AR20

CODE: 20MET207 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

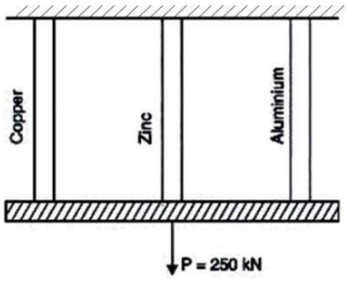
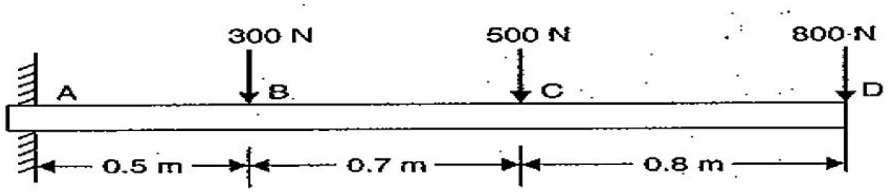
II B.Tech.II Semester Supplementary Examinations, August, 2023

STRENGTH OF MATAERIALS

(Mechanical Engineering)

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

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

			Marks	CO	Blooms Level
		UNIT-I			
1.		Three bars made of Copper, Zinc and Aluminium are of equal length and have cross sectional areas 500 mm^2, 750 mm^2 and 1000 mm^2 respectively. They are rigidly connected at their ends. If this composite bar is subjected to a load of 250 kN as shown in figure, estimate the load carried by each rod and the stress induced in each rod. Take the values of E for Copper =1.3 x 10^5 N/mm^2, E for Zinc =1 x 10^5 N/mm^2 and E for Aluminium = 0.8 x 10^5 N/mm^2. 	10M	1	Apply
		(OR)			
2.	a.	Draw a typical stress-strain curve for mild steel, indicate and explain salient points on it.	6M	1	understand
	b.	Explain the following terms i) Factor of safety ii) Poisons ratio	4M	1	understand
		UNIT-II			
3.		A cantilever beam of length 2 m carries the point loads as shown in fig. Draw the shear force and Bending moment diagrams for the cantilever beam. 	10M	2	Apply
		(OR)			
4.		A simply supported beam of 6m long carries a uniformly distributed load 5 kN/m over entire length and point loads 10kN at a distance of 3m from the left support. Draw the Shear force and bending moment diagrams.	10M	2	Apply
		UNIT-III			
5.		Derive the Bending equation $\frac{M}{I} = \frac{f}{y} = \frac{E}{R}$ and also state any Five assumptions in the derivation of this equation.	10M	3	understand
		(OR)			
6.		A simply supported beam of I section with top flange 200 mm X 20 mm, Web 360 mm X 20 mm and bottom flange 200 mm X 20 mm. Find the maximum intensity of shear stress in the cross section of the beam. Also sketch the shear stress distribution across the depth of the section if it carries a shearing force of 200 kN at a section.	10M	3	Apply

UNIT-IV

7.		Determine the diameter of a solid steel shaft which will transmit 90 kW at 160 r.p.m. also determine the length of the shaft if the twist must not exceed 1 degree over the entire length. Maximum shear stress is limited to 60 N/mm^2. Take the modulus of rigidity as 8x10^4 N/mm^2.	10M	4	Apply
		(OR)			
8		A boiler shell is to be made of 15 mm thick plate having a limiting tensile stress of 120 N/mm^2. If the efficiencies of the longitudinal and circumferential joints are 30% and 70% respectively determine: (i)The maximum permissible diameter of the shell for an internal pressure of 2 N/mm^2, and (ii) permissible intensity of internal pressure when the shell diameter is 1.5 m.	10M	4	Apply

UNIT-V

9.		Find the Euler's crippling load for a hollow cylindrical steel column of 38 mm external diameter and 2.5 mm thick. Take length of the column as 2.3 m and hinged at its both ends. Take E = 205 GPa.	10M	5	Apply
		(OR)			
10.		Derive the expression for the Euler buckling load when both the ends of the column are (i) hinged (ii) One end fixed and other end free and also state the assumptions in the derivation	10M	5	understand

UNIT-VI

11.	a.	A cantilever of length 3 m carries two point loads of 2 kN at the free end and 4 kN at a distance of 1 m from the free end. Find the deflection at the free end. Take E = 2 x 10^5 N/mm^2 and moment of inertia I = 10^8 mm^4.	5M	6	Apply
	b.	Derive the expression for slope and deflection of a cantilever beam of length L and carrying a uniformly distributed load over the whole length?	5M	6	understand
		(OR)			
12.		A beam of uniform rectangular section 200mm wide and 300mm deep is supported at its ends and carries a UDL of 9kN/m over the entire length of 5m. If the value of E for the beam material is 1 x 10^4 N/mm^2, find (i) slope at the supports (ii) maximum deflection.	10M	6	Apply

AR20

CODE: 20ECT207 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech.II Semester Supplementary Examinations, August, 2023

TRANSMISSION LINES & ELECTRO MAGNETIC WAVES

(Electronics and Communication Engineering)

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

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

			Marks	CO	Blooms Level
		UNIT-I			
1.	a	Draw the equivalent circuit of transmission line and discuss the transmission line parameters.	5	1	Understanding
	b	An open wire transmission line has primary constants R=5Ω/km, L=3mH/km, G=0.5μ mhos/km and C=0.04μF/km at 2kHz. Calculate propagation constant and phase velocity.	5	1	Applying
		(OR)			
2.	a	Explain the terms phase velocity, group velocity and obtain the relation between them.	5	1	Understanding
	b	Find the velocity of propagation and characteristic impedance at 200kHz for a lossless transmission line having L=30μH/m and C=20nF/m.	5	1	Applying
		UNIT-II			
3.	a	Show that the characteristic impedance of a transmission line is the geometric mean of Z_{oc} and Z_{sc}.	5	2	Analyzing
	b	A 75Ω transmission line is terminated by a load of 120+j80Ω.Find reflection coefficient and VSWR.	5	2	Applying
		(OR)			
4.	a	Describe the characteristics and applications of Quarter wave transmission line.	5	2	Understanding
	b	Discuss the principle of single stub matching in transmission lines.	5	2	Analyzing
		UNIT-III			
5.		Derive the expression for Electric field (E) due to infinite sheet of charge with uniform charge density ρs C/m^2. Express the point P (1, -4, -3) in spherical coordinates.	10	3	Analyzing
		(OR)			
6.	a	State Gauss Law. List the applications of Gauss Law.	5	3	Understanding
	b	Derive Poisson ‘s and Laplace ‘s Equations.	5	3	Analyzing
		UNIT-IV			
7.	a	State and prove Ampere ‘s Circuital Law.	5	4	Analyzing
	b	State and explain Ampere’s force law.	5	4	Understanding
		(OR)			
8.		Using Ampere’s circuital law, derive the expression for magnetic field intensity due to a coaxial cable having inner conductor radius a and outer conductor thickness extending from radius b to radius c.	10	4	Applying

