# AR20

**CODE: 20CET207** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, September, 2022**

## 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. | a. | Describe the procedure for determining water content and specific gravity of a given soil in the laboratory by using a pycnometer. | 5M | 1 | 1 |
| | b. | Explain Indian Standard soil classification system for classifying coarse grained soil. | 5M | 1 | 1 |
| | | **(OR)** | | | |
| 2. | a. | A soil sample is found to have the following properties. Classify the soil according to IS classification system. Passing 75μ sieve = 10%; passing 4.75 mm sieve = 70%; Uniformity coefficient =8; coefficient of curvature = 2.8; Plasticity index = 4%. | 5M | 1 | 2 |
| | b. | Derive the relationship between void ratio and porosity. | 5M | 1 | 1 |
| | | **UNIT-II** | | | |
| 3. | | What are the factors affecting permeability of soils? Explain briefly. | 10M | 2 | 2 |
| | | **(OR)** | | | |
| 4. | a. | What are flow nets? State their properties and uses. | 5M | 2 | 2 |
| | b. | The falling head permeability test was conducted on a soil sample of 4cm diameter and 18cm length. The head fell from 1.0m to 0.40m in 20 minutes. If the cross-sectional area of the stand pipe was $1cm^2$, determine the coefficient of permeability. | 5M | 2 | 2 |
| | | **UNIT-III** | | | |
| 5. | a. | The water table in a deposit of sand 8m thick is at a depth of 3m below ground surface. Above the water table, the sand is saturated with capillary water. The bulk density of sand is 19.62 $kN/m^3$. Give the effective pressure at 1m, 3m, and 8m below the ground surface. Hence plot the variation of total, neutral and effective stress over the depth of 8m. | 5M | 5 | 3 |
| | b. | What is Quick sand condition? Under what circumstances can it occur? | 5M | 5 | 1 |
| | | **(OR)** | | | |
| 6. | a. | How stress takes place when flow takes place through the soil from top to bottom? | 5M | 5 | 2 |
| | b. | Show the relationship between total, neutral and effective stresses. | 5M | 5 | 2 |
| | | **UNIT-IV** | | | |
| 7. | | How does compaction improve engineering properties of soil. | 10M | 4 | 2 |
| | | **(OR)** | | | |

8. Following results refer to a standard compaction test.

| **Water content (%)** | 5 | 10 | 14 | 20 | 25 |
|---|---|---|---|---|---|
| **Bulk density(kN/m$^3$)** | 17.6 | 19.6 | 21 | 21.7 | 21.5 |

a. Determine the optimum moisture content and maximum dry density. Also determine the degree of saturation and percentage air voids at maximum dry density. Take G=2.7. 6M 4 2

b. List various factors affecting compaction. 4M 4 1

**UNIT-V**

9. a. Find intensity of vertical pressure at a point 3 m directly below 25 kN point load acting on a horizontal ground surface. What will be the vertical pressure at a point 2m horizontally away from the axis of loading and at same depth of 3m.? Use Boussinesq's equation. 5M 3 2

b. List the Boussinesq's theory assumptions and limitations. 5M 3 1

**(OR)**

10. a. A concentrated point load of 200 kN acts at the ground surface. Find the intensity of vertical pressure at a depth of 10m below the ground surface and situated on the axis of the loading. What will be the vertical pressure at a point at a depth of 5m and at a radial distance of 2m from the axis of loading? Use Westergaard analysis. 5M 3 2

b. What is the principle behind Newmark's influence chart? 5M 3 1

**UNIT-VI**

11. a. Explain Mohr Coulomb's equation for shear strength of soil? 5M 6 2

b. In an in-situ vane shear test on saturated clay, a torque of 35 Nm was required to shear the soil. The diameter of the vane was 50 mm and length 100 mm. Calculate the undrained shear strength of clay. The vane was then rotated rapidly to cause remoulding of the soil. The torque required to shear the soil in the remoulded state was 5 Nm. Determine the sensitivity. 5M 6 2

**(OR)**

12. a. Write down a step-by-step procedure for determination of cohesion of a given clayey soil by conducting unconfined compression test. 5M 6 2

b. Write the advantages, disadvantages and limitations of direct shear test. 5M 6 2

AR20

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**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, September, 2022**

# 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) | What do you mean by closed loop control system? Give examples of closed loop control systems. | 4M | CO1 | L2 |
| | b) | Consider the parallel RLC network excited by a current source shown in Fig.1. Find the (i) differential equation representation and (ii) transfer function representation of the system. | 6M | CO1 | L3 |

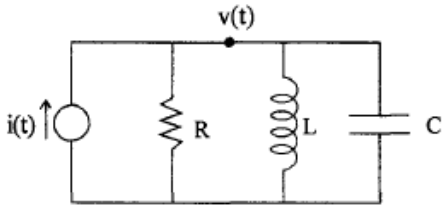
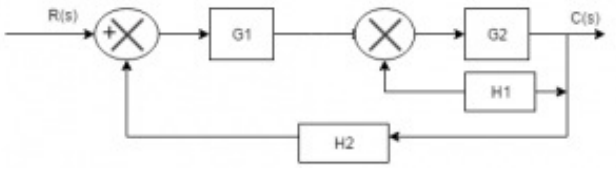



Figure 1

**(OR)**

| | | | | | |
|---|---|---|---|---|---|
| 2. | a) | State and explain the Mason's gain formula. | 4M | CO1 | L2 |
| | b) | In the following block diagram, $G_1$=10/s $G_2$=10/(s+1) $H_1$=(s+3), $H_2$=1. The overall transfer function is given by : | 6M | CO1 | L3 |




| | | | | | |
|---|---|---|---|---|---|
| | | **UNIT-II** | | | |
| 3. | a) | Explain the principle of operation synchro transmitter. | 5M | CO2 | L2 |
| | b) | For a unity feedback system, as G(s) = $\frac{36}{s(s+0.72)}$ | | | L3 |
| | | Calculate the error constants and steady state error. | 5M | CO2 | |
| | | **(OR)** | | | |
| 4. | a) | List out the basic requirements of a Servo motor. | 4M | CO2 | L2 |
| | b) | Damping factor and natural frequency of the system are 0.12 and 84.2 rad/sec respectively. Determine the rise time (tr), peak time (tp), maximum peak overshoot (Mp) and settling time (ts). | 6M | CO2 | L3 |
| | | **UNIT-III** | | | |
| 5. | a) | Write the procedural steps to construct the root locus. | 5M | CO3 | L2 |
| | b) | For the following characteristic equation $S^4 + S^3 + 5S^2 + 4S + 4 = 0$ | 5M | CO3 | L3 |
| | | Find the location of roots in the complex S- plane and determine the stability of the system. | | | |
| | | **(OR)** | | | |

