficient of Kurtosis $\beta_2 =$	1M	4	1
	viii What is the relation between regression coefficients and correlation coefficient?	1M	4	1
	ix. What is an alternative hypothesis?	1M	5	1
	x. If the Critical region is evenly distributed, then the test is referred as?	1M	5	1

Q.2(A)	i. State and Prove Baye's theorem.	5M	1	3
	ii. A computer center has three printers A, B, and C, which print at different speeds. Programs are routed to the first available printer. The probability that a program is routed to printers A, B and C are 0.6, 0.3 and 0.1 respectively. Occasionally a printer will jam and destroy the printout. The probability that printers A, B and C will jam are 0.01, 0.05 and 0.04 respectively. Your program is destroyed when a printer jams. What is the probability that printer A is involved?	5M	1	3

OR

Q.2(B)	Let $X$ denote, the number of holes that for can be drilled per bit. The density for $X$ is given the following table:	10M	1	5
--------	--	-----	---	---

$x$	1	2	3	4	5	6	7	8
$f(x)$	0.02	0.03	0.05	0.2	0.4	0.2	0.07	$f(8)$

- (a) Find  $f(8)$   
 (b) Find the table for  $F$   
 (c) Find the mean and variance of  $x$ .

Q.3(A)	During one stage in the manufacture of IC chips, a coating must be applied. If 70% of chips receive a thick enough coating, find the probability that, among 15 chips, (i) atleast 12 will have thick enough coatings, (ii) atleast 5 will have thick enough coatings and (iii) exactly 10 will have thick enough coatings.	10M	2	3
--------	---	-----	---	---

OR

Q.3(B) Derive the moment generating function of gamma distribution and then find the mean and variance. 10M 2 4

Q.4(A) Given the following bivariate probability distribution, obtain (i) mean of X and mean of Y (ii) the conditional distribution of X given Y=2 (iii) covariance between X and Y (iv) V(X) 10M 3 4

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

OR

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

(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 the first four moments of the following distribution about the mean: 10M 4 3

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

Also calculate  $\beta_1$  and  $\beta_2$ .

OR

Q.5(B) Psychological tests of intelligence and of engineering ability were applied to 10 students. Here is a record of ungrouped data showing intelligence ratio (I.R) and engineering ratio (E.R). Calculate coefficient of correlation. 10M 4 3

I.R	105	104	102	101	100	99	98	96	93	92
E.R	101	103	100	98	95	96	104	92	97	94

Q.6(A) A random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5% l.o.s? 10M 5 4

OR

Q.6(B) i. A random sample of size 81 was taken from the population whose variance is 20.25. Sample mean is 32. Construct 95% confidence interval for the population mean. 5M 5 4

ii. Find 95% confidence limits for the mean of a normally distributed population from which the following sample was taken 15,17,10,18,16,9,7,11,13,14. 5M 5 4

\*\*\* END\*\*\*



--	--	--	--	--	--	--	--	--	--

## MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022

### DIGITAL DESIGN

(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**

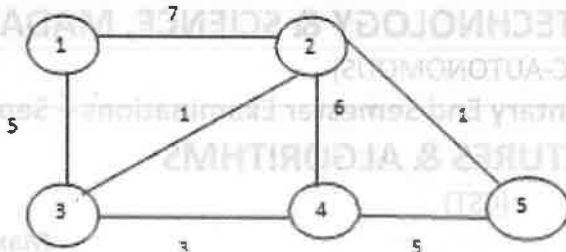
Q. No.	Question	Marks	CO	BL
Q.1	i. Convert $(6027)_{10}$ to BCD.	1M	1	2
	ii. State De-Morgan's Theorem.	1M	1	2
	iii. Define Min term & Max term	1M	2	1
	iv. Recall SOP and POS with an example.	1M	2	1
	v. Recall the excitation table of D Flip Flop.	1M	3	2
	vi. Outline the logic diagram for 1x2 Demux.	1M	3	2
	vii. Distinguish between Latch and Flip Flops?	1M	4	4
	viii. How many flip-flops are required to design MOD-9 Up counter?	1M	4	1
	ix. Define PLD.	1M	5	1
	x. Classify various Memories.	1M	5	2
Q.2(A)	Design the AND, OR NOT and EXOR Functions using NAND gates.	10M	1	6
<b>OR</b>				
Q.2(B)	Illustrate the following. (i) $(10110.0101)_2 = (?)_{10}$ (ii) $(15.5)_{16} = (?)_{10}$ (iii) $(BADC.E)_{16} = (?)_{10}$	10M	1	2
Q.3(A)	Find the minimal SOP form of the boolean function using K-map method $F(A,B,C,D,E) = \sum m = (1,4,6,10,20,22,24,26) + d(0,11,16,27)$ .	10M	2	6
<b>OR</b>				
Q.3(B)	Design the minimized boolean using NAND gates. $F = \sum m (7, 9, 10, 11, 12, 13, 14, 15)$	10M	2	6
Q.4(A)	Design 3x8 decoder using basic gates with its truth table.	10M	3	6
<b>OR</b>				
Q.4(B)	Design a Decimal to BCD Encoder and also implement it using logic gates.	10M	3	6
Q.5(A)	Design MOD-10 ripple counter using D flip-flops.	10M	4	6
<b>OR</b>				
Q.5(B)	Determine the characteristic and excitation tables of SR, JK, D and T flip flops.	10M	4	5
Q.6(A)	Solve the following Boolean function using PLA. $F_1(A,B,C) = \sum m (0,1,3,5)$ , $F_2(A,B,C) = \sum m (0,3,5,7)$	10M	5	3
<b>OR</b>				
Q.6(B)	Explain the functionality of SRAM with its read and write operations.	10M	5	2