UNIT-V

9.	a	Prove that $\nabla \times H = J + \frac{\partial D}{\partial t}$.	5	5	Analyzing
	b	State Maxwell's equations in integral form and write down their word statements.	5	5	Understanding
		(OR)			
10.		State and prove the boundary conditions for electric and magnetic fields between two media.	10	5	Analyzing

UNIT-VI

11.	a	Derive the wave equations for a conducting medium.	5	6	Analyzing
	b	Show that for free space the intrinsic impedance is 377Ω.	5	6	Analyzing
		(OR)			
12.	a	Explain wave propagation in good dielectrics.	5	6	Analyzing
	b	Explain the concepts of linear, circular and elliptical polarization.	5	6	Understanding

AR20

CODE: 20EET207 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech.II Semester Supplementary Examinations, August, 2023

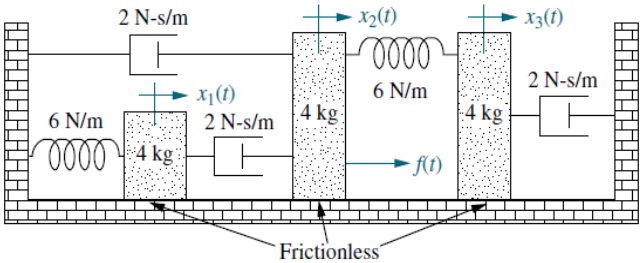
CONTROL SYSTEMS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

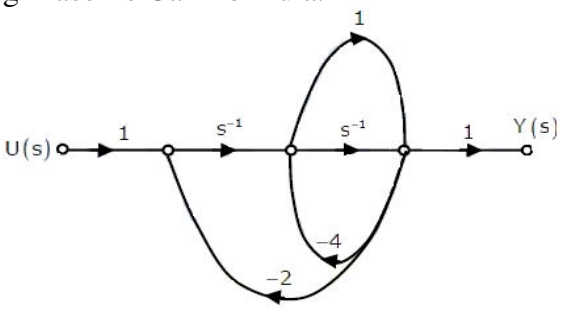
Time: 3 Hours **Max Marks: 60**

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

			Marks	CO	Blooms Level
		UNIT-I			
1.	a	Write the equation of motion for the three masses for the translational mechanical system shown below. Also, find the transfer function $X_2(s)/F(s)$. Note: The indicated damping is viscous.	6	1	Applying

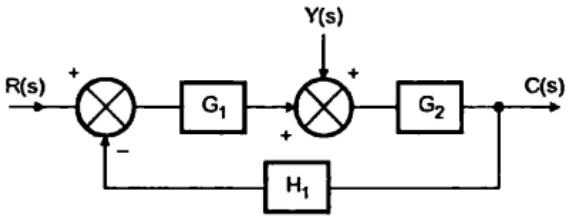


	b	Obtain transfer function of the following control system in Fig.1 using Mason's Gain formula.	4	1	Applying

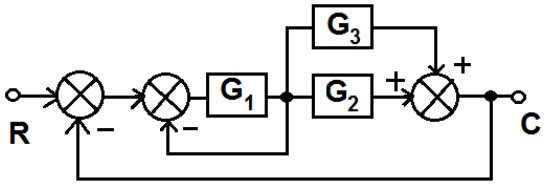


(OR)

2.	a	Obtain the resultant output C(s) in terms of the input R(S).	4	1	Understanding



	b	Using block diagram reduction technique, find the closed loop transfer function of the following block diagram.	6	1	Applying



		UNIT-II			
3.	a	Derive the transfer function of a field-controlled DC servo motor	4	2	Remembering
	b	A closed loop system has two complex poles at s_1, s_2=-2±j1. Determine the form of transfer function and values of ω_n, T_P, T_r, T_s and M_P assuming standard second order system.	6	2	Understanding

(OR)

4.	a	Derive the expression of a unit step response of a second-order under-damped system. Also, find the expressions of peak time and peak overshoot of the system.	6	2	Remembering
	b	A second order system has overshoot of 50% and period of oscillations 0.2 sec in step response. Determine: (i) Resonant peak (ii) Resonant frequency (iii) Bandwidth	4	2	Understanding

UNIT-III

5.	a	Take the help of examples to discuss the effect of adding poles and zeros to transfer functions.	4	3	Understanding
	b	For a unity feedback control system, the forward path gain is given as, $G(s) = \frac{10K}{s(s^2+s+1)(s+2)}$. Find the range of values of "K" and the value of natural frequency of oscillation by using R-H criteria.	6	3	Applying

(OR)

6.	a	For a system $G(s)H(s) = \frac{K(1+s)^2}{s}$, find the range of 'K' for system to be stable.	4	3	Understanding
	b	Sketch the complete root locus for the following system: $G(s)H(s) = \frac{K}{s(s+4)(s^2+4s+20)}$.	6	3	Applying

UNIT-IV

7.	a	Sketch the bode plot of a system with open-loop gain as follows. $G(s)H(s) = \frac{10}{s(s+2)(s+10)}$ Referring the plot, determine the gain margin, phase margin and stability of the system.	5	4	Applying
	b	Consider $G(s)H(s) = \frac{10(s+3)}{s(s-1)}$. Draw the complete Nyquist plot and then determine the stability of closed loop system.	5	4	Applying

(OR)

8.	a	Given $G(s)H(s) = \frac{20(s+10)}{s(s+1)(s^2+2s+2)}$ Draw the bode plot and find the Gain Margin and Phase Margin	5	4	Applying
	b	Construct the Nyquist plot for a control system with OLTF = $\frac{K(s+1)^2}{s^3}$. Find the range of values of "K" for stability condition.	5	4	Applying