| | | | | |
|---|---|---|---|---|
| 6. | The open loop transfer function of a system is $G(s) = \frac{k}{s(s2 + 4s + 8)}$<br>Draw the root locus and investigate the stability of the closed loop system. What is the value of K for which the dominant pole of the closed loop transfer function lies on jω axis? | 10M | CO3 | L4 |
| | **UNIT-IV** | | | |
| 7. | a) ExplainNyquist stability criterion? | 2M | CO4 | L2 |
| | b) Given the open loop transfer function of a unity feedback | 8M | CO4 | L3 |
| | $G(s) = \frac{K}{s(1+0.2s)(1+0.01s)}$<br>Draw the frequency plot of Bode plot and find the phase crossover frequency. | | | |
| | **(OR)** | | | |
| 8. | a) Find resonant frequency, resonant peak and band width of a unity feedback system with $G(s) = \frac{38}{s(s+8)}$ | 5M | CO4 | L2 |
| | b) Wrte the procedural steps to draw the Bode plots. | 5M | CO4 | L3 |
| | **UNIT-V** | | | |
| 9. | For the given open loop transfer function, $G(s) = \frac{K}{s(s+4)(s+6)}$<br>Design suitable lead compensation so that phase margin is ≥ 30º and velocity error constant, $K_v \geq 15$ | 10M | CO5 | L6 |
| | **(OR)** | | | |
| 10. | Discuss in detail about the procedural steps to design a phase lag compensator in frequency domain. | 10M | CO5 | L4 |
| | **UNIT-VI** | | | |
| 11. | **a)** Derive the expression for transfer function from the state model $\dot{x} = A\ X + BU, Y=CX+DU$ | 4M | CO6 | L2 |
| | b) A linear time-in variant system is characterized by the homogenous state equation $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$<br>Compute the state solution of state equation when subjected to unit step input. Assume the following initial conditions $x_0 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ | 6M | CO6 | L3 |
| | **(OR)** | | | |
| 12. | a) List out the properties of state transition matrix and prove them. | 4M | CO6 | L2 |
| | b) Consider a system having a state model with D=0. Obtain its Transfer Function.<br>$\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} -2 & -3 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 3 \\ 5 \end{bmatrix} U$<br>$Y = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$ | 6M | CO6 | L5 |

**AR20**

**CODE: 20MET207** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, September, 2022**

# 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. | | Explain stress strain diagram of a mild steel and locate its salient points on it. | 10 | CO1 | L2 |
| | | **(OR)** | | | |
| 2. | | A rectangular block 20 cm X 12 cm X 10 cm is subjected to axial load as follows: 120 kN tensile in the direction of length. 75 kN tensile on the 20 cm X 10 cm faces and 96 kN compressive on the 20 cm X 12 cm faces. Take Poisson's ratio as 0.25 and find the strain in the direction of each force in terms of Young's Modulus (E). If E = $20x10^6$ N/$cm^2$, find the Modulus of Rigidity and Bulk Modulus for the material of the block. Also calculate the change in the volume of the block due to the application of the loading specified above. | 10 | CO1 | L3 |
| | | **UNIT-II** | | | |
| 3. | a. | Discuss the various types of loads acting on the beam? | 3+7 | CO2 | L2 |
| | b. | A cantilever 1.5 m long is loaded with an udl of 2kN/m over a length of 1.25 m from the free end. It also carries a point load of 3 kN at a distance of 0.25 m from the free end. Draw the shear force and bending moment diagrams of the given cantilever. | | CO2 | L3 |
| | | **(OR)** | | | |
| 4. | | A beam AB, 2 m long is simply supported at inte mediate points C and D which are 2 and 3 m from A and B. It carries an udl of l kN/m throughout its length and concentrated load of 4 kN and 7 kN at point 4 m and 5 m respectively from A and B. Draw the BM and SF diagrams and find the points of max BM, max shear and contraflexure. | 10 | CO2 | L3 |
| | | **UNIT-III** | | | |
| 5. | | Derive the equation of theory of pure bending? What are the assumptions made in the theory of bending? | 10 | CO3 | L2 |
| | | **(OR)** | | | |
| 6. | a. | Explain the term Strength of a section? | 4+6 | CO3 | L2 |
| | b. | A beam of I-section 60 cm deep and 30 cm wide has equal flanges 2.5 cm thick and web 1.5 cm thick. It carries a shear force of 300 kN at the cross-section. Determine the shear stress distribution in the beam and the ratio of maximum shear to mean shear. Also find the total shear force carried by the two flanges and the web. | | CO3 | L3 |
| | | **UNIT-IV** | | | |
| 7. | | A hollow circular shaft with 20 mm thickness transmits 300 kW power at 200 rpm. Find the outer diameter of the shaft if the shear strain due to torsion is not to exceed 0.00086. Take modulus of rigidity as $0.8x10^5$ MPa. Assume the outer diameter as 100 mm for the first trail. | 10 | CO4 | L3 |
| | | **(OR)** | | | |

| | | | | | |
|---|---|---|---|---|---|
| 8. | a. | Which type of stress is used for finding the thickness of cylindrical vessel? Justify your answer. | 2+8 | CO4<br>CO4 | L2<br>L3 |
| | b. | Find the increase in volume enclosed by a boiler shell 2.4 m long and 1.0 m in diameter, when it is subjected to an internal pressure of 160 $N/cm^2$. The wall thickness is such that the maximum tensile stress in shell is 2150 $N/cm^2$ under this pressure. Take E = $20x10^6$ $N/cm^2$ and Poisson's ratio as 0.3.<br>If the cylindrical container has 52 cm outer diameter and 1 cm thickness and the length being 2 m. Find the change in the outer diameter and the length, when it is changed to 1000 $N/cm^2$ internal pressure. Take E = $20x10^6$ $N/cm^2$ and Poisson's ratio as 0.3. | | | |

**UNIT-V**

| | | | | | |
|---|---|---|---|---|---|
| 9. | a. | What do you understand by equivalent length of a column? How is this concept applied in the column theory? | 3+7 | CO5<br>CO5 | L2<br>L3 |
| | b. | A column of circular section of cast iron 200 mm external diameter and 20 mm thick is used as a column 4 m long. Both ends of the column are fixed. The column carries a load of 150 kN at an eccentricity of 25 mm from the axis of the column. Find the extreme stresses on the column section and also calculate the maximum eccentricity in order to have no tension anywhere on the section. Take E = 9400 $kN/cm^2$ | | | |

