

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA****B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022*****SUB: Geo-Technical Engineering - 1 (CE)*****Time: 3 Hours****Max. Marks: 70****Answer any FIVE Questions choosing one question from each unit.****All questions carry Equal Marks.****UNIT - I**

1. (a) Explain with sketches the following structures: (i) Single grained . (ii) Honeycombed . (iii) Flocculent 7M  
(b) A 5 cm long cube of dry clay has a mass of 210 gm. The same sample under saturated condition and unchanged volume has a mass of 260 gm. Determine the specific gravity of solids and void ratio 7M

**(OR)**

2. (a) A soil sample has a volume of 1000 cm<sup>3</sup> and a weight of 17.5 N. The specific gravity of solids is 2.67. If the dry unit weight of the soil is 14.8 kN/m<sup>3</sup> . Determine: (i) Water content . (ii) Voids ratio. (iii) Porosity . (iv) Degree of saturation. (v) Saturated unit weight. (vi) Submerged unit weight . 7M  
(b) Define the terms degree of saturation, specific gravity of solids, porosity, density of solids, air content and dry density 7M

**UNIT – II**

3. (a) Describe the construction of phreatic line for an earth dam of homogeneous cross section. 7M  
(b) What are the characteristics of a flow net? 7M

**(OR)**

4. (a) Define permeability. Enumerate the various parameters that affect the permeability of soil in the field. Explain how you would determine permeability in the field. 7M  
(b) Differentiate between seepage velocity and discharge velocity. Derive the relation between them 7M

**UNIT – III**

5. (a) Describe Westergaard's elastic solution for stress distribution in soil under a point load 7M  
(b) A line load of 90 kN/m run extends to a long distance. Determine the intensity of vertical stress at a point 1.5 m below the surface. (i) Directly under the line load. (ii) At a distance 1m perpendicular to the line. Use Boussinesq's theory. 7M

**(OR)**

6. (a) Give the salient features of compaction curve and explain the significance of zero air void line 7M  
(b) Write brief note on Newmark's influence chart . 7M

**UNIT – IV**

7. (a) What is coefficient of consolidation? How it is determined in the laboratory 7M  
(b) A clay layer 4.0 m thick is subjected to a pressure of 55 kPa. If the layer has double drainage and undergoes 50% consolidation in one year, determine the coefficient of consolidation. Take  $T_v = 0.196$  7M

**(OR)**

8. (a) Discuss Terzaghi theory of consolidation, stating various assumptions 7M  
(b) In a consolidation test on a soil, the void ratio of sample decreased from 1.25 to 1.1 when pressure is increased from 200 kN/m<sup>2</sup> to 400 kN/m<sup>2</sup>. Calculate the coefficient of consolidation if coefficient of permeability is  $8 \times 10^{-8}$  cm/s 7M

**UNIT-V**

9. (a) Explain the following terms: (i) Critical void ratio. (ii) Pore pressure coefficients 7M  
(b) Describe a triaxial shear test with a neat sketch 7M

**(OR)**

10. (a) Explain the merits and demerits of direct shear test when compared with the other laboratory tests to determine the shear strength of soil 7M

- (b) Discuss about Liquefaction & Explain about determination of shear strength using vane shear test 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
**SUB: Hydraulic Machinery (CE)**

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) State and explain the Buckingham's  $\pi$ -theorem. 7M  
(b) Find an expression for the drag force on a smooth sphere of diameter  $D$ , moving with a uniform velocity  $V$ , in a fluid of density  $\rho$  and dynamic viscosity  $\mu$ . 7M

**(OR)**

2. (a) Explain the different types of hydraulic similarities that must exist between a prototype and its model. 7M  
(b) Define Reynolds' number and Froude's number. Derive expressions for the above numbers. 7M