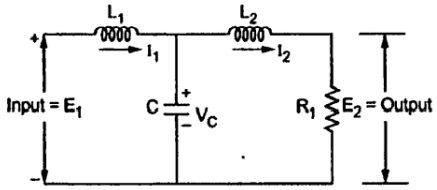
UNIT-V

9.		Discuss the design of a Lead-Lag compensator.	10	5	Remembering

(OR)

10.		What is compensation and why it is needed for controller system explain the types of compensation.	10	5	Understanding

UNIT-VI

11.	a	Obtain the state equation and output equation of the electrical network as shown in figure below 	5	6	Applying
	b	(i) What is a state variable? What are its properties? (ii) Find the transfer function of a system defined by the state-space equation: $$\dot{X} = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -3 & -4 \end{pmatrix} X + \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} U, Y = (1 \quad 0 \quad 0)X$$	5	6	Understanding
		(OR)			
12.	a	A linear time invariant system is characterized by the homogenous state equation $\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$ Compute the solution of homogenous equation, assume the initial state vector: $$X_o = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$	6	6	Understanding
	b	(i) Write the advantages of states space approach compare to transfer function approach.	4	6	Understanding

AR20

CODE: 20CST207 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech.II Semester Supplementary Examinations, August, 2023

OPERATING SYSTEMS

(COMMON TO CSE , CSE (AIML) & IT Branches)

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

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

			Marks	CO	Blooms Level
		UNIT-I			
1.	a	Explain any five main functions of an Operating System.	5	CO1	K1
	b	What is the system call and explain the types of system calls.	5	CO1	K1
		(OR)			
2.		Consider the following set of processes with the length of CPU burst time and arrival time in milliseconds.	10	CO1	K3

Process	Burst time	Arrival time
P1	10	0
P2	1	8
P3	2	10
P4	1	12
P5	5	13

Draw Gnattcharts illustrating execution of these processes using i)FCFS ii)SJF preemptive.Calculate the avg waiting time and turnaround time of the above scheduling algorithms.

		UNIT-II			
3.	a	Discuss the Critical Section problem using Peterson's Solution.	5	CO2	K2
	b	Explain wait and signal semaphore operations without busy waiting.	5	CO2	K2
		(OR)			
4.	a	Illustrate the classical problem of synchronization with example	5	CO2	K3
	b	What is monitor? Explain its functionalities	5	CO2	K2
		UNIT-III			
5.	a	What is WFG? How it is used to detect deadlock?	5	CO3	K1
	b	Explain the two solutions of recovery from deadlock	5	CO3	K2
6.	a	Explain the necessary conditions for deadlock	5	CO3	K2
	b	Explain deadlock prevention methods.	5	CO3	K2
		UNIT-IV			
7.		Explain paging with example.	10	CO4	K3
		(OR)			
8.		Consider the page references 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, with 4 page frame. Find number of page faults for any two of the algorithms - FIFO, Least Recently Used (LRU), Optimal page replacement algorithm	10	CO4	K3
		UNIT-V			
9.		Explain various file access methods with suitable examples.	10	CO5	K2
		(OR)			
10.		Write short notes on :i) Contiguous file allocation and ii) Linked File allocation methods	10	CO5	K2
		UNIT-VI			
11.		Write in detail about the on-disk and in-memory structures used to implement a file system	10	CO6	K3
		(OR)			
12.		Explain any two disk scheduling algorithms with example.	10	C06	K3

AR20

CODE: 20CET207 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech.II Semester Supplementary Examinations, August, 2023

GEOTECHNICAL ENGINEERING

(CIVIL ENGINEERING)

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

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

			Marks	CO	Blooms Level
		UNIT-I			
1.		Explain Indian standard classification of soils.	10M	1	L2
		(OR)			
2.	a)	Draw the phase diagrams of soil when the soil is in fully saturated and in partially saturated conditions.	5M	1	L2
	b)	State the significance of well graded, poorly graded and uniformly graded soils with standard curves.	5M	1	L2
		UNIT-II			
3.	a)	Describe the factors affecting the coefficient of permeability.	5M	2	L2
	b)	A soil sample 150 mm high (L) and 100 mm in diameter (D) is placed in a falling head permeameter that has connected to it a vertical pipe of 2 mm diameter (d). The level of the water in this pipe, measured above the outlet level in the permeameter falls from 350 mm to 200 mm in 60 seconds. Determine the permeability of the soil.	5M	2	L3
		(OR)			
4.	a)	Derive the equation for seepage discharge through a soil based on flow net analysis.	5M	2	L2
	b)	State the importance of hydraulic conductivity in stratified layers of soil and derive the equivalent permeablitiy equation when the flow is horizontal to bedding planes.	5M	2	L2
		UNIT-III			
5.	a)	Define total stress, effective stress and pore water pressure in soil under normal conditions.	5M	3	L2
	b)	Explain the variation of stress distribution in soil in the case upward seepage flow.	5M	3	L2
		(OR)			
6.	a)	Explain the process of evaluation of effective stress in saturated soil under static conditions.	5M	3	L2
	b)	Explain the variation of stress distribution in soil in the case downward seepage flow.	5M	3	L2
		UNIT-IV			
7.	a)	State the factors effecting compaction of soil.	5M	4	L2
	b)	List the differences between compaction and consolidation.	5M	4	L2
		(OR)			

8.	a)	List the field compaction equipments available to compact soil and discuss its suitability with nature of projects.	5M	4	L2
	b)	A fill is constructed at a site where the soil profile consists of 1m of sand underlain by 6m of clay resting on rock. The coefficient of consolidation is $2x10^{-6}$ m^2/min. How long will it take for a) 50% of the consolidation to take place? b) 90% of the consolidation to take place?	5M	4	L3

UNIT-V

9.	a)	Distinguish between stress distribution on horizontal and vertical plane of soils subjected to external loading.	5M	5	L2
	b)	How do you find stresses using Newmark's influence chart? Explain.	5M	5	L2

(OR)

10.	a)	Describe the stresses due to different shapes of footings with the help of neat sketches.	5M	5	L2
	b)	Differentiate between Boussinesque's and Westergard's analsyis of stresses in soils due to external loading.	5M	5	L2