\*\*\* END\*\*\*



Q.6(B) Illustrate Kruskal's algorithm to find the minimum spanning tree of the following graph

10M 5 2



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

Q.No	Question	Marks	CO	BL	
Q.1	i) Define time complexity. ii) List out the advantages of circular linked over singly linked list. iii) What causes overflow and underflow of a queue? iv) What is the difference between a queue and a stack? v) What is hashing? vi) What do you mean by stable sorting? vii) Define linked block Tree. viii) Define a binary search tree. Give an example. ix) Which data structure is used to implement BFS? x) Define spanning tree.	1M 1M 1M 1M 1M 1M 1M 1M 1M 1M	1 1 3 3 3 3 4 4 2 2	1 1 3 3 3 3 4 4 2 2	1 1 3 3 3 3 4 4 2 2
Q.2(A)	a) What is Data Structure? Explain Various types of Data Structure in detail. b) Explain Non-Linear Data structure with examples.	5M	1	2	
OR					
Q.2(B)	Compose an algorithm to i) count the number of nodes in a given singly linked list ii) searching the element from linked list.	3M 3M	2 3	3 4	
Q.3(A)	i) Given a infix expression convert it into postfix expression using Mark's algorithm. ii) Given the prefix for an expression. Write its postfix. $A^*B^*C^*D$ and $A^*B^*C^*D$ .	3M 3M	2 2	3 3	
OR					
Q.3(B)	Define queues? Explain De-queue with application and suitable examples.	10M	3	4	
Q.4(A)	What is the meaning of collision in hashing? Explain collision resolution techniques in context of hashing with examples.	10M	3	1	
OR					
Q.4(B)	Explain Quick Sort with the given elements 87, 9, 19, 27, 18, 108, 10, 21.	10M	3	1	
Q.5(A)	Describe about AVL trees with all the illustration.	10M	4	2	
OR					
Q.5(B)	Create a Binary Search Tree for the following data and do in-order, pre-order and post-order traversal of the tree with algorithm. 50, 60, 25, 40, 10, 70, 35, 10, 22, 65, 3 and 18.	10M	4	3	
Q.6(A)	Describe in detail about the following traversals of a graph. i) DFS ii) BFS	3M 3M	2 2	2 2	
OR					

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

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022**

**DATABASE SYSTEMS**

(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 a relationship, give an example?	1M	1	2
	ii. What is a referential Integrity?	1M	1	1
	iii. What is meant by DML?	1M	1	2
	iv. List aggregate functions supported by SQL?	1M	2	1
	v. What are functional dependencies?	1M	2	1
	vi. List types of decomposition.	1M	3	2
	vii. What is primary indexing?	1M	4	1
	viii. What is Cascading rollback?	1M	4	1
	ix. What is importance of access control?	1M	4	1
	x. Compare authentication and authorization.	1M	5	5
Q.2(A)	A university database contains information about professors (identified by social security number, or SSN) and courses (identified by course id). Professors teach courses; each of the following situations concerns the Teaches relationship set. For each situation, design and draw an ER diagram that describes the following relations. • Professors can teach the same course in several semesters, and each offering must be recorded. • Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded. Every professor must teach some course	10M	5	5
<b>OR</b>				
Q.2(B)	Compare and contrast file system and DBMS in details with a suitable example.	10M	1	3
Q.3(A)	Demonstrate SQL statements for following: Student( Enrno, name, courseId, emailId, cellno) Course(courseId, course_nm, duration) i) Add a column city in student table. ii) Find out list of students who have enrolled in "computer" course. iii) List name of all courses with their duration. iv) List name of all students start with „a“. v) List email Id and cell no of all mechanical engineering students.	10M	2	4
<b>OR</b>				
Q.3(B)	Explain about the Join operation with syntax and example.	10M	2	2
Q.4(A)	How to compute closure of set of functional dependency? Explain with a suitable example schema.	10M	2	3
<b>OR</b>				
Q.4(B)	Explain 3NF & BCNF. What is the difference between them?	10M	2	4