**(OR)**

| | | | | | |
|---|---|---|---|---|---|
| 10. | a. | Differentiate between strut and column? | 2+8 | CO5 | L2 |
| | b. | A short length of tube having 40 mm internal diameter and 50 mm external diameter, failed in compression at a load of 240 kN. When a 2 m length of the same tube was tested as a strut with fixed ends, the load at failure was 158 kN. Assuming that $\sigma_c$ in Rankine's formula is given by the first test, find the value of the constant 'a' in the same. What will be the crippling load of this tube if the it is used as a strut of 3 m long with one end fixed and other hinged? | | CO5 | L3 |

**UNIT-VI**

| | | | | | |
|---|---|---|---|---|---|
| 11. | | A simply supported beam of 3m carries point load of 120 kN and 80kN at a distance of 0.6 and 2 meters respectively from left hand support. Moment of inertia for the section of the beam is $16x10^8$ $mm^4$ and E=210 $GN/m^2$. Calculate the deflection of the beam at points under the two loads. | 10 | CO6 | L3 |

**(OR)**

| | | | | | |
|---|---|---|---|---|---|
| 12. | a) | What is Macaulay's method of beam deflection analysis? | 2+8 | CO6 | L2 |
| | b) | A horizontal girder of steel having uniform section is 14 m long and is simply supported at its ends. It carries concentrated loads of 120 kN and 80 kN at two points 3.0 m and 4.50 m from the two ends respectively. I for the section the girder is 16 X $10^8$ $mm^4$ and E = $210X10^5$ $N/mm^2$. Calculate the deflection of the girder at points under the two loads. Also find the maximum deflection | | CO6 | L3 |

AR20

CODE: 20ECT207 SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, September, 2022**

**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 | Derive the condition for Distortion less transmission line. | 5 | 1 | Analyzing |
| | b | A two-wire open air line, whose diameter is 2.588 mm, is used in several applications. The wires are spaced at 290 mm between the centres. Find out the characteristic impedance of the line. | 5 | 1 | Applying |
| | | **(OR)** | | | |
| 2. | | Derive the relations existing between secondary constants and primary constants of a transmission line. | 10 | 1 | Analyzing |
| | | **UNIT-II** | | | |
| 3. | | A transmission line is lossless and is 25 m long. It is terminated in a load of $z_L$ = 40 + *j*30Ω at a frequency of 10MHz. The inductance and capacitance of the line are L = 300 nH/m, C = 40 pF/m. Find the input impedance at the source and at the mid-point of the line. | 10 | 2 | Applying |
| | | **(OR)** | | | |
| 4. | a | Explain the significance and utility of λ/8, λ/4 and λ /2 lines. | 5 | 2 | Understanding |
| | b | Write in brief about SC and OC lines. | 5 | 2 | Understanding |
| | | **UNIT-III** | | | |
| 5. | | State and prove the Maxwell 's Two Equations for Electrostatic Fields. | 10 | 3 | Understanding |
| | | **(OR)** | | | |
| 6. | a | Two-point charges -4μC and 5μC are located at (2, -1, 3) and (0, 4, -2) respectively. Find the potential at (1, 0, 1) assuming zero potential at infinity. | 5 | 3 | Applying |
| | b | Derive the Continuity Equation. | 5 | 3 | Analyzing |
| | | **UNIT-IV** | | | |
| 7. | | Using Ampere's law, find H for an infinitely long transmission line consisting of two concentric cylinders having their axes along the z-axis. | 10 | 4 | Analyzing |
| | | **(OR)** | | | |
| 8. | a | Derive the expression for force on a Current Element in a Magnetic Field. | 5 | 4 | Analyzing |
| | b | State Biot-Savart Law. Determine the field due to a straight current carrying filamentary conductor of finite length using Biot Savart's law. | 5 | 4 | Understanding |
| | | **UNIT-V** | | | |
| 9. | a | The parallel plates in a capacitor have an area of $4 \times 10^{-4}$ $m^2$ and are separated by 0.4 cm. A voltage of 10 sin $10^3$ t volts is applied to the capacitor. Find the displacement current when the dielectric material between the plates has a relative permittivity of 4. | 5 | 5 | Applying |
| | b | What are the transformer and motional Electro motive forces in the context of Faraday's law. | 5 | 5 | Understanding |
| | | **(OR)** | | | |
| 10. | | What are boundary conditions and give their prominence? Discuss the boundary conditions for dielectric-dielectric boundary in electrostatics and magnetostatics. | 10 | 5 | Understanding |
| | | **UNIT-VI** | | | |
| 11. | a | State Poynting theorem and derive the expression for the measure of the rate of energy flow per unit area. | 5 | 6 | Analyzing |
| | b | Explain the propagation of wave in a loss less medium. | 5 | 6 | Understanding |
| | | **(OR)** | | | |
| 12. | a | When the amplitude of the magnetic field in a plane wave is 2 A/m, (i) determine the magnitude of the electric field for the plane wave in free space (ii) determine the magnitude of the electric field when the wave propagates in a medium which is characterised by σ = 0, μ = $\mu_0$ and ε = $4\varepsilon_0$ . | 5 | 6 | Applying |
| | b | Define and explain the terms linear, elliptical and circular polarizations. | 5 | 6 | Understanding |