UNIT-VI

11.	a)	State the importance of shear strength of soil and list the shear strength parameters.	5M	6	L2
	b)	Describe the procedure of vane shear test for bottom and top-bottom shear.	5M	6	L2

(OR)

12.		Explain Direct shear test on soil to find shear strength with neat sketch.	10M	6	L2

AR18

CODE: 18MET205 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B. Tech II Semester Supplementary Examinations, August, 2023

IC ENGINES

(Mechanical Engineering)

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

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

UNIT-I

1.	a)	Classify the internal combustion engines.	6M
	b)	Demonstrate the working of the engine fitted to the Scooter	6M
		(OR)	
2.	a)	Label any ten components of IC engine	6M
	b)	Demonstrate the working of the lubrication system in the Lorry	6M
		UNIT-II	
3.	a)	Explain the effects of detonation in SI engine.	6M
	b)	Explain T and L head type combustion chambers in SI Engine.	6M
		(OR)	
4.	a)	Explain the stages of combustion process in C.I engine.	6M
	b)	Explain any four variables which will affect the delay in CI engines	6M
		UNIT-III	
5.		The following observations were recorded during a trial of a four-stroke, single-cylinder oil engine. Duration of trial is 30 min; oil consumption is 4 litres; calorific value of the oil is 43 MJ/kg; specific gravity of the fuel = 0.8; average area of the indicator diagram = 8.5 cm^2; Length of the indicator diagram = 8.5 cm; spring constant = 5.5 bar/cm; brake load = 150 kg; spring balance reading = 20 kg; effective brake wheel diameter = 1.5 m; speed = 200 rpm; cylinder diameter = 30 cm; stroke = 45 cm; jacket cooling water = 10 kg/min; temperature rise is 36 °C. Calculate (i) indicated power (ii) brake power (iii) mechanical efficiency (iv) brake specific fuel consumption in kg/kW h and (v) indicated thermal efficiency	12M
		(OR)	
6.	a)	Explain any five performance parameters of IC engines	6M
	b)	Explain the heat balance sheet in detail.	6M
		UNIT-IV	
7.	a)	Compare the emissions from CI and SI engine.	6M
	b)	List any five adverse effects of SI engine pollutants on environment	6M
		(OR)	
8.	a)	Explain the construction and working of two way catalytic converters	6M
	b)	List the sources of pollutants from SI engine	6M
		UNIT-V	
9.	a)	Derive an expression for the work done in single stage reciprocating compressor without considering clearance volume.	6M
	b)	A single stage air compressor receives air at 1 bar and 27^0C and delivers air at 6 bar. The atmospheric temperature and pressure are 1.013 bar and 15 ^{0}C. The compression follows the law $PV^{1.3}$ = constant and the clearance volume is 5 % of the stroke volume. Calculate the volumetric efficiency	6M
		(OR)	
10.	a)	List any four advantages of axial flow compressors over centrifugal compressors	6M
	b)	Explain the roots blower and derive an equitation for its efficiency	6M

AR18

CODE: 18EET209 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B. Tech II Semester Supplementary Examinations, August, 2023

CONTROL SYSTEMS

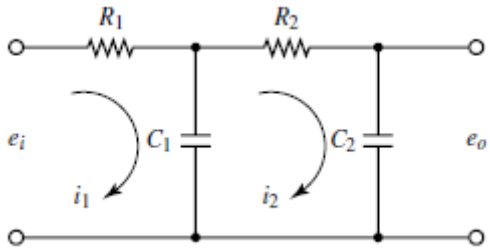
(Electrical and Electronics Engineering)

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

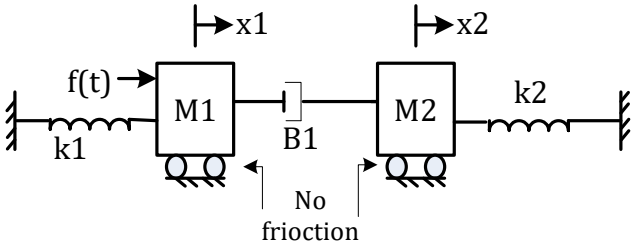
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Obtain the transfer function *E*o(s)/*E*i(s). (Capacitors *C*1 and *C*2 are not charged initially.) 6M

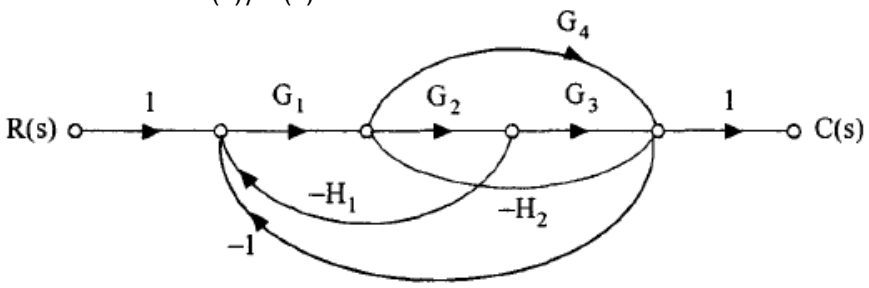


b) Obtain the differential equations of the mechanical system and find the transfer function $X_2(s)/F(s)$. 6M



(OR)

2. a) Find transfer function C(s)/R(s). 6M



b) What is the effect of feedback on overall gain and Stability? 6M

UNIT-II

3. a) Consider the unit step response of a unity feedback control system whose open loop transfer function is $G(s) = \frac{1}{s(s+1)}$. Obtain the rise time, maximum over shoot and settling time(5% criterian). 6M

b) For a unity feedback system the open loop transfer function is 6M

$G(s) = \frac{10(s+2)}{s^2(s+1)}$. Find the positional, velocity and acceleration error constants.

Also evaluate steady state error when the input is $R(s) = \frac{3}{s} - \frac{2}{s^2} + \frac{1}{s^3}$.

(OR)

4. a) Explain the effects of proportional derivative, proportional integral systems with a suitable example. 6M

b) Derive the transfer function of armature controlled DC servo motor. 6M

UNIT-III

5. a) Determine the stability of the control system with characteristic equation 6M

$s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0$ using Routh Hurwitz Criterion.

b) Write the limitations of Routh Hurwitz Criterion. 6M

(OR)

6. a) Sketch the root locus of the system with 12M

$$G(s)H(s) = \frac{K}{(s+1)(s+3)(s+6)}$$

UNIT-IV

7. a) Construct the complete Nyquist plot for a unity feedback control system whose open loop transfer function is 12M

$$G(s)H(s) = \frac{K}{S(S^2+2S+2)}$$

Find maximum value of 'K' for which the system is stable.