---

Q.5(A) Define conflict equivalent schedule. Detect whether the following the schedules are conflict equivalent or not. 10M 3 4  
S1: R1(A) R2(B) W1(A) W2(B)  
S2: R2(B) R1(A) W2(B) W1(A)

OR

Q.5(B) Examine how multi-level indexes are constructed using B trees? Explain. 10M 4 3

---

Q.6(A) Analyze how database is used in developing modern application. 10M 5 5

OR

Q.6(B) Describe any two access control models in details. 10M 4 1

\*\*\* END\*\*\*

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

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022**  
**COMPUTER SYSTEM ARCHITECTURE**  
(Common to CSE, CS, DS, 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. Recall the truth table of XOR gate.	1M	1	1
	ii. Determine the sum of $(101001)_2$ and $(111111)_2$	1M	1	5
	iii. Find the 1's Complement of $(-128)_{10}$	1M	2	1
	iv. List out basic storage elements in digital system.	1M	2	1
	v. When will Carry and Overflow flag be set?	1M	3	1
	vi. Distinguish between RISC and CISC Processors.	1M	3	4
	vii. Define the term pipeline.	1M	4	1
	viii. Mention the advantages of Micro-programmed Control unit.	1M	4	1
	ix. Enumerate the various Data transfer schemes.	1M	5	2
	x. Define spatial locality.	1M	5	1
Q.2(A)	i) Illustrate the working of JK Flip flop with a neat logic diagram ii) Find the Minimal SOP expression using K map for the function $F = \sum m(7,9,10,11,12,13,14,15)$ and draw the circuit diagram.	5M 5M	1	4
<b>OR</b>				
Q.2(B)	Explain about of 8 X 1 Multiplexer and 1 X 8 Demultiplexer with its logic diagram.	10M	1	2
Q.3(A)	Illustrate Booth's Algorithm for signed multiplication with a neat flowchart for the given data $(-16)_{10} * (10)_{10}$	10M	2	4
<b>OR</b>				
Q.3(B)	Illustrate Restoring Division algorithm with an example and also explain how this algorithm can be extended for signed division?	10M	2	3
Q.4(A)	Explain the various addressing modes of x86 with relevant examples.	10M	3	2
<b>OR</b>				
Q.4(B)	Discuss in detail about Hardwired Control Unit.	10M	3	2
Q.5(A)	Classify the various types of pipeline hazards with suitable examples.	10M	4	2
<b>OR</b>				
Q.5(B)	Explain about the concepts of Multithreading.	10M	4	2
Q.6(A)	Briefly discuss about various Cache Memory Mapping Techniques.	10M	5	2
<b>OR</b>				
Q.6(B)	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. $A1=0x42C8A4$ , $A2=0x5F6822$ , $A3=0x6A981B$ . Determine the sets in the cache to which these physical addresses are mapped.	10M	5	5

\*\*\* END\*\*\*

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022

**DATA STRUCTURES**

(CSE)