**AR20**

**CODE: 20CST207** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, September, 2022**

**OPERATING SYSTEMS**

**(Common to CSE & 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

| | | | Marks | CO | Blooms Level |
|---|---|---|---|---|---|
| | | **UNIT-I** | | | |
| 1. | a | State and explain various types of computer Environments used in Computer System. | 5 | CO1 | K1 |
| | b | How does the distinction between kernel mode and user mode function as a rudimentary form of protection (security) system? Justify your answer. | 5 | CO1 | K2 |
| | | **(OR)** | | | |
| 2. | a | Distinguish between pre-emptive and non-pre-emptive scheduling algorithms. | 5 | CO1 | K2 |
| | b | Suppose the following jobs arrive for processing at the times indicated, each job will run the listed amount of time.<br>Jobs Arrival Time (in secs) Burst Time (in secs)<br>1 0.0 8.0<br>2 0.4 4.0<br>3 1.0 1.0<br>Draw Gantt chart illustrating the execution of these jobs using the non- pre-emptive FCFS and SJF scheduling algorithms. Compute the average turnaround time and average waiting time of each job for above algorithms. | 5 | CO1 | K3 |
| | | **UNIT-II** | Marks | CO | Blooms Level |
| 3. | a | Explain the principles of concurrency and the execution of concurrent processes with a simple example. | 5 | CO2 | K2 |
| | b | Explain the infinite buffer producer/consumer problem for concurrent processing which uses binary semaphores? | 5 | CO2 | K2 |
| | | **(OR)** | | | |
| 4. | a | Define semaphore. Explain the method of application of semaphore for process synchronization. | 5 | CO2 | K2 |
| | b | Define monitor. Distinguish between monitor and semaphore. Explain in detail a monitor with notify and broadcast functions using an example. | 5 | CO2 | K3 |
| | | **UNIT-III** | Marks | CO | Blooms Level |
| 5. | a | Distinguish between deadlock avoidance and prevention strategies. | 5 | CO3 | K2 |
| | b | Explain Banker's algorithm for deadlock avoidance with an example. | 5 | CO3 | K1 |
| | | **(OR)** | | | |
| 6. | a | List the four data structures (matrices) that must be maintained to implement banker's algorithm? | 5 | CO3 | K1 |
| | b | Discuss deadlock detection methods used in detail with an example. | 5 | CO3 | K2 |

| | | | Marks | CO | Blooms Level |
|---|---|---|---|---|---|
| | | **UNIT-IV** | | | |
| 7. | a | Describe contiguous memory allocation concept with advantages and disadvantages. | 5 | CO4 | K2 |
| | b | Suppose you have 16M bytes of main memory. Using the list method there is an overhead of 8B per memory block. Using the bitmap method, the allocation granularity is of 128B. How many blocks are there when the space overhead of both methods is the same? Find the average block size for this many blocks. | 5 | CO4 | K3 |
| | | **(OR)** | | | |
| 8. | a | Explain why the "principle of locality" is crucial to the use of virtual memory. What is accomplished by page buffering? | 5 | CO4 | K2 |
| | b | Consider there are 3 page frames which are initially empty. If the page reference string is 1, 2, 3, 4, 2, 1, 5, 3, 2, 4, 6. Find the number of page faults using any three page replacement policies. | 5 | CO4 | K3 |
| | | **UNIT-V** | Marks | CO | Blooms Level |
| 9. | a | Explain the operations that can be performed on a directory. | 5 | CO5 | K1 |
| | b | Describe the file system of UNIX operating system with a neat diagram. | 5 | CO5 | K2 |
| | | **(OR)** | | | |
| 10. | a | List any five common file types and their extensions. | 5 | CO5 | K1 |
| | b | Explain the concept of file sharing. What are the criteria to be followed in systems which implement file sharing | 5 | CO5 | K2 |
| | | **UNIT-VI** | Marks | CO | Blooms Level |
| 11. | a | Explain how disk caching can improve disk performance? | 5 | CO6 | K2 |
| | b | Differentiate among the following disk scheduling algorithms FCFS, SSTF, SCAN, C-SCAN, LOOK and C-LOOK. | 5 | CO6 | K2 |
| | | **(OR)** | | | |
| 12. | a | Explain Seek time, Latency, Access time and Transfer time in detail with respect to disk. | 5 | CO6 | K1 |
| | b | Consider that a disk drive has 5,000 cylinders, numbered 0 to 4,999. The drive is currently serving request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is:<br>86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130<br>Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending requests for each of the following disk scheduling algorithms?<br>A. FCFS<br>B. SSTF<br>C. SCAN<br>D. C-SCAN<br>E. LOOK | 5 | CO6 | K3 |

# AR18

**CODE: 18CET207** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B. Tech II Semester Supplementary Examinations, September, 2022**

**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) | Differentiate between (i) Gradually varied flow and rapidly varied flow, (ii) subcritical and supercritical flow. | [4] |
| | b) | A trapezoidal channel with side slopes of 2 horizontal : 1 vertical has to be designed to carry 15 $m^3/s$ at a slope of 1/5000. Determine the dimensions of the efficient section. Manning's coefficient is 0.014. | [8] |
| | | **(OR)** | |
| 2. | a) | Sketch the water surface profiles that can occur in a steep slope channel. | [5] |
| | b) | In a rectangular channel 12 m wide and 3.6 m deep water is flowing with a velocity of 1.2 m/s. The bed slope of the channel is 1 in 4000. If flow of water through the channel is regulated in such a way that energy line is having a slope of 0.00004, find the rate of change of depth of water in the channel. | [7] |

## UNIT-II

| | | | |
|---|---|---|---|
| 3. | a) | Derive the expression for force exerted by a jet of water on a stationary flat plate. | [5] |
| | b) | A nozzle of 6 cm diameter delivers a stream of water at 20 m/s on a inclined plate moving with velocity 12 m/s. The vane is inclined at an angle of 600 to the direction of motion of jet. Find the resultant force exerted by jet on the plate in magnitude and direction, work done and efficiency when the plate is moving in the direction of resultant force. | [7] |
| | | **(OR)** | |
| 4. | | A jet of water having a velocity of 20 m/s strikes a curved vane, which is moving with a velocity of 10 m/s. The jet makes an angle of 20° with the direction of motion of vane at inlet and leaves at an angle of 130° to the direction of motion of vane an outlet. Calculate:(i) vane angles, so that the water enters and leaves the vane without shock, (ii) work done per second per weight of water striking (or work done per unit weight of water striking) the vane per second. | [12] |

## UNIT-III

| | | | |
|---|---|---|---|
| 5. | a) | A Kaplan turbine working under a head of 20 m develops 11772 kW shaft power. The outer diameter of the runner is 3.5 m and hub diameter 1.75 m. The guide blade angle at the extreme edge of the runner is 35˚. The hydraulic and overall efficiency of the turbines are 88% and 84% respectively. If the velocity of whirl is zero at outlet, determine: (i) runner vane angles at inlet and outlet at the extreme edge of the runner, and (ii) speed of the turbine. | [8] |
| | b) | Criticize specific quantities of a turbine | [4] |
| | | **(OR)** | |

6. An inward flow reaction turbine is designed to operate under a head of 60 m at a speed of 800 rpm, Power output is 2800 KW, Flow ratio is 0.2, hydraulic efficiency is 95% and mechanical efficiency is 85%, ratio of wheel width to diameter is 0.1 and ratio of inner to outer diameter of runner is 2. Find the diameters at inlet & out let, blade angles for the turbine. Assume radial discharge at outlet. [12]