(OR)

8. a) Draw the bode plot of $G(s)H(s) = \frac{250}{s(2.5+s)(10+s)}$. Test the stability of closed loop system. 12M

UNIT-V

9. a) Explain about lag compensator with necessary circuits. 5M

b) A linear time-variant system is characterized by the state equation 7M

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

where u is a unit step function. The initial condition is

$$X(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

Obtain the solution of the state equation.

(OR)

10. a) Diagonalize the system matrix $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$. 6M

b) Obtain state model of a system whose transfer function is given by 6M

$$T(S) = \frac{Y(S)}{U(S)} = \frac{S+1}{S(S+2)(S+4)}$$

***

AR18

CODE: 18ECT209 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B. Tech II Semester Supplementary Examinations, August, 2023

DIGITAL ELECTRONICS

(Electronics and Communication Engineering)

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

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

UNIT-I

1.	a)	Convert the following (i) $(DFD7)_{16} = (\ )_2$ (ii) $(378.93)_{10} = (\ )_8$	6M
	b)	(i) Perfrom12 bit arithmetic Addition of -45.75 to +87.5 (ii)Perform 1's complement of -99 & -77.25 in 8 bit	6M
		(OR)	
2.	a)	What is gray code? Explain binary to gray conversion with one example	6M
	b)	Perform BCD Subtraction using 9's & 10's compliment methods of 305.5 – 168.8	6M

UNIT-II

3.	a)	Express the Boolean function F = A + B'C as a sum of minterms with canonical form	6M
	b)	Perform the realization of all basic logic gates and explain with the help truth table.	6M
		(OR)	
4.	a)	Reduce the expression f=Σm(2,3,6,7,8,10,11,13,14) using mapping	6M
	b)	(i) Prove x'y'z' + x'yz' + xyz' = x'z' + yz' (ii) Simplify F = x'yz + x'yz' + xz.	6M

UNIT-III

5.	a)	Design a half adder by using basic gates and explain its operation.	6M
	b)	Design a 4-bit carry ahead adder circuit	6M
		(OR)	
6.	a)	Draw the logic diagram of a 4-bit parallel subtractor?	4M
	b)	Design a full subtractor and explain its operation.	8M

UNIT-IV

7.	a)	Design a 16:1 multiplexer by using four 4:1 multiplexers	6M
	b)	Design a decimal to BCD encoder and implement by using logic gates	6M
		(OR)	
8.	a)	What is Prority encoder ? Construct 8-to-3 Bit Priority Encoder	6M
	b)	Design a 2-bit magnitude comparator and draw the logic by using logic gates	6M

UNIT-V

9.	a)	Convert J-K flip flop to S-R Flip flop ?	6M
	b)	Design Bidirectional shift register	6M
		(OR)	
10.	a)	Design a Two-bit ripple up-counter using negative edge triggered flip flop	6M
	b)	What is Race around Condition? How it can be eliminated	6M

***

AR18

CODE: 18CST206 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B. Tech II Semester Supplementary Examinations, August, 2023

Operating Systems

(Common to CSE AND IT)

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

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

UNIT-I

1. a) Explain the following types of Operating Systems 6M
   i) Batch Operating System ii) Real Time Operating System
   b) Explain the following functions of OS 6M
   i) File Management ii) Memory Management

(OR)

2. a) What is Process ? Discuss the importance of PCB in process execution. 6M
   b) 6M

Consider the following set of processes p1,p2,p3,p4 with their arrival and burst times given in below table:

Process	Arrival time	Burst time
P1	0	7
P2	3	3
P3	5	5
P4	6	2

Draw the Gantt chart and calculate the average waiting time and average turnaround time using the **SJF** preemptive algorithm.

UNIT-II

3. a) Describe a dining-philosopher problem? Write an algorithm to solve the problem using semaphores? 6M
   b) Discuss in detail about deadlock avoidance using banker's algorithm with suitable examples. 6M

(OR)

4. a) Explain the basic concepts of process synchronization. How is the message passing mechanism working inwards communication of processes? 6M
   b) Describe the Classical problems of Synchronization 6M

UNIT-III

5. a) Explain about Swapping and memory management modules. 6M
   b) What is paging? Explain the Structure of the Page Table. 6M

(OR)

6. a) Explain **LRU** page replacement algorithm 6M
   b) What is virtual memory? Discuss the benefits of virtual memory techniques 6M

UNIT-IV

7.	a)	Write short notes on file Structures	6M
	b)	Compare contiguous allocation of disk space with linked allocation of disk space.	6M
		(OR)	
8.	a)	Explain the following File allocation methods [1] Indexed allocation [2] Linked allocation	6M
	b)	Discuss in detail about Free Space Management.	6M

UNIT-V

9.	a)	Explain in detail about the SCAN disk scheduling algorithms with examples	6M
	b)	Explain the different I/O Buffering Techniques.	6M
		(OR)	
10.	a)	What is DMA? Explain the concept of DMA with neat diagram	6M
	b)	Explain in detail about the following: i) Magnetic disks ii) Solid-State disks	6M

***

AR18

CODE: 18CET207 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B. Tech II Semester Supplementary Examinations, August,2023

Fluid Mechanics-II

(CIVIL ENGINEERING)

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

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

UNIT-I

1.	a)	List the types of channels, write short note on economical section of channel.	[5M]
	b)	A rectangular channel 3.5m wide is laid on a slope of 0.0005. Calculate the normal depth of flow for a discharge of $5m^3$ /s in this channel. The Manning's coefficient can be taken as 0.02.	[7M]
		(OR)	
2.	a)	What are the assumptions made for deriving dynamic equation for gradually varied flow?	[4M]
	b)	Show that the head loss in a hydraulic jump formed in a rectangular channel may be expressed as $\Delta E=(v_1-v_2)^3/2g\ (v_1+v_2)$	[8M]