**UNIT – II**

3. (a) Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet. 7M  
(b) A jet of water of diameter 75 mm moving with a velocity of 30m/s, strikes a curved fixed plate tangentially at one end at an angle of  $30^\circ$  to the horizontal. The jet leaves the plate at an angle of  $20^\circ$  to the horizontal. Find the force exerted by the jet on the plate in the horizontal and vertical directions. 7M

**(OR)**

4. (a) A nozzle of 50 mm diameter delivers a stream of water at 20 m/s perpendicular to a plate that moves away from the jet at 5 m/s. Find : (i) the force on the plate,(ii) the work done and (iii) the efficiency of the jet. 7M  
(b) Explain the various elements of a hydroelectric power plant. 7M

**UNIT – III**

5. (a) Obtain an expression for the work done per second by water on the runner of a Pelton wheel. Hence derive an expression for the maximum efficiency of the Pelton wheel. 7M  
(b) What is a draft-tube? Why is it used in a reaction turbine? Describe with sketches two different types of draft-tubes. 7M

**(OR)**

6. (a) Obtain an expression for unit speed, unit discharge and unit power for a turbine. 7M  
(b) Explain the characteristic curves of a turbine. 7M

**UNIT – IV**

7. (a) Define a centrifugal pump. Explain the working of a single-stage centrifugal pump with a sketch. 7M  
(b) The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200r.p.m. The vane angles of the impeller at inlet and outlet are  $20^\circ$  and  $30^\circ$  respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water. 7M

**(OR)**

8. (a) Define the specific speed of a turbine. Derive an expression for the specific speed. What is the significance of the specific speed? 7M  
(b) Differentiate between single-stage and multistage centrifugal pumps. Describe multistage centrifugal pump with (i) impellers in parallel and (ii) impellers in series. 7M

**UNIT-V**

9. (a) What is a reciprocating pump? Differentiate between (i) single-acting and double-acting reciprocating pump and (ii) single cylinder and double cylinder reciprocating pump. 7M
- (b) A single-acting reciprocating pump, running at 50 r.p.m., delivers  $0.01 \text{ m}^3/\text{s}$  of water. The diameter of the piston is 200 mm and stroke length is 400 mm. Determine : (i) Theoretical discharge of the pump, (ii) Co-efficient of discharge and (iii) Slip and the percentage slip of the pump. 7M

(OR)

10. The length and diameter of a suction pipe of a single-acting reciprocating pump are 5 m and 10 cm respectively. The pump has a plunger of diameter 15 cm and a stroke length of 35 cm. The centre of the pump is 3m above the water surface in the sump. The atmospheric pressure head is 10.3 m of water and the pump is running at 35 r.p.m. Determine: (i) Pressure head due to acceleration at the beginning of the suction stroke, (ii) Maximum pressure head due to acceleration and (iii) Pressure head in the cylinder at the beginning and at the end of the stroke. 14M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Building Construction (CE)***

**Time: 3 Hours****Max. Marks: 70****Answer any FIVE Questions choosing one question from each unit.****All questions carry Equal Marks.****UNIT - I**

1. Write the principles of planning of buildings. 14 M

**(OR)**

2. Explain about the column orientation. 14 M

**UNIT – II**

3. Explain about the brick masonry and concrete masonry. 14 M

**(OR)**

4. Explain the types of partition walls. 14 M

**UNIT – III**

5. Explain about different types of floors? 14 M

**(OR)**

6. Explain about types of staircases. 14 M

**UNIT – IV**

7. What is damp Proofing. Explain the methods of damp proofing for Foundations, floors and roofs? 14 M

**(OR)**

8. Write the methods of damp proofing for roofs. 14 M

**UNIT-V**

9. What are the principles, benefits and disadvantages of Green buildings. 14 M

**(OR)**

10. Explain the design criteria for intelligent buildings. 14 M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Surveying - II (CE)***

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

**Answer any FIVE Questions choosing one question from each unit.**

**All questions carry Equal Marks.**

**UNIT - I**

1. (a) Describe the procedure to determine the elevation when the distance to the object cannot be measured. 7M  
(b) If the distance between two stations is 980 m, find the linear and angular corrections for curvature, refraction and the combined correction. 7M