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 node structure of doubly linked list?	1M	1	1
	ii. Differentiate between static and Dynamic memory allocation?	1M	1	4
	iii. Write down the condition for Queue overflow?	1M	2	3
	iv. What are the applications of stack?	1M	2	1
	v. What is height of a tree data structure?	1M	3	1
	vi. What is a Full Binary Tree?	1M	3	1
	vii. What is hashing?	1M	4	1
	viii. What is chaining?	1M	4	2
	ix. What is adjacency matrix?	1M	5	1
	x. What are graph traversal algorithms?	1M	5	1
Q.2(A)	Write an algorithm to insert a new node at the beginning in the linked list? Explain the algorithm with an example.	10M	1	5
Q.2(B)	Write an algorithm to insert a new node at the end in the singly linked list with an example.	10M	1	5
Q.3(A)	How can we represent a circular queue? Explain with examples.	10M	2	2
Q.3(B)	Write a pseudo code for Stack insert and delete operations.	10M	2	5
Q.4(A)	Discuss tree traversal techniques with examples.	10M	3	6
Q.4(B)	What is priority queue? Explain the implementation of heaps with examples.	10M	3	3
Q.5(A)	Sort the following using heap sort algorithm. 45, 78, 21, 42, 12, 65, 15, 23, 54, 67. 34. 90, 78, 32	10M	4	3
Q.5(B)	What is a collision in hashing? How it can be solved.	10M	4	3
Q.6(A)	What are the properties of Red-Black tree? Construct a Red-Black tree with the following values. 46, 81, 50, 23, 73, 93, 58, 62, 79, 48, 28, 89, 70	10M	5	3
Q.6(B)	Explain about rotations in AVL tree to make it balance?	10M	5	2

\*\*\* END\*\*\*

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022****OBJECT ORIENTED PROGRAMMING USING C++**

(CSE/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. How can we access the class members in C++?	1M	1	1
	ii. Define reference variable in C++.	1M	1	1
	iii. Why is it necessary to overload an operator?	1M	2	1
	iv. When will you make a function inline? Why?	1M	2	1
	v. What is derived class and write its syntax.	1M	3	1
	vi. Define abstract classes.	1M	3	1
	vii. What is a stream?	1M	4	1
	viii. When do we use file() function?	1M	4	1
	ix. Write the advantages of Templates.	1M	5	1
	x. What is an exception?	1M	5	1
Q.2(A)	Explain the various data types used in C++.	10M	1	2
<b>OR</b>				
Q.2(B)	Explain pass by value, pass by reference using pointers and pass by reference using reference variable with example.	10M	1	2
Q.3(A)	Write a C++ program to overload assignment operator	10M	2	4
<b>OR</b>				
Q.3(B)	Explain the usage of friend keyword with an example program	10M	2	4
Q.4(A)	Explain how base class member function can be invoked in a derived class.	10M	3	4
<b>OR</b>				
Q.4(B)	Discuss in detail on how the object pointers and virtual functions are used to implement dynamic binding.	10M	3	3
Q.5(A)	Discuss on file stream classes with a suitable example	10M	4	3
<b>OR</b>				
Q.5(B)	i) How can we determine errors while dealing with files?	10M	4	2
	ii) Explain about File Pointers and their manipulations with example.			
Q.6(A)	Explain the following concepts with example code i) Exception handling mechanism ii) Class Template	10M	5	2
<b>OR</b>				
Q.6(B)	i) Develop a program that illustrates the application of multiple catch statements.	10M	5	4
	ii) Write a C++ program using function template for finding the maximum value in an array.			

**\*\*\* END\*\*\***



--	--	--	--	--	--	--	--	--	--

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

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022**  
**DATABASE MANAGEMENT SYSTEM**  
(CSE)

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 characteristics of database.	1M	1	
	ii. What is view?	1M	1	
	iii. What is trigger?	1M	2	
	iv. Differentiate between Super Key and Candidate Key	1M	2	
	v. What is Functional Dependency?	1M	3	
	vi. State 2NF	1M	3	
	vii. List out the ACID properties.	1M	4	
	viii. What is lock based protocol?	1M	4	
	ix. What is NoSQL?	1M	5	
	x. Define Checkpoint.	1M	5	
Q.2(A)	Explain the advantages of DBMS over a file System	10M	1	
<b>OR</b>				
Q.2(B)	Built an E-R Model for the Pharmaceutical company by considering the following information.	10M	1	
	i. For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.			
	ii. Each pharmacy has a name, address, and phone number. Every patient has a primary physician. Every doctor has at least one patient. Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.			
	iii. Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors.			
	iv. Each prescription has a date and a quantity associated with it. You can assume that, if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.			
	v.			
Q.3(A)	Discuss the different type of relational algebraic operations with examples.	10M	2	

OR

Q.3(B) Consider the following relations: 10M 2  
 Student(*snum*: integer, *sname*: string, *major*: string, *level*: string, *age*: integer)  
 Class(*name*: string, *meets at*: string, *room*: string, *fid*: integer)  
 Enrolled(*snum*: integer, *cname*: string)  
 Faculty(*fid*: integer, *fname*: string, *deptid*: integer)  
 Write a SQL Query for the following

1. Find the names of all Juniors (level = JR) who are enrolled in a class taught by YSuresh.
2. Find the age of the oldest student who is either a History major or enrolled in a course taught by YSuresh.
3. Find the names of all classes that either meet in room R128 or have five or more students enrolled.
4. Find the names of all students who are enrolled in two classes that meet at the same time.