## UNIT-IV

7. A 4 stage centrifugal pump supplying water is to be designed for a total lift of 120 m when running at 1450 rpm, its discharge under these conditions is 0.24 m3/s. The vanes are set back at an angle of $30^o$ with the tangent of the wheel at outlet, and the impeller is surrounded by guide vanes. The water enters the vane passages in a radial direction, the velocity of flow through the impeller is 0.3 of the outlet peripheral velocity and the losses in the pump amount to one – third of the velocity head at discharge from the impeller. Find the diameter and width of impeller at outlet, the manometric efficiency and the angle of the guide vanes. [12]

**(OR)**

8. a) Explain Net Positive Suction Head of centrifugal pump and Discuss its importance. [6]
   b) Discuss the phenomenon Cavitation and its effects. [6]

## UNIT-V

9. a) To study the pressure drop in flow of water through a pipe, a model of scale 1/10 is used. Determine the ratio of pressure drops between model and prototype if water is used in the model. In case air is used determine the ratio of pressure drops. [8]
   b) Explain the different types of similarities to be ensured between the model and prototype. [4]

**(OR)**

10. a) Explain the Froude model law and Reynolds model law. [4]
    b) A model of rectangular pier 1.5m wide and 4.5m long in a river is built to a scale of 1: 25.The average depth of water in the river is 3m. The model was tested in a laboratory, where the velocity of flow was maintained constant at 1.65m/s.It was observed that the force acting on the model was 3.92 N and the height of the standing wave was 3.5cm. Determine for the prototype a) the corresponding speed, b) the force acting, c) the height of the standing wave at nose. [8]



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# AR18

## CODE: 18EET209 SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B. Tech II Semester Supplementary Examinations, September, 2022**

## CONTROL SYSTEMS

**(Electrical and Electronics Engineering)**

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

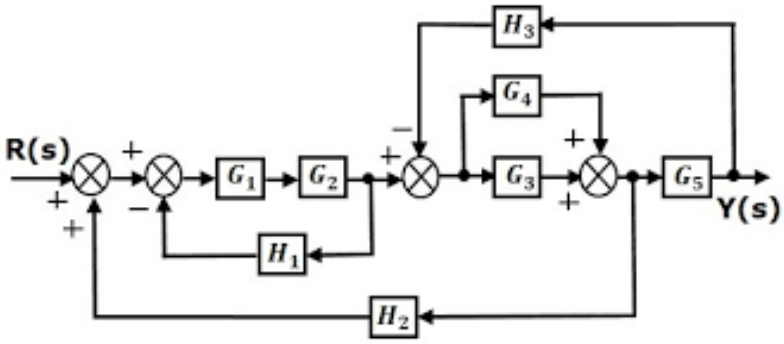
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

### UNIT-I

1. a) Differentiate between open loop and closed loop control systems. 6M
   b) List out any ten rules for reduction of Block diagram. 6M

**(OR)**

2. a) Derive the Transfer function of the Block Diagram using Masons gain formulae. 8M




   b) Discuss the necessity of feedback in control system and how it effects the sensitivity of the system. 4M

### UNIT-II

3. a) Derive an expression for the transfer function of armature controlled DC servo motor. 8M
   b) Derive the expression for steady state error of type -0, type-1 and type-2 systems. 4M

**(OR)**

4. a) Derive the expression for peak time and peak overshoot of a second order system. 6M
   b) A second order system has a damping ratio of 0.7 and its natural frequency of oscillation is 12 radians per second. Determine the damped frequency of oscillation, the rise time, peak time, peak overshoot and settling time. 6M

### UNIT-III

5. a) Explain in detail about Routh Hurwitz criterion of stability 6M
   b) The open loop transfer function of a unity feedback control system is given by $G(s) = \frac{K}{S(1+ST_1)(1+ST_2)}$. Apply RH stability criterion, determine the value of K in terms of $T_2$ and $T_2$ for the system to be stable. 6M

**(OR)**

6. a) Sketch the root locus of the system whose open loop transfer function is 6M

$G(S)H(S)=\frac{K}{S(S+3)(S^2+3S+11.25)}$.

b) The characteristic polynomial equation of a system is 6M

$S^7+5S^6+9S^5+9S^4+4S^3+20S^2+36S+4$ Determine the location of the roots on the S plane and hence the stability of the system.

## UNIT-IV

7. Sketch the Bode plot of given open loop transfer function $G(s)=\frac{100}{S(s+5)(s+10)}$. 12M

Determine the phase margin and gain margin from the plot.

**(OR)**

8. a) Explain in detail about the significance of Nyquist plot? 4M

b) Sketch the polar plot of the given transfer function. Also determine the frequency at which the plots cross the real axis and the corresponding magnitude. 8M

$$G(s)=\frac{10(S+2)}{S(S+1)(S+3)}$$

## UNIT-V

9. a) What is lag compensator? Obtain the transfer function of lag compensator. Sketch the pole –zero plot. 6M

b) Classify the types of compensators and briefly explain about it 6M

**(OR)**

10. a) List the properties of State Transition Matrix. 6M

b) Consider a system having a state model with D=0. Obtain its Transfer Function. 6M

$$\begin{bmatrix}\dot{X}_1\\ \dot{X}_2\end{bmatrix}=\begin{bmatrix}-2 & -3\\ 4 & 2\end{bmatrix}\begin{bmatrix}X_1\\ X_2\end{bmatrix}+\begin{bmatrix}3\\ 5\end{bmatrix}U$$

$$Y=\begin{bmatrix}1 & 1\end{bmatrix}\begin{bmatrix}X_1\\ X_2\end{bmatrix}$$



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# AR18

**CODE: 18MET205** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B. Tech II Semester Supplementary Examinations, September, 2022**

**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) | What is a spark plug? Where is it used? How combustion is initiated in CI engine? | 6M |
| | b) | What is the function of a carburettor? Explain simple carburettor with a neat sketch? | 6M |
| | | **(OR)** | |
| 2. | a) | What is port timing diagram? Explain port timing diagram of a two stroke cycle engine. | 6M |
| | b) | Briefly explain with PV diagram the working of a four stroke otto cycle? | 6M |

## UNIT-II

| | | | |
|---|---|---|---|
| 3. | a) | Explain briefly abnormal combustion and pre-ignition. | 6M |
| | b) | What is air-fuel ratio? Explain lean mixture, rich mixture and ideal mixture? | 6M |
| | | **(OR)** | |
| 4. | a) | Define performance number? Explain the main factors that influence the flame speed. | 6M |
| | b) | What is detonation? Explain the factors affecting detonation. | 6M |