**(OR)**

2. (a) Explain the different methods for base line measurement. 7M  
(b) Explain the concept of strength of figure and the method used to calculate it. 7M

**UNIT – II**

3. (a) Explain the compound curve with neat sketch and designate the elements in it. 7M  
(b) A simple circular curve has a radius of 800 m and the deflection angle of 36°. Tabulate the ordinates from the long chord to set out the curve. 7M

**(OR)**

4. (a) Explain the following types of curves and state where they generally used. 7M  
(i) Reverse curve, (ii) Transition curve and (iii) Vertical curve  
(b) A vertical curve lies between two gradients of +0.6% and -0.8%. Rate of change of gradient for the curve is 0.05% per 20 m. If the chainage and elevations of point of intersection are 950.5 m and 858.75 m, respectively. Find the length of the vertical curve, chainages of the points on the curve and the elevations of the points on the curve at 20-m intervals for the first half. 7M

**UNIT – III**

5. (a) Explain how horizontal and vertical control is achieved during hydrographic surveying. 7M  
(b) Explain any two methods of locating soundings. 7M

**(OR)**

6. (a) Explain briefly how GPS works to determine the position coordinates of a point. 7M  
(b) Explain about different types of GPS receivers with their functions. 7M

**UNIT – IV**

7. (a) Write a short note on the following: 7M  
(i) Oblique photography, (ii) Photo mosaic, (iii) Relief displacement, (iv) Scale of vertical photograph  
(b) Describe the equipment required for Aerial Photogrammetry and explain the procedure followed to take photographs. 7M

**(OR)**

8. (a) Define and explain photo-interpretation. Discuss briefly the factors that aid in photo-interpretation 7M  
(b) Explain with reference to aerial photographs, what is meant by end overlap and side overlap and why they are provided? 7M

**UNIT-V**

9. (a) Explain features of Total Station? Compare Total Station with Theodolite. 7M  
(b) Explain the procedure of traversing with Total Station. 7M

**(OR)**

10. (a) Explain the procedure of Remote Elevation Method and Missing Line Measurement, using total station. 7M  
(b) Explain the different sources of errors may occur while using total station, suggest remedial measures. 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
**SUB: Mechanics of Materials - I (CE)**

Time: 3 Hours

Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT – I**

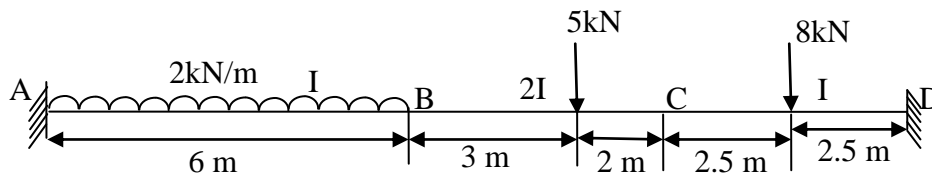
1. (a) Derive the relationship between (i) Modulus of elasticity and modulus of rigidity. 7M  
 (b) Distinguish between (i) Elastic limit and yield point. (ii) Nominal stress and true stress. 7M

**(OR)**

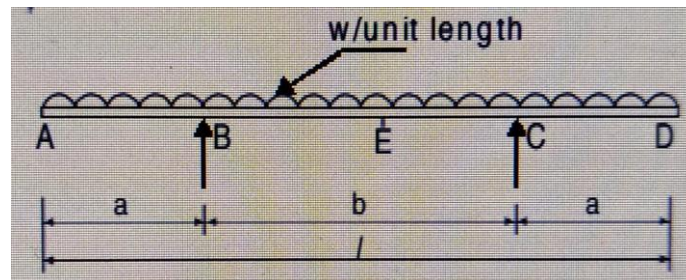
2. (a) Explain the term factor of safety and bulk modulus. 7M  
 (b) A bar of uniform thickness  $t$  tapers uniformly from a width  $b_1$  at one end to  $b_2$  at the other end in a length  $L$ . Find the expression for its extension under an axial pull  $P$ . 7M