---

Q.4(A) Describe about the Join Dependencies and Fifth normal form with suitable example. 10M 3

**OR**

Q.4(B) Suppose you are given a relation *R* with four attributes *ABCD*. For each of Consider a relation *R* with attributes *ABCDE*. Let the following FDs be given:  $A \rightarrow BC$ ,  $BC \rightarrow E$ , and  $E \rightarrow DA$ . Similarly, let *S* be a relation with attributes *ABCDE* and let the following FDs be given:  $A \rightarrow BC$ ,  $B \rightarrow E$ , and  $E \rightarrow DA$ . Identify the normal form of relation 'R' and 'S'. 10M 3

---

Q.5(A) Explain the timestamp based protocol for concurrency control. 10M 4

**OR**

Q.5(B) Discuss about different type of indexing with an example. 10M 4

---

Q.6(A) Explain the CAP theorem in NoSQL with an example. 10M 5

**OR**

Q.6(B) Discuss about shadow paging based recovery technique. 10M 5

**\*\*\* END\*\*\***

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

B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022

**REAL TIME OPERATING SYSTEMS**

(CSE-IOT)

Time: 3Hrs

Max Marks: 60

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

Q.No	Question	Marks	CO	BL
Q.1	i. Draw the structure of real time systems.	1M	1	2
	ii. What is Real time system?	1M	1	1
	iii. Define context switches.	1M	2	1
	iv. What is super-loops?	1M	2	1
	v. Write the five services of Time management.	1M	3	1
	vi. Define Weighted Round Robin Approach.	1M	3	1
	vii. What is the II Kernel structure?	1M	4	1
	viii. Define the effective deadline.	1M	4	1
	ix. What is stack based priority?	1M	5	1
	x. Define Resource Access Control (RAC).	1M	5	1
Q.2(A)	i) Explain in detail about the characteristics of Real-Time systems. ii) Differentiate hard vs soft real time systems.	10M	1	2
<b>OR</b>				
Q.2(B)	Explain about types of Task Classes in real-time systems.	10M	1	2
Q.3(A)	Discuss about task and task states in uC/OS –II.	10M	2	3
<b>OR</b>				
Q.3(B)	Explain the following i) Non-Pre-emptive Kernels ii) Pre-emptive kernels	10M	2	2
Q.4(A)	Differentiate QNX and VX Works and PSOS.	10M	3	3
<b>OR</b>				
Q.4(B)	Explain in brief about Memory management in uC/OS –II.	10M	3	
Q.5(A)	Briefly explain about common approaches of real time scheduling.	10M	4	2
<b>OR</b>				
Q.5(B)	Write about the Clock driven, weighted round robin and priority driven	10M	4	2
Q.6(A)	Explain the following i) STACK-BASED Priority ii) PRIORITY-CEILING (CEILING-PRIORITY) PROTOCOL	10M	5	2
<b>OR</b>				
Q.6(B)	Discuss about the Non-preemptive Critical Sections and Preemption Ceiling Protocol.	10M	5	3