## UNIT-III

| | | | |
|---|---|---|---|
| 5. | a) | Explain the following performance parameters: (a) Brake power (b) Specific fuel consumption (c) Thermal efficiency (d) Heat supplied by fuel. | 6M |
| | b) | With a neat sketch explain the working of stratified charge engine? | 6M |
| | | **(OR)** | |
| 6. | a) | Explain Homogeneous Charge Compression Ignition (HCCI) with advantages and disadvantages? | 6M |
| | b) | With a neat sketch explain the working of Wankel engine? | 6M |

## UNIT-IV

| | | | |
|---|---|---|---|
| 7. | a) | What are the sources of HC formation in petrol engine? Explain different factors which affect HC formation. | 6M |
| | b) | Explain briefly the factors which effect the formation of NOx and SOx? | 6M |
| | | **(OR)** | |
| 8. | a) | What are bio fuels? Explain their need in terms of emissions? | 6M |
| | b) | Give a brief note on EURO and BHARAT emission norms. | 6M |

## UNIT-V

| | | | |
|---|---|---|---|
| 9. | | What is air compressor? With a neat sketch explain the working of reciprocating compressor. | 12M |
| | | **(OR)** | |
| 10. | | With a neat sketch explain the working of roots blower and vane sealed compressor. | 12M |

# AR18

**CODE: 18ECT209** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B. Tech II Semester Supplementary Examinations, September, 2022**

**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) Solve for b. 6M
   i) $(16)_{10} = (X)_2$ ii) $(292)_{10} = (X)_8$
   b) Explain the procedure involved in addition of BCD numbers using with an example. 6M

**(OR)**

2. a) Perform the following addition using excess-3 code. 6M
   i. 386+756
   ii. 247.6+359.4
   b) Explain about Hamming code with example. 6M

**UNIT-II**

3. a) Minimize the following expression using K-map and write the advantages and disadvantages of K-map. 6M
   $F(A,B,C,D) = \Sigma\, m(1,4,7,10,13) + \Sigma\, d(5,14,15)$
   b) Implement all logic gates using NAND gates only. 6M

**(OR)**

4. a) Find the reduced POS and SOP form of the function and draw the logic diagram 6M
   $F(A, B, C, D) = \Sigma(1,3,7,11,15) + \Sigma\, d(0,2,5)$
   b) Explain the procedure to find the dual of a logic expression with an example. 6M

**UNIT-III**

5. a) Implement the full subtractor circuit using half subtractor circuits. 6M
   b) Design a 4-bit binary parallel adder using full adders. 6M

**(OR)**

6. a) Explain the operation of a BCD adder with an example. 6M
   b) Drive the expressions for sum and carry for full adder. 6M

**UNIT-IV**

7. a) Design a 1X8 de-multiplexer using 1X4 and 1X2 de-multiplexers. 6M
   b) Design a 2-bit magnitude comparator using logic gates. 6M

**(OR)**

8. a) Design a 3X8 decoder using 2X4 decoders. 6M
   b) Write the differences between an encoder and a priority encoder with logic diagrams and truth tables. 6M

**UNIT-V**

9. a) What is race around condition? How it can minimize in J-K flip-flop? 6M
   b) Convert D-Flip-Flop into T-Flip-Flop. 6M

**(OR)**

10. a) Design a mod-10 synchronous counter using T flip flops. 6M
    b) Draw and explain a 4-bit ring counter. 6M

# AR18

**CODE: 18CST206** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B. Tech II Semester Supplementary Examinations, September, 2022**

**OPERATING SYSTEMS**

**(Common to CSE & 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) What is System call and explain types of system calls. 6M

   b) Assume the following workload in a system. All jobs are arrived at time 0 in the order given 6M

| Process | Burst Time | Order |
|---|---|---|
| P1 | 4 | 1 |
| P2 | 5 | 2 |
| P3 | 3 | 3 |

Draw a Gantt chart illustrating the execution of these jobs using Round Robin CPU scheduling algorithm. (Assume Time Quantum=1 unit) and also Calculate the Avg. Waiting Time and Turnaround Time.

**(OR)**

2. a) What is PCB? Specify the information maintain in it. 6M

   b) Explain the following Operating systems 6M
   (i) Simple Batch (ii) Multi Tasking (iii) Time Shared

**UNIT-II**

3. a) What is Semaphore? How can we achieve the synchronization using semaphore for producer consumer problem? 6M

   b) Explain any two solutions of Recovery from Deadlock. 6M

**(OR)**

4. a) Explain about monitors in Operating systems. 6M

   b) What is Resource allocation graph? Explain about the Deadlock detection. 6M

**UNIT-III**

5. a) What is Demand paging explain with an example. 5M

   b) Compare Paging with Segmentation with respect to the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses 7M

**(OR)**

6. a) Explain the differences between external fragmentation and internal fragmentation with suitable example. 6M

   b) Explain about Optimal Page Replacement Algorithm with an example. 6M

**UNIT-IV**

7. a) Explain about Linked and Indexed file allocation methods. 6M

   b) Explain in detail about various types of directory structures with a neat diagram. 6M

**(OR)**

8. a) List and explain about the operations performed on a file. 6M

   b) Explain about file free space management. 6M

**UNIT-V**

9. a) Discuss various types of disk storage attachments. 6M

   b) Compare SCAN and C-SCAN disk scheduling algorithms with an example. 6M

**(OR)**

10. a) Explain in detail about swap space management. 6M

    b) Consider the disk queue with following request for I/O blocks on cylinders 98,123,37,122, 14,124,65,67 (Assume disk head is at 53). Draw CLOOK scheduling. 6M

# AR16

**CODE: 16CE2009** **SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, September, 2022**

**STRENGTH OF MATERIALS-II**

**(Civil Engineering)**

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

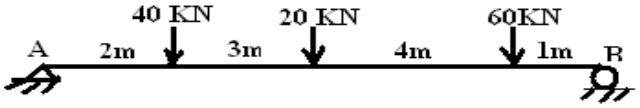
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

## UNIT-I

1. A cantilever beam of length 6m carries a uniformly distributed load of intensity 10kN/m over its entire length. Find the slope and deflection at the free end. Take E = 200 X $10^6$ kN/$m^2$ and Moment of inertia (I)=30 X $10^{-5}$ $m^4$. 14

**(OR)**

2. A simply supported beam of span 10m is loaded as shown in figure. 14




Determine the magnitude of maximum deflection. Given E=200kN/$mm^2$ and I= 695.054x$10^6$ $mm^4$.