**UNIT – II**

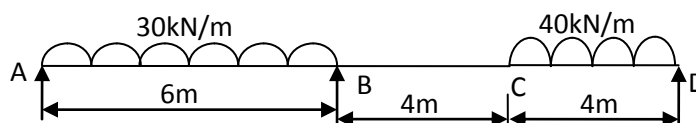
3. (a) A continuous beam ABCD consists of three span, and is loaded as shown in Figure. 7M  
 Ends A and D are fixed. Draw the SFD and BMD by indicating principle values.



- (b) A bar of length ' $l$ ' is supported at A and B which are at distances ' $a$ ' from the ends as shown in Figure. Find the distance ' $a$ ' such that maximum moment is least. 7M

**(OR)**

4. (a) A beam of AB 11m long is simply supported at its ends A and B. It carries a uniformly distributed load of 20kN/m for a distance of 5m from the left end A and a concentrated load of 40kN at a distance of 3m from the right end B. Determine the distance of point of contra flexure from end A. Draw the S.F.D. and B.M.D. for the beam. 7M  
 (b) For the beam shown in Figure draw the shear force and bending moment diagrams. 7M  
 Indicate the salient values.

**UNIT – III**

5. (a) A beam of I section 640mm deep and 250mm wide has a flange 20mm thick and web 15mm thick. It carries a uniformly distributed load of 90kN/m over the whole span. Find the extreme bending stress for the section and state if the stress is permissible. Safe stress in bending is 160N/mm<sup>2</sup>. 7M
- (b) List out the assumptions made in the theory of simple bending and explain them. 7M

(OR)

6. (a) Find the safe concentrated load that can be applied at the free end of a 2.5meter long cantilever. The section of the cantilever is a hollow square of external side 60mm and internal side 50mm the safe bending stress for the material being 75N/mm<sup>2</sup>. 7M
- (b) A simply supported beam of span 10m is 350mm deep. The section of the beam is symmetrical. The moment of inertia of the section is  $9.5 \times 10^7 \text{ mm}^4$ . If the permissible bending stress is 120 N/mm<sup>2</sup>. Find (i) The safe point load that can be applied at the center of the span. (ii) The safe uniformly distributed load that can be applied on the span. Without considering the weight of the beam. 7M

UNIT – IV

7. (a) A horizontal cantilever of uniform section of length l carries a point load, W at the free end and 2W at a distance of 'a' from the free end. Find the maximum deflection due to this loading. 7M
- (b) A cantilever of length 2 meters carries a uniformly distributed load of 2500N per meter for a length of 1.25meters from the fixed end and a point load of 1000N at the free end. If the section is a rectangular 120mm side and 240 mm deep, find the deflection at the free end. Consider  $E = 10000\text{N/mm}^2$ . 7M

(OR)

8. (a) A cast iron beam 40mm wide and 80 mm deep is placed on supports 1.25 meters apart and is subjected to a central point load 30kN. If the central deflection is found to be 6.5mm, find the value of the Young's Modulus for the material. 7M
- (b) Find the uniform bending moment which is to be applied to a steel rod 18 mm diameter so as to bend it into a circular arc of 18 meters radius. where  $E = 2 \times 10^5 \text{ N/mm}^2$ . 7M

UNIT-V

9. (a) Determine the diameter of a solid shaft which will transmit 90kW at 160 rpm if the shear stress in the shaft is limited to 60N/mm<sup>2</sup>. Find also the length of the shaft, if the twist must not exceed 1 degree over the entire length. Consider  $C = 8 \times 10^4 \text{ N/mm}^2$ . 7M
- (b) A solid circular shaft transmits 60kW at 180 r.p.m. Calculate the shaft diameter if the twist in the shaft is not exceed 1° in 2 meters of shaft and the shearing stress is limited to 50 N/mm<sup>2</sup>. Where  $C = 8 \times 10^4 \text{ N/mm}^2$ . 7M