UNIT-II

3.	a)	How to find the work done and efficiency when flow is over radial vanes?	[5M]
	b)	A jet of water 6 cm in diameter moving with a velocity of 30 m/s strikes a fixed flat plate in such a way that the angle between the Jet axis and plate is 60^o. Find the force exerted on plate (i) in the direction normal to plate (ii) in the direction of the Jet.	[7M]
		(OR)	
4.		A 3 cm diameter of Jet strikes without shock on a series of vanes. The Jet velocity is 50 m/sec and vane moves in the same direction as that of the Jet and deflects through an angle of 170^o the vanes move in the same direction as that of Jet with a velocity of 30 m/sec. If the water flow ratio is 180 liters/sec, determine the component of forces on the vane. Find the power developed and vane efficiency.	[12M]

UNIT-III

	a)	Differentiate between Francis turbine and Kaplan turbine mentioning the principle of working advantages and applications.	[5M]
5.	b)	A Kaplan turbine is designed to develop 20 MW under a head of 25 m and a speed of 150rpm. The hydraulic efficiency is 95 %. Overall efficiency is 85 % and outer diameter is 5 m. and diameter of hub is 2 m. Determine runner vane angles at the hub and at the outer periphery. Assume that the turbine discharges without whirl at exit.	[7M]
		(OR)	
6.	a)	Discuss the characteristic curves of Hydraulic turbines.	[6M]
	b)	Discuss the significance of unit quantities and specific quantities	[6M]

UNIT-IV

7. a) Discuss the phenomenon behind pouring of water in centrifugal pump. [5M]

   b) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 rpm works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at outlet. If the outlet diameter of the impeller is 500 mm and width at outlet is 50 mm, determine: i) vane angle at inlet, ii) work done by impeller on water per second, and iii) Manometric efficiency. [7M]

(OR)

8. What is the need for multi staging of Centrifugal pumps? Describe the working of multi stage pump with a) impellers in parallel b) impellers in series [12M]

UNIT-V

9. a) Obtain a relationship for the torque τ to rotate a disk of diameter D in a fluid of viscosity μ at an angular speed ω over a plate, with clearance h. [8M]

   b) Distinguish between Reynolds number and Froude number. [4M]

(OR)

10. a) A water tunnel operates with a velocity of 3m/s at the test section and power required was 3.75 kW. If the tunnel is to operate with air, determine for similitude the flow velocity and the power required. Take $\rho a = 1.25$ kg/m3, $\gamma a = 14.8 \times 10–6$ m2/s, $\gamma w = 1.14 \times 10–6$ m2/s. [6M]

    b) The frictional torque T of a disc of diameter D rotating at a speed of N in a fluid of viscosity μ and density ρ in a turbulent flow is given by $T=D^5N^2\ \rho\phi(\mu/D^2N\rho)$. [6M]

***

AR16

CODE: 16ME2011 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, August, 2023

MACHINE DRAWING

(MECHANICAL ENGINEERING)

TIME: 3 HOURS **MAX. MARKS: 70**

NOTE: ANSWER ANT TWO QUESTIONS FROM PART A
ANSWER QESTION FROM PART B

PART A **15X2=30M**

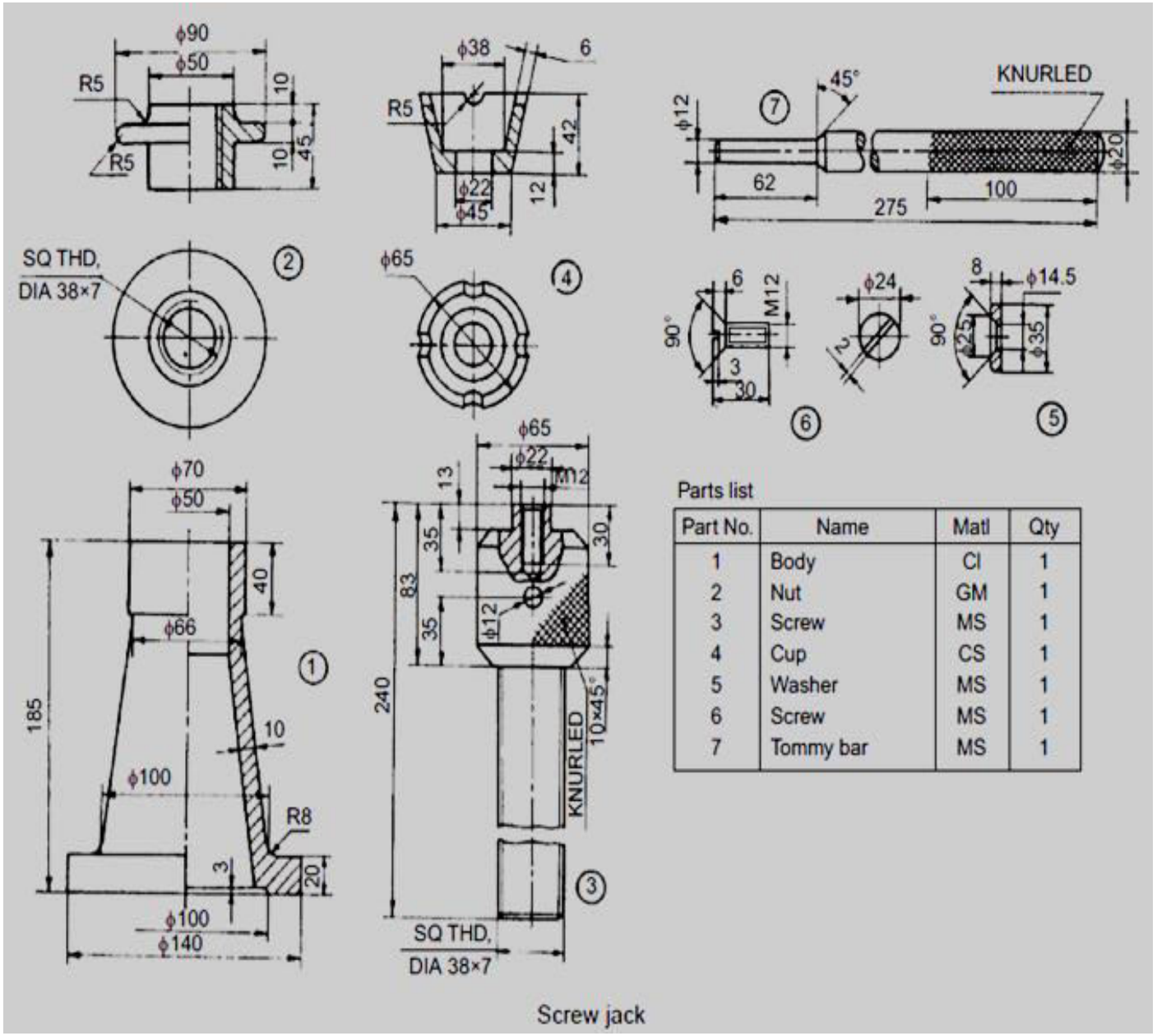
1. a) Sketch the following thread profiles for a nominal diameter of 20 mm and pitch 2 mm
   i) Worm thread ii) ACME thread
b) Sketch neatly, giving proportionate dimensions, the eye foundation bolt of diameter 25 mm?