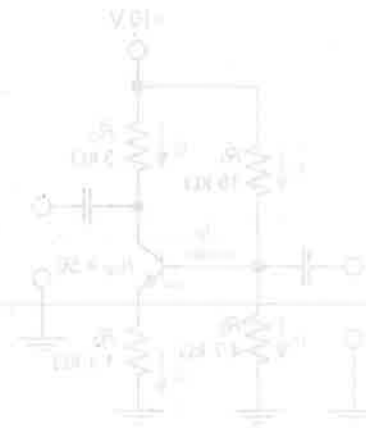
\*\*\* END\*\*\*



hence draw its drain and transfer characteristics

Q.4(A)	(i) Explain Schmitt trigger circuit with the help of diagram and obtain its transfer characteristics.	5M	3	2
	ii) Discuss Successive Approximation ADC.	5M	3	2
<b>OR</b>				
Q.4(B)	i) Explain Sample and hold circuit .	5M	3	2
	ii) Explain the TTL logic in detail	5M	3	2
Q.5(A)	i) Simplify the following Boolean function using 4-variable K-map. $F(w,x,y,z) = \sum(1,3,7,11,15) + \sum d(0,2,5)$	7M	4	2
	ii) Design a Full-adder circuit using EX OR logic gates.	3M	4	6
<b>OR</b>				
Q.5(B)	Solve the following Boolean function F no more than two NOR gates $F=(A,B.C,D)=\sum(0,1,2,9,11)+d(8,10,14,15)$	10M	4	2
Q.6(A)	Explain different types of Read Only Memory	10M	5	2
<b>OR</b>				
Q.6(B)	i) Explain the features of a 4-bit Universal Shift Register along with the circuit diagram.	5M	5	2
	ii) Explain the Block Diagram of a 4x4 RAM.	5M	5	2

**\*\*\* END\*\*\***



Hall Ticket No: 

QP Code: 20CSO106/20CSD105/20CAI105

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE**

(UGC-AUTONOMOUS)

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022****OBJECT ORIENTED PROGRAMMING JAVA**

(CSE-IOT/CSE-DS/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. List any three bitwise operators.	1M	1	2
	ii. What is Java Virtual Machine?	1M	1	1
	iii. How to compare two strings? Write the syntax.	1M	2	2
	iv. What is a final class?	1M	2	1
	v. What is an exception?	1M	3	1
	vi. List out the benefits of multithreading in Java.	1M	3	2
	vii. What is stream in java?	1M	4	2
	viii. Differentiate between List and Set interfaces.	1M	4	4
	ix. Expand MVC.	1M	5	4
	x. Give the syntax for Button.	1M	5	1
Q.2(A)	List and classify the operators used in java. Explain any two operator classifications.	10M	1	2
<b>OR</b>				
Q.2(B)	Explain the working style of for each loop with the help of two dimensional array matrix elements accessing.	10M	1	4
Q.3(A)	What is string in java? How strings are created in Java with suitable examples?	10M	2	3
<b>OR</b>				
Q.3(B)	State the uses of abstract and final keyword in Java with suitable examples.	10M	2	2
Q.4(A)	Write a java program with a user defined exception involving all the five keywords of exception handling.	10M	3	2
<b>OR</b>				
Q.4(B)	Explain isAlive() and join() methods in threads with suitable example program.	10M	3	3
Q.5(A)	Discuss about I/O Streams in detail with appropriate example.	10M	4	3
<b>OR</b>				
Q.5(B)	Describe any five collection framework classes. Explain any two with example program.	10M	4	5
Q.6(A)	Explain different types of Buttons each with an example.	10M	5	2
<b>OR</b>				
Q.6(B)	What is the role of event listeners in event handling? List the Java event listeners.	10M	5	3

**\*\*\* END\*\*\***

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

B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022

**DATA STRUCTURES & ALGORITHMS**

(CSE-IOT)

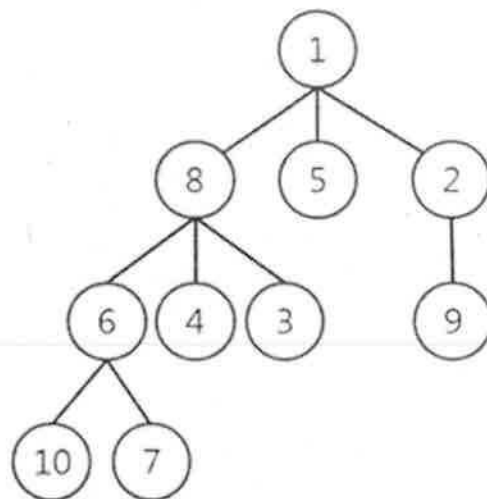
Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.

**All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.No	Question	Marks	CO	BL
Q.1	i. List Out various asymptotic notations?	1M	1	1
	ii. Determine the time complexity of the code: <pre>for(i=1;i&lt;=n;i++){   for(j=1;j&lt;=n;j++){     printf("%d%d", i, j);   } }</pre>	1M	1	5
	iii. Construct a Binary Search Tree if the preorder and inorder traversals are given as [A B D E C F] and [D B E A F C]	1M	2	3
	iv. Choose the data structure that is efficient in terms of memory and access of elements from the list {Queue, Circular Queue, Double ended queue}	1M	2	3
	v. What is the time complexity of a search operation in Binary Search Tree?	1M	3	1
	vi. Which data structure is suitable to represent telephone network?	1M	3	1
	vii. Identify the role of Priority Queues in Operating Systems?	1M	4	2
	viii. List the order of nodes that get visited when Depth First Search starts with vertex 1	1M	4	5