(OR)

10. (a) List out the various assumptions made in the theory of pure torsion. Derive the torsion equation  $\frac{T}{J} = \frac{f_s}{R} = \frac{G\theta}{l}$ . 7M
- (b) A hollow steel shaft of external diameter 150mm and internal diameter 100mm is 1.5 meter long. Find the maximum torque required to produce a twist of 0.5 degree over the length of the shaft. Consider  $C = 8 \times 10^4 \text{ N/mm}^2$ . 7M



**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Basic Electrical and Electronics Engineering (CE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) Explain in detail about the steady state analysis of a series RL circuit with DC excitation. 7M  
(b) Prove that the energy stored in a capacitor is  $\frac{1}{2} C V^2$  7M

**(OR)**

2. (a) Define the following: 7M  
i) Alternating Quantity ii) R.M.S. Value iii) Average value iv) Form factor  
(b) Deduce an expression for the equivalent capacitance of three capacitors connected in  
i) Parallel ii) Series. 7M

**UNIT – II**

3. (a) Explain the necessity for conducting OC and SC tests on a single phase transformer 7M  
(b) Discuss the principle of operation of DC machine as a generator and motor. 7M

**(OR)**

4. Explain in detail about the constructional features of a DC machine 14M

**UNIT – III**

5. (a) Explain the forward and reverse bias operation and VI characteristics of a PN Junction diode 7M  
(b) Define ripple factor and efficiency. What is the value of ripple factor for FWR and HWR? 7M

**(OR)**

6. Explain the operation of a full wave rectifier using 2-diodes and 4-diodes with waveforms. Discuss the relative merits and demerits. 14M

**UNIT – IV**

7. Explain the Input and output characteristics of a CB transistor with relevant diagrams 14M

**(OR)**

8. (a) Explain the necessary conditions to get sustained oscillations 6M  
(b) Explain negative feedback. In what ways does it modify amplifier performance? 8M

**UNIT-V**

9. (a) What are the advantages and disadvantages of three phase induction motor? 6M  
(b) Draw the torque-slip characteristics of a 3-phase induction motor. Explain them briefly? 8M

**(OR)**

10. (a) Draw the circuit diagram of Dual Trace oscilloscope and explain its operation in detail. 7M  
(b) Explain the operation of vertical amplifier used in a CRO 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Power Systems - I (EEE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT – I**

1. (a) Write short notes on the following: (i) load curves, (ii) demand factor, (iii) load factor, (iv) Diversity factor. 6M
- (b) A proposed station has the following daily load cycle 8M
- |               |     |      |       |       |       |       |      |
|---------------|-----|------|-------|-------|-------|-------|------|
| Time in hours | 6—8 | 8—11 | 11—16 | 16—19 | 19—22 | 22—24 | 24—6 |
| Load in MW    | 20  | 40   | 50    | 35    | 70    | 40    | 20   |
- Draw the load curve and determine the Maximum Demand, Units generated and load factor from the curve

**(OR)**

2. (a) Explain how a load duration curve is plotted? What is its use? 7M
- (b) Discuss the objectives and requirements of tariff methods. 7M

**UNIT – II**

3. (a) Explain the types of Insulators used in overhead transmission lines. 7M
- (b) Discuss about the important components of an overhead transmission line 7M

**(OR)**

4. (a) Deduce an approximate expression for sag in overhead lines when (i) supports are at equal levels (ii) supports are at unequal levels. 7M
- (b) Why are insulators used with overhead lines? Discuss the desirable properties of insulators 7M

**UNIT – III**

5. (a) Explain the concept of self GMD and Mutual GMD. 6M
- (b) Derive an expression for the inductance per phase for a 3-phase overhead transmission line when (i) conductors are symmetrically placed (ii) conductors are unsymmetrically placed but the line is completely transposed 8M