2. Draw two views of a Single strap butt joint of two rows zig – zag to connect two plates of 9 mm thick?

3. Draw a proportionate diagram of Journal bearing for a shaft of φ 40mm.

PART B **40X1=40M**

1. Figure gives the detailed drawings of a screw jack. Assemble all the parts and draw the following assembled views. a) Sectional front view b) Top view



Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Nut	GM	1
3	Screw	MS	1
4	Cup	CS	1
5	Washer	MS	1
6	Screw	MS	1
7	Tommy bar	MS	1

Screw jack

AR16

CODE: 16EE2013 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, August, 2023

CONTROL SYSTEMS

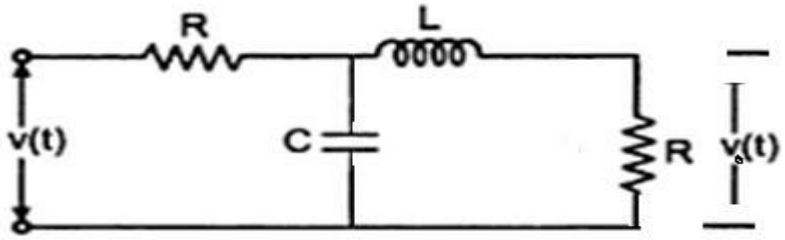
(ELECTRICAL & ELECTRONICS ENGINEERING)

Time: 3 Hours **Max Marks: 70**

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

UNIT-I

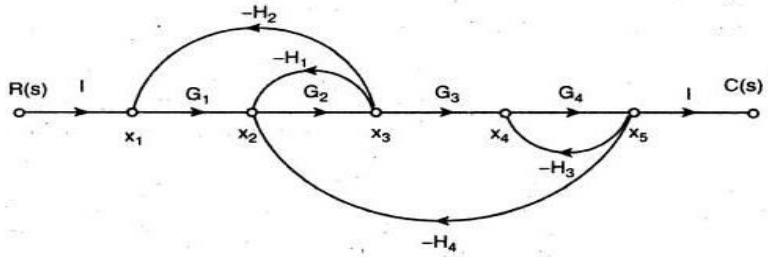
1. a) Determine the Transfer function for the electrical Network vo(s)/vi(s) **7M**



b) Define Closed loop system and explain one of the real time application using block diagram **7M**

(OR)

2. Find C(s)/R(s) using Mason's gain formula. **14M**



UNIT-II

3. a) Discuss the effect of PD and PI on performance of a control system. **6M**

b) For a second order system, the location of poles is known to be -3+j7 & -3-j7. Calculate peak time, % over shoot and approximate settling time. **8M**

(OR)

4. a) Explain the construction and principle of operation synchro transmitter. **5M**

b) A system has the following transfer function C(s) /R(s) = 20/(s+5) Determine its unit impulse, step and ramp response with zero initial conditions. Sketch their responses **9M**

UNIT-III

5. a) Consider the open-loop transfer function of a unity feedback control system: **8M**

$$G(s) = \frac{K(s+2)}{S(S+4)(S+6)}$$

Using Routh criterion, find the range of values of k that correspond to a stable system. Note that K is a positive real constant.

b) Write detailed notes relative stability with its roots of s-plane **6M**

(OR)

6. A unity feedback system has an open loop function G (s) = $\frac{K}{S(S^2+3S+10)}$ **14M**

make a rough sketch of root locus plot by determining the following (i) Centroid, number and angle of asymptotes (ii) angle of departure of root loci from the poles, (iii) Breakaway points if any, (iv) points of intersection with jω axis and (v) maximum value of k for stability

UNIT-IV

7. a) Derive the expressions for frequency domain specifications of a second order system. **6M**

b) Given the open loop transfer function of a unity feedback system $G(s) = \frac{1}{S(S+3)(1+2S)}$ .Draw the Bode plot and measure from the plot the frequency at which the magnitude is 0 dB. **8M**

(OR)

8. a) Explain about gain crossover frequency and phase cross over frequency **4M**

b) Sketch the polar plot of the following transfer functions and from the plot determine the phase margin and gain margin **10M**

$$G(s) = \frac{10(s+1)}{(s+10)^2}$$

UNIT-V

9. A unity feedback system has an open-loop transfer function G(s) = $\frac{4}{S(2S+1)}$ It is desired to obtain a phase margin of 40^0 without sacrificing the K_v of the system. Design a suitable lag network and compute the value of network components assuming any suitable impedance level. **14M**

(OR)

10. The state equation of a system is given by **14M**

$$\begin{bmatrix}\dot{X}_1\\ \dot{X}_2\end{bmatrix} = \begin{bmatrix}-3 & 1\\ -2 & -1\end{bmatrix}\begin{bmatrix}X_1\\ X_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix} u(t), t > 0$$

a) Is the system controllable?

b) Compute the state transition matrix

c) Compute x1(t) under zero initial condition and a unit step input.