- |     |   |    |   |   |
|-----|---|----|---|---|
| ix. | Assume that you are developing a 'Text Editor'. Which pattern matching method among {Brute-Force, Boyer-Moore, Knuth-Morris-Pratt} would you select for your application? | 1M | 5 | 4 |
| x.  | How many unique colors are required for proper vertex coloring of a complete graph that has 10 vertices?  | 1M | 5 | 2 |

Q.2(A) Identify the purpose of the code given below and analyze its time complexity for an input size n. 10M 1 5

```

#include <stdio.h>
int main() {
    int n;
    double arr[100];
    printf("Enter the number of elements (1 to 100): ");
    scanf("%d", &n);

    for (int i = 0; i < n; ++i) {
        printf("Enter number%d: ", i + 1);
        scanf("%lf", &arr[i]);
    }
    for (int i = 1; i < n; ++i) {
        if (arr[0] < arr[i]) {
            arr[0] = arr[i];
        }
    }
    printf("%.2lf", arr[0]);
    return 0;
}

```

OR

Q.2(B) Create a linked list that represents a polynomial of the form: 10M 1 3  
 $P(X)=a_0+a_1X+a_2X^2+\dots+a_nX^n$

Q.3(A) Write algorithms to implement circular queue operations. 10M 2

OR

Q.3(B) Illustrate the functioning of circular queue of size 5 for the following operations: 10M 2 2  
 insert(10),delete(),insert(20),insert(30),insert(40),delete(),  
 insert(50),delete(),insert(60), insert(70),delete(),insert(80),insert(90)

Q.4(A) Write algorithms for inorder, preorder and post order traversals. 10M 3 2

OR

Q.4(B) What is a Max Heap? Construct a Max Heap for the data set { 44, 33, 77, 11, 55, 88, 66, 100, 10, 20} 10M 3 3

Q.5(A) What is a Hash Table? Explain different methods used in handling collisions of a Hash Table. 10M 4 2

OR

Q.5(B) What is a weighted graph? Give the adjacency matrix representation of a weighted graph. 10M 4 2

Q.6(A) What is the importance of pattern matching in search engines? Briefly explain how Google works. 10M 5 3

OR

Q.6(B) What is sum-of-subsets problem? Explain how backtracking is used to solve it. 10M 5 2

\*\*\* END\*\*\*



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

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022**

**DATA STRUCTURES USING PYTHON**

(Common to 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. What are the characteristics of Matrix ADT?	1M	1	1
	ii. Write the Disadvantages of Array?	1M	1	1
	iii. Outline the purpose of Big-oh Notation in Complexity Analysis?	1M	2	2
	iv. What are the characteristics of set operation?	1M	2	2
	v. What is meant by traversal in linked list?	1M	3	1
	vi. What is the different operation of Queue ADT with respected syntax?	1M	3	2
	vii. Define separate chaining?	1M	4	1
	viii. Define recursive applications?	1M	4	2
	ix. What are the characteristics of AVL tree with their respected syntax?	1M	5	1
	x. List out the advantages of Quick sort?	1M	5	1
Q.2(A)	Explain briefly about set implementation of different operations with their respected syntax and concluded it with program.	10M	1	3
<b>OR</b>				
Q.2(B)	Justify two working method of python list gives more result comparable to array and support your answer with classifying different syntax of list.	10M	1	4
Q.3(A)	(i) Explain briefly about Linear search concepts and mention its merits and demerits. (ii) Justify why amortized cost is needed for the program implementation.	10M	2	4
<b>OR</b>				
Q.3(B)	Explain Bubble sort for the following integers 10,51,2,18,4,31,13,5,23,64,29?	10M	2	2
Q.4(A)	Represent the concept of Stack ADT and implement its working method with insert and delete operations?	10M	3	4
<b>OR</b>				
Q.4(B)	Describe briefly about priority queue and justify your answer how priority queue differ from Queue ADT.	10M	3	3
Q.5(A)	Explain the concept of doubly linked list and mention its properties of Linked list with different operations.	10M	4	4
<b>OR</b>				
Q.5(B)	Discuss the working method of separate chaining and how it is utilized in hashing method.	10M	4	3
Q.6(A)	Explain about different sorting techniques and elaborate neat sketch on quicksort technique with an example program.	10M	5	4
<b>OR</b>				
Q.6(B)	Compare and contrast between binary search and AVL tree notation and explain its behavior of working with an example.	10M	5	4