**(OR)**

6. (a) Derive an expression for the capacitance of a single phase overhead transmission line. 7M
- (b) What do you understand by electric potential? Derive an expression for electric potential 7M

**UNIT – IV**

7. (a) Explain the method of solving of AC distribution systems 6M
- (b) A single phase distributor 2 kilometres long supplies a load of 120 A at 0.8 p.f. lagging at its far end and a load of 80 A at 0.9 p.f. lagging at its mid-point. Both power factors are referred to the voltage at the far end. The resistance and reactance per km (go and return) are 0.05  $\Omega$  and 0.1  $\Omega$  respectively. If the voltage at the far end is maintained at 230 V, calculate: (i) voltage at the sending end (ii) phase angle between voltages at the two ends 8M

**(OR)**

8. (a) What is the importance of load power factors in a.c. distribution 7M
- (b) Calculate the voltage drop for AC Distribution system fed at one end and power factor referred to their respective load voltage. 7M

**UNIT-V**

9. (a) Compare the merits and demerits of underground system versus overhead system. 7M
- (b) Explain different parts in underground cables. 7M

**(OR)**

10. (a) List out the factors effecting corona and mention the methods for reducing the corona effect. 6M
- (b) A 3-phase, 220 kV, 50 Hz transmission line consists of 1.5 cm radius conductor spaced 2 metres apart in equilateral triangular formation. If the temperature is 40°C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Take  $m_0 = 0.85$ . 8M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
**SUB: Electrical Machines - II (EEE)**

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

**Answer any FIVE Questions choosing one question from each unit.**

**All questions carry Equal Marks.**

**UNIT - I**

1. (a) Discuss the operation of transformer on No-load and load conditions. 7M  
(b) A 50 KVA, 1- $\Phi$  transformer has a full load primary current of 250 A and total resistance referred to primary is 0.006 $\Omega$ . If the iron loss amounts to 200 W. Find the efficiency on full load and half load at unity power factor. 7M

**(OR)**

2. (a) Distinguish between core and shell types transformers. 7M  
(b) A 7.5 KVA 2400V/120V. Transformer was tested by short circuiting the low voltage side and applying 100V to H.V side. The measured power input was 145W. Determine the regulation when the load has 0.8 lag power factor. 7M

**UNIT – II**

3. (a) Describe OC and SC tests on single-phase transformer. 7M  
(b) In a power loss test on a 10Kg specimen of sheet steel laminations, the maximum flux density and waveform factor are maintained constant and the following results obtained. 7M  
Frequency(Hz) : 25    40    50    60    80  
Total loss (watt) : 18.5    36    50    66    104  
Calculate the eddy current loss per kg at a frequency of 50 Hz.

**(OR)**

4. (a) Illustrate the parallel operation of transformers with un-equal voltage ratios. 7M  
(b) Explain the conversion of 2-winding transformer into Auto-transformer. 7M

**UNIT – III**

5. (a) Discuss the connections of Y- $\Delta$  and  $\Delta$ -Y of three phase transformer. 7M  
(b) Describe the Scott connection of three phase transformer. 7M

**(OR)**

6. (a) Discuss the production of rotating magnetic field in three phase induction motor. 7M  
(b) A 4-pole, 3-phase induction motor operates from a supply whose frequency is 50 Hz. 7M  
Calculate  
(i) The speed at which the magnetic field of the stator is rotating.  
(ii) The speed of the rotor when the slip is 0.04.  
(iii) The frequency of the rotor currents when the slip is 0.03.  
(iv) The frequency of the rotor currents at standstill.