## UNIT-II

3. a) The principal stresses at a point in a piece of steel are 90 MPa tensile and 60 MPa compressive. Find the intensity and direction of the stress across a plane the normal of which is inclined at $30^0$ to the axis of the 90 MPa principal stress, the plane being also perpendicular to the plane of zero stress. 7

   b) A steel bar is 10 m long and 100 mm x 25 mm in section. It is subjected to an axial pull of 250 kN. Determine the intensities of normal and tangential stresses on a plane section inclined at $60^0$ to the longitudinal axis. 7

**(OR)**

4. a) Derive an expression for a body subjected to direct stress in one plane. 7

   b) At a point within a body subjected to two mutually perpendicular directions the stresses are 120N/$mm^2$ tensile and 80N/$mm^2$ compressive. Determine the normal, shear and resultant stresses on an oblique plane inclined at an angle of $45^0$ with the axis of minor tensile stress. 7

## UNIT-III

5. A shell 3.25m long, 1m in diameter is subjected to an internal pressure of 1N/$mm^2$. If thickness of the shell is 10mm, find the circumferential and longitudinal stresses. And also find the maximum shear stress and the changes in the dimensions of the shell. Take E = $2\times10^5$ N/$mm^2$ and poison's ratio=0.3. 14

**(OR)**

6. A cylinder air receiver for a compressor is 3m in internal diameter and made of plates 10mm thick. If the hoop stress is not to exceed 70 N/$mm^2$ and the axial stress is not to exceed 50 N/$mm^2$, find the maximum safe air pressure. 14

## UNIT-IV

7. A tube 80 mm inside and 120 mm outside diameter is to be reinforced by shrinking on a second tube of 160 mm outside diameter. The compound tube is to withstand an internal pressure of 35 MPa and the shrinkage allowance is to be such that the final maximum stress in each tube is to be the same. Calculate this stress. What is the initial difference of diameters before shrinking on (E = 200 GPa). 14

**(OR)**

8. Determine the maximum and minimum hoop stress across the section of a pipe 400 mm internal diameter and 100 mm thick when the pipe contains a fluid at a pressure of 8 $N/mm^2$. 14

## UNIT-V

9. List the assumptions made in Euler's theory of buckling? Derive an expression for the Euler's buckling load for a column fixed at both ends? 14

**(OR)**

10. A solid round bar 3 m and 50 mm diameter is used as a strut. Determine the crippling load for the below cases. Take E = $2X10^5$ $N/mm^2$. 14

    1. When both ends hinged
    2. One end is fixed and other end free
    3. One end is fixed and other end hinged



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# AR16

**CODE: 16ME2011** **SET 1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**II B.Tech II Semester Supplementary Examinations, September, 2022**
**MACHINE DRAWING**
**(Mechanical Engineering)**

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

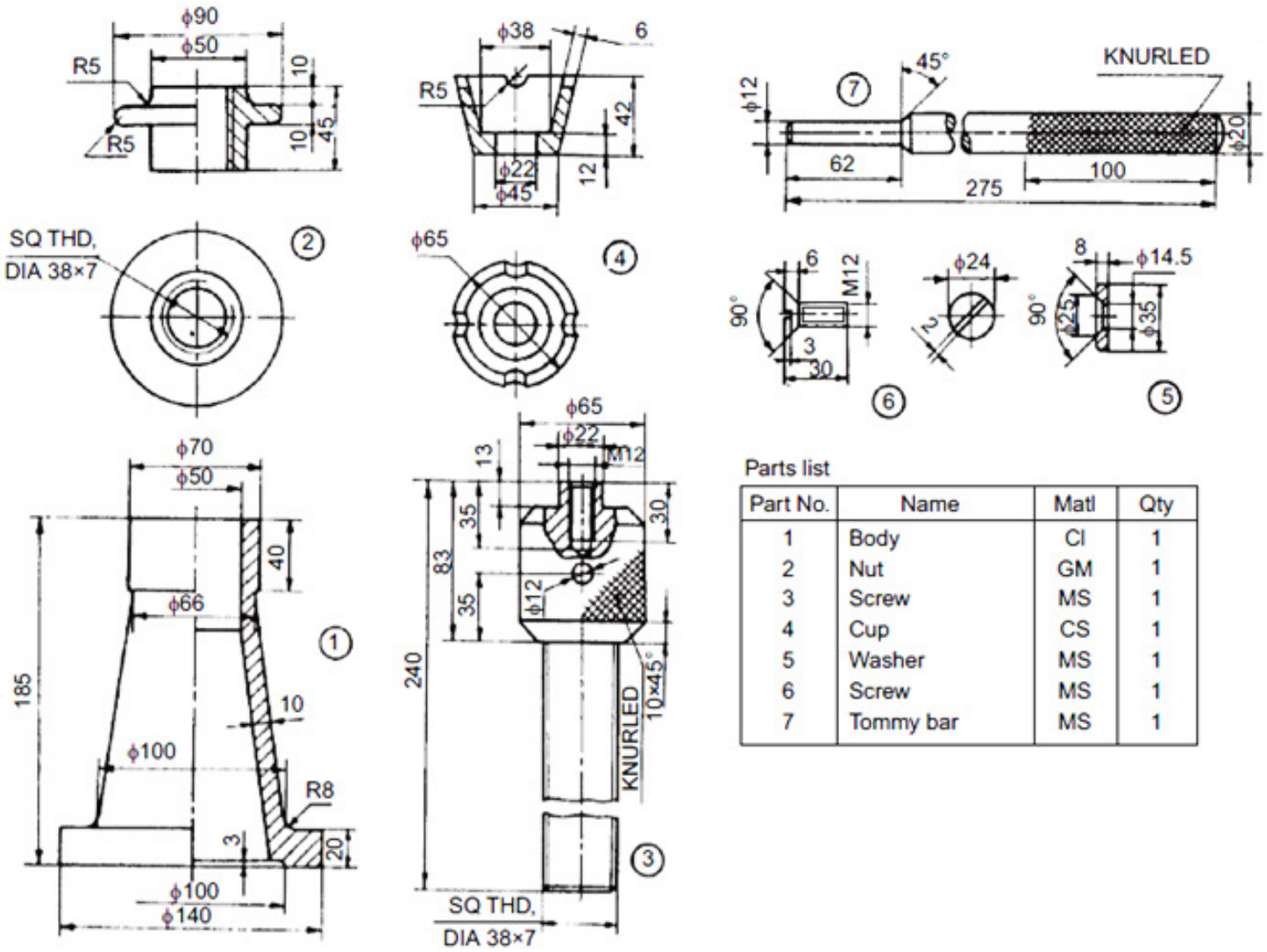
**Note: Answer any two questions from section-A**
**Section - B is compulsory** **(2x15=30Marks)**