\*\*\* END\*\*\*

Hall Ticket No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

QP Code: 20CSD106/20CAI106

## MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022

### FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

(CSE-DS/ 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. What is AI?	1M	1	1
	ii. Define Intelligent Agents.	1M	1	1
	iii. What are the advantages of Breadth First Search?	1M	2	1
	iv. What is sensor-less problem?	1M	2	1
	v. What is the difference between Simple Hill Generate and Test algorithm Climbing?	1M	3	1
	vi. What are the 3 types of symbol which is used to indicate objects, relations and functions?	1M	3	1
	vii. Define Propositional Logic.	1M	4	1
	viii. What is Epistemological commitment?	1M	4	1
	ix. What is learning?	1M	5	1
	x. What is a Bayesian network?	1M	5	1
Q.2(A)	What is an agent? Explain the basic kinds of agent program.	10M	1	2
<b>OR</b>				
Q.2(B)	How a problem is formally defined? List down the components of it?	10M	1	4
Q.3(A)	Explain about A* algorithm in detail.	10M	2	3
<b>OR</b>				
Q.3(B)	Solve the Water Jug problem: you are given 2 jugs, a 4-gallon one and 3-gallon one. Neither has any measuring maker on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into 4-gallon jug? Explicit assumptions: A jug can be filled from the pump, water can be poured out of a jug onto the ground, water can be poured from one jug to another and that there are no other measuring devices available.	10M	2	5
Q.4(A)	Explain the various types of hill climbing search techniques.	10M	3	2
<b>OR</b>				
Q.4(B)	Illustrate in detail about Informed search strategies.	10M	3	3

Q.5(A) Explain about quantifiers, its types and the connection between them 10M 4 2

OR

Q.5(B) Consider a two player game in which the minimax search procedure is used to compute the best moves for the first player. Assume a static evaluation function that returns values ranging from -10 to 10, with 10 indicating a win for the first player and -10 a win for the second player. Assume the following game tree in which the static scores are from the first player's point of view. Suppose the first player is the maximizing player and needs to take the next move. What move should be chosen at this point? Can the search be optimized? 10M 4 5

Q.6(A) Illustrate Fuzzy Logic and fuzzy sets in detail. 10M 5 3

OR

Q.6(B) How can use STRIPS and ADL Language for representing planning problems? Explain in detail. 10M 5 4

\*\*\* END\*\*\*

OR

OR

OR

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

**B.Tech II Year I Semester (R20) Supplementary End Semester Examinations – September 2022**

**DATABASE FUNDAMENTALS FOR SECURITY**

(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. Define DML.	1M	1	1
	ii. What is relational Model?	1M	1	1
	iii. What is B. Tree?	1M	2	1
	iv. How to use indexes in database?	1M	2	1
	v. What is Transaction?	1M	3	1
	vi. List out the ACID properties.	1M	3	1
	vii. What is DAC?	1M	4	1
	viii. What is timestamp protocol?	1M	4	1
	ix. What is Audit Trail?	1M	5	1
	x. What is Virtual Private Database	1M	5	1
Q.2(A)	Write SQL statements for following: Student( Enrno, name, courseId, emailId, cellno) Course(courseId, course_nm, duration) i) Add a column city in student table. ii) Find out list of students who have enrolled in "computer" course. iii) List name of all courses with their duration. iv) List name of all students start with „a“. v) list email Id and cell no of all mechanical engineering students.	10M	1	5
<b>OR</b>				
Q.2(B)	What is Entity set? Also define Relationship set. List and explain the symbols used to draw ER Diagram.	10M	1	3
Q.3(A)	Explain in detail about the properties and operations of a B Tree with an example.	10M	2	2
<b>OR</b>				
Q.3(B)	Illustrate functioning of different Types of Keys in Relational Model.	10M	2	3
Q.4(A)	Explain in detail about various concurrency control techniques with example.	10M	3	2
<b>OR</b>				
Q.4(B)	Discuss in detail about MAC and RBAC Model.	10M	3	2
Q.5(A)	Illustrate various types of watermarking mechanisms.	10M	4	3
<b>OR</b>				
Q.5(B)	Explain how database Auditing Models useful in database security.	10M	4	2
Q.6(A)	Discuss in detail about hashing techniques.	10M	5	2
<b>OR</b>				
Q.6(B)	List and explain various issues while transactions are running concurrently in DBMS	10M	5	2

\*\*\* END\*\*\*