**UNIT – IV**

7. (a) Illustrate the torque-speed characteristics of three phase induction motor. 7M  
(b) A 440-V, 3- $\Phi$ , 50-Hz, 4-pole, Y-connected induction motor has a full-load speed of 1425 rpm. The rotor has an impedance of (0.4 + j 4) ohm and rotor/stator turn ratio of 0.8. Calculate (i) full-load torque (ii) rotor current and full-load rotor Cu loss (iii) power output if windage and friction losses amount to 500 W (iv) maximum torque and the speed at which it occurs (v) starting current and (vi) starting torque. 7M

**(OR)**

8. Illustrate the construction of a circle diagram of three phase induction motor. 14M

**UNIT-V**

9. (a) Discuss the rotor resistance control method of three phase induction motor. 7M  
(b) How the speed of induction motor is controlled with line voltage? Discuss. 7M

**(OR)**

10. (a) Discuss the auto transformer starter of three phase induction motor. 7M

(b) Explain the operation of double cage induction motor.

7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Electrical & Electronics Measurements (EEE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) Derive the expression for deflection angle for moving iron instrument. 6M  
(b) A basic D'Arsonval movement with an internal resistance of  $50 \Omega$  and a full scale deflection current of 3 mA is to be used as a multirange voltmeter. Design the series string of multipliers to obtain the voltage ranges of 0-10 V, 0-50 V, 0-100 V and 0-500 V using sensitivity method. 8M

**(OR)**

2. (a) What are the different types of errors in the measuring instruments? How to reduce or eliminate the random errors? 6M  
(b) Design a multirange d.c. milliammeter with a basic meter having a resistance of  $75 \Omega$  and full scale deflection for the current of 2 mA. The required ranges are 0-10 mA, 0-50 mA and 0-100 mA. 8M

**UNIT – II**

3. (a) Derive the expression for deflecting torque and controlling torque in single phase dynamometer wattmeter. 10M  
(b) If two energy meters with 800 and 1000 meter constants are available to measure the energy. Which energy meter can be preferred to measure the energy? And give the comments on the selection of energy meter. 4M

**(OR)**

4. (a) Explain about the different types of power factor meters. 6M  
(b) What are the various types of errors involved in the energy meter? How the errors are compensated? 8M

**UNIT – III**

5. A bridge consists of arm 'ab', a choke coil having a resistance of  $R_1$  and inductance  $L_1$ , arm 'bc' a non inductive resistance of  $R_3$ . When the bridge is fed from a source of 500Hz, balance is obtained under the following conditions:  $R_2=2410\Omega$ ,  $R_3=750\Omega$ ,  $C_4=0.35\mu\text{F}$ , and  $R_4=64.5\Omega$ . The series capacitance is  $0.4\mu\text{F}$ . Calculate the resistance and inductance of the choke coil. The supply is connected between 'a' and 'c' and the detector is between 'b' and 'd'. 14M

**(OR)**

6. The arms of Anderson's Bridge are as follows: 14M  
Arm AB: Unknown impedance with  $R_1$ ,  $L_1$  in series with variable resistor of  $r_1$   
Arm BC: Pure resistance  $R_3 = 100 \Omega$ , Arm CD: Pure resistance  $R_4 = 200 \Omega$   
Arm DA: Pure resistance  $R_2 = 250 \Omega$ , Arm DE: Variable pure resistance  $r$   
Arm EC: A loss free capacitor  $C = 1\mu\text{F}$ , Arm BE: A detector  
AC supply is connected between terminal A and C.  
Calculate the resistance and inductance  $R_1$  and  $L_1$ , if  $r= 43.1 \Omega$  and  $r= 229.7 \Omega$  under balance condition?