## Section- A

| | | |
|---|---|---|
| 1. | Draw the sectional front view and view from above of a Double riveted, double strap zig-zag butt joint. | 15 |
| 2. | Draw half sectional front view and top view of a foot step bearing for 40 mm diameter | 15 |
| 3. | Draw the sectional front view and view from above of a Cotter joint with Gib | 15 |

## Section- B

4. Assemble all parts of the screw jack, shown in Figure and draw the following views: **(40Marks)**
   - *(i)* Half sectional view from the front, and
   - *(ii)* View from above.




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: 16EC2010** **SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, September, 2022**

**DIGITAL ELECTRONICS**

**(Electronics and Communication 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) Convert the Octal number 623 to decimal, binary, and hexadecimal. 6M
   b) Encode each of the decimal digits 0, 1, …, 9 by means of the following weighted binary codes:
      i) 6 3 1 –1
      ii) 7 3 2 –1 8M
      iii) 5 4 –2 –1
      iv) 8 7 – 4 –2
   Determine which of the above code is self-complementing.

**(OR)**

2. a) Perform the arithmetic operations using 2's compliment.
      i) 101011 + 111000 8M
      ii) 111001 – 001010
   b) Perform the following addition using BCD code.
      i) 386+756 6M
      ii) 1010+444

## UNIT-II

3. a) Reduce the following Boolean expressions to the indicated number of literals:
      i) $A'C' + ABC + AC'$ to three literals 6M
      ii) $(A' + C)(A' + C')(A + B + C'D)$ to four literals
   b) Minimize the following function using K-map and realize using NAND gates: 8M
      F (w, x, y, z) = Σ m (0, 2, 3, 4, 6, 7, 8, 10, 13) + d (5, 14)

**(OR)**

4. a) Convert the following expressions into product of sums form:
      i) $(AB + C)(B + C'D)$ 6M
      ii) $x' + x(x + y')(y + z')$
   b) Find the complement of $F = x + yz$; then show that $F \cdot \bar{F} = 0$ and $F + \bar{F} = 1$. 8M

## UNIT-III

5. a) Draw and explain a 4-bit adder-subtractor circuit. 6M
   b) Design a combinational circuit that produces a Excess-3 addition and explain it. 8M

**(OR)**

6. a) Draw and explain the Truth table and Logic diagram of a Full subtractor. 8M
   b) Design a full subtractor circuit using two half subtractor. Explain it. 6M

## UNIT-IV

| | | | |
|---|---|---|---|
| 7. | a) | Design and implement 2-bit comparator using logic gates. | 8M |
| | b) | Implement the function F = $\Sigma(0, 1, 2, 3, 5, 7, 11, 15)$ using 8x1 Multiplexer. | 6M |
| | | **(OR)** | |
| 8. | a) | Implement a full-adder circuit with a 3×8 decoder and two OR gates. | 6M |
| | b) | Design a combinational circuit that converts a BCD code into 8 4 – 2 – 1 code. | 8M |

## UNIT-V

| | | | |
|---|---|---|---|
| 9. | a) | Draw the logic diagram of positive edge-triggered D-flipflop using NAND gates and explain. | 7M |
| | b) | With the help of neat diagram, explain the operation of BCD ripple counter. | 7M |
| | | **(OR)** | |
| 10. | a) | Convert a T flip-flop into a JK Flip-flop. | 6M |
| | b) | Explain the working of 4-bit universal shift register with the help of diagram. | 8M |



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# AR16

**CODE: 16CS2009** **SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, September,2022**

**OPERATING SYSTEMS**

**(Common to CSE & IT)**

**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 are the advantages and disadvantages of using the same system call interface for manipulating both files and devices. | 7M |
| | b) | Write and explain various scheduling criteria's with respect CPU scheduling. And show the calculations for at least 5 processes arriving at consecutive intervals. | 7M |
| | | **(OR)** | |
| 2. | a) | Explain in detail, the sequence of actions taken by the operating system to context switch between processes. | 7M |
| | b) | Consider the following<br>4 processes represented as (Process, Arrival Time, Burst Time) with the length of CPU burst in milliseconds.<br>{ ( P1, 0, 10), (P2, 1, 7), (P3, 2, 13), (P4, 3, 11) }. Using preemptive SJF scheduling:<br>i) Draw Gantt chart. ii) Calculate average waiting time. | 7M |

## UNIT-II

| | | | |
|---|---|---|---|
| 3. | a) | Write about Characterization of deadlock by resource allocation graph. | 7M |
| | b) | Explain about software-based Peterson's solution to the critical-section problem. | 7M |
| | | **(OR)** | |
| 4. | a) | What are the necessary conditions for a Deadlock? Discuss. | 7M |
| | b) | What happens if the wait() and signal() semaphore operations are not executed atomically? Give explanation. | 7M |

## UNIT-III

| | | | |
|---|---|---|---|
| 5. | a) | What is a page fault? Explain the steps involved in handling a page fault with a neat sketch. | 7M |
| | b) | Explain the process of converting virtual addresses to physical addresses with a neat diagram.. | 7M |
| | | **(OR)** | |
| 6. | a) | How demand paging affects the performance of a computer system? Give explanation.. | 7M |
| | b) | How does the system detect Thrashing? What can the system do to eliminate this problem? Explain. | 7M |

## UNIT-IV

| | | | |
|---|---|---|---|
| 7. | a) | Discuss various file access methods in detail. | 7M |
| | b) | Explain about file system implementation. | 7M |
| | | **(OR)** | |
| 8. | a) | Briefly explain about single-level, two-level and Tree-Structured directories. | 7M |
| | b) | Explain about various file allocation methods. | 7M |

## UNIT-V

| | | | |
|---|---|---|---|
| 9. | a) | Write overview of mass storage structure in detail. | 7M |
| | b) | Explain about various issues involved in selecting appropriate disk scheduling algorithm. | 7M |
| | | **(OR)** | |
| 10. | a) | Discuss in detail about file directory structure. | 7M |
| | b) | Explain and compare the FCFS and SSTF disk scheduling algorithms. | 7M |