AR16

CODE: 16CS2009 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, August, 2023

Operating Systems

(COMMON TO CSE & IT Branches)

Time: 3 Hours **Max Marks: 70**

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

UNIT-I

1. a) What is an Operating System and explain the different types of Operating Systems? **7M**

   b) Enumerate and explain various Operating System Services **7M**

(OR)

2. a) Consider the following set of processes, assumed to have arrived at time '0' in the order given with the length of the CPU burst time in milliseconds

Process	Burst Time
P1	10
P2	29
P3	3
P4	7
P5	12

8M

Consider FCFS and Round Robin (quantum(Q)=10 milliseconds) scheduling algorithms for this set of processes and schedule them. Find the average waiting time for each algorithm provide Gantt charts

   b) State and explain the various states that a process can be in. 6M

UNIT-II

3 Write and explain Bankers algorithm for dead lock avoidance with an example. 14M

(OR)

4. a) State and explain four conditions that are necessary for deadlocks to occur with example. **7M**

   b) Explain the resource allocation graph for deadlock detection with relevant diagram **7M**

UNIT-III

5. Explain LRU page replacement algorithm. Consider the following reference string 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. Assume there are three frames. Apply LRU replacement algorithm to the reference string above and find out how many page faults are produced. 14M

(OR)

6. a) Why are segmentation and paging sometimes combined into one scheme? **7M**

   b) Explain the concept of paging with diagrams **7M**

UNIT-IV

7. a) Write short notes on
   (i) File sharing (ii) Protection **7M**

   b) Describe the most common schemes for defining logical structure of a directory **7M**

(OR)

8. a) Explain about various file access methods. **7M**

   b) Explain about file system structure. **7M**

UNIT-V

9. a) Explain the following disk scheduling algorithms with proper diagram.
   (i) FCFS (ii) SSTF (iii) SCAN (iv) LOOK **7M**

   b) Explain the three implementation methods of access matrix. **7M**

(OR)

10. Explain briefly different RAID levels 14M

AR16

CODE: 16CE2009 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, August, 2023

Strength of Materials-II

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

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

UNIT-I

1. A beam of uniform section 10m long is simply supported at the ends. It carries point loads of 100 kN and 60 kN at a distance of 2m and 5m respectively from the left end. Calculate : i) The deflection under each load , ii) The maximum deflection, ii) Slope at A. Given E = $200x10^6$ N/m^2 and I=118 x 10^{-4} m^4 **14 M**

(OR)

2. a) Derive the expression EI d^2y/dx^2 = M **7 M**

   b) A cantilever 2.4 m long is loaded as shown if fig.2 Calculate the slope and deflection at the free end if the section is rectangular, 120mm x 240mm. Take E = 0.11 x 10^5 N/mm^2. **7M**

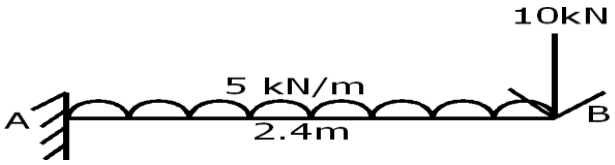


Fig. 1

UNIT-II

3. For the state of stress shown in Fig. 2, determine the principle stresses, maximum shear stress clearly show the planes on which these stresses act. **14 M**

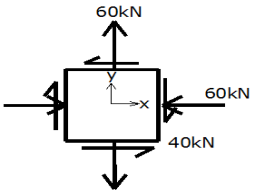


Fig. 2

(OR)

4. Find i) The principal planes and principal stresses . ii) The plane of maximum shear stress and its intensity for the element shown in fig. 3 by using mohr's circle method. **14 M**

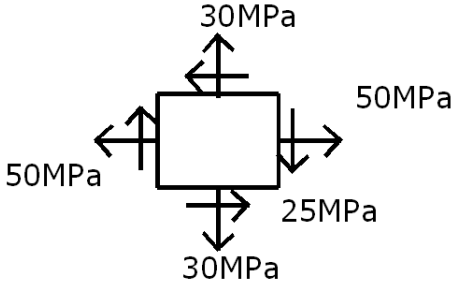


Fig. 3

UNIT-III

5. a) A cylindrical vessel whose ends are closed by means of rigid flange plates is made of steel plate 3mm thick. The internal length and diameter of vessel are 50cm and 25cm respectively. Determine the longitudinal and circumferential stress due to an internal fluid pressure of $3N/mm^2$. Also calculate increase in length, diameter and volume of the vessel. Take E = $200GN/m^2$ and 1/m = 0.30. **7 M**

   b) A spherical shell of 1.50m diameter has 1cm thick wall. Determine the pressure that can increase its volume by $100cm^3$, Take E = 200 GN/m^2, 1/m = 0.3 **7 M**

(OR)

6. a) What are thick cylinders Write the assumption in deriving lame's theory. Derive the Lame's formula. **7 M**

   b) A pipe 200mm internal diameter and 50 mm thick carries a fluid under pressure of 5 MPa . Calculate the maximum and minimum intensities of circumferential stress across the section. **7 M**

UNIT-IV

7. a) Derive Eulers' crippling load for a column subjected an axial load, if both ends fixed. **7M**

   b) A T section flange 120mm x 20mm, web 150 mm x 120 mm has a length L=4 m with fixed at its both ends. Calculate the Euler's crippling load. If 'E' of the material be 200Gpa. **7M**

(OR)

8. a) Define i) Buckling load ii) Slenderness ratio iii) Equivalent length of a column **6M**

   b) A hollow cylindrical column both ends fixed is 6m long and has an outer diameter of 120mm and inner diameter of 80mm. Compare crippling load obtained by Euler's and Rankine's formula. E = 80GPa, and σy = 550 MPa, Rankine's constant = 1/1600 **8M**

UNIT-V

9. Find the stresses at four corners at the section ABCD for the block shown in Fig.5, If P = 64 kN . Neglect the weight of the block. **14M**

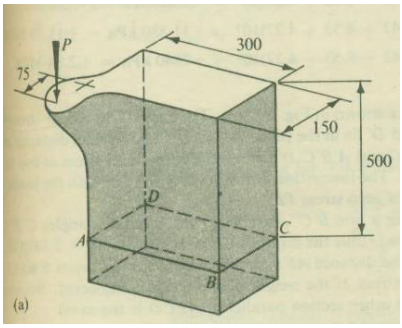


Fig. 5

(OR)

10. a) Find the kern of hollow cylindrical section has external diameter 'D' and internal diameter is 'd' **7 M**

    b) A hollow cast iron column of rectangular section 600mm deep and 300mm wide overall, thickness of metal 50mm carries a load of W in the vertical plane bisecting the width at an eccentricity e, If the extreme stresses induced in the section are 8 N/mm^2 at one end and 50 N/mm^2 at the other, both compressive. Evaluate 'W' and 'e'. **7M**