**UNIT – IV**

7. (a) Explain briefly about the polar type and coordinate type potentiometers. 6M  
(b) Derive the expression for phase angle of a potential transformer with equivalent circuit and its phasor diagram. 8M

**(OR)**

8. (a) Derive the expression for actual ratio and phase angle of a current transformer with 8M

equivalent circuit and its phasor diagram

- (b) A current transformer has a single turn primary and 400 turns secondary. The secondary is supplying a pure resistive load of  $2\ \Omega$  at 5 A. The magnetizing m.m.f required to set up the flux in the core is 100 AT. The frequency is 50 Hz. While core has cross sectional area of  $8\text{ cm}^2$ . Calculate the ratio and phase angle of the current transformer. Also obtain the maximum flux density in the core. Neglect iron losses and copper losses. 6M

**UNIT-V**

9. (a) Explain the ramp type digital voltmeter with its block diagram and associated waveforms. Mention the applications of ramp type digital voltmeter 7M
- (b) Explain how voltage can be measured with the help of integrating type digital voltmeter? Compare with ramp type digital voltmeter. 7M

**(OR)**

10. (a) How the unknown frequency can be measured with the help of Lissajous patterns? 7M
- (b) Explain the concept of time base generator with its simple sawtooth generator in CRO. 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Generation of Electrical Power (EEE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) Explain about (i) Economizer (ii) Super heater (iii) Condenser (iv) Air preheater (v) Cooling tower. 10M  
(b) Briefly explain why pulverized fuel is preferred in thermal power plant? 4M

**(OR)**

2. (a) Discuss the important factors to be taken into account while selecting the site for a thermal power station. 7M  
(b) What are the types of fuels used in thermal power plants? Explain in detail. 7M

**UNIT – II**

3. (a) Draw the general layout of a hydroelectric power plant explain about the function of main components of a hydroelectric power plant. 10M  
(b) What are the disadvantages of hydro power station? 4M

**(OR)**

4. (a) What is Nuclear Fusion? How does it differ from Nuclear Fission? Briefly explain about chain reaction. 6M  
(b) Explain with neat diagram the function of boiling water reactor. Mention its advantages and disadvantages. 8M

**UNIT – III**

5. (a) What are the main components of a flat plate collector? Explain the function of each component. 8M  
(b) Write short notes on solar distillation and solar drying. 6M

**(OR)**

6. (a) Explain the various methods to extract geothermal energy. 8M  
(b) What are the specific environmental effects if the geothermal source of energy is used for the power generation? 6M

**UNIT – IV**

7. (a) Describe the horizontal and vertical axis wind turbine configurations with neat sketches. 10M  
(b) List out any four main consideration in selecting a site for wind power generation 4M

**(OR)**

8. (a) Explain about the role and potential of wind energy option. 6M  
(b) Discuss the advantages and disadvantages of horizontal and vertical axis windmills. 8M

**UNIT-V**

9. (a) With the help of neat diagrams, explain the biogas plants of floating type and fixed type systems. 10M  
(b) Mention any four advantages of anaerobic digestion. 4M

**(OR)**

10. (a) What is the basic principle of Ocean Thermal Energy Conversion? Explain. 7M  
(b) What is the phenomenon of tides? Classify them and explain the reason for tides. 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Switching Theory and Logic Design (ECE & EEE)***

**Time: 3 Hours****Max. Marks: 70****Answer any FIVE Questions choosing one question from each unit.****All questions carry Equal Marks.****UNIT - I**

1. (a) Why the binary number system is used in computer design? And what is the necessity of binary codes? 6M  
(b) Perform the subtraction with the following unsigned binary numbers by taking the 2's complement of the subtrahend: (i) 110110-10110. (ii) 10110-11010. 8M

**(OR)**

2. (a) What are reflective codes? Explain with an example. 7M  
(b) Determine the Hamming code for the binary sequence 11011. 7M

**UNIT – II**

3. Simplify the following Boolean function using tabulation method. 14M  
 $Y(A,B,C,D)=\Sigma(1,3,5,8,9,11,15)$

**(OR)**

4. (a) Simplify the following Boolean functions, using Karnaugh maps: 7M  
 $F(A,B,C,D)=\Sigma(2,3,6,7,12,13,14)$   
(b) Simplify and implement the following function with two-level NAND gate circuit: 7M  
 $F(A,B,C,D)=A'B'C'D+CD+AC'D$

**UNIT – III**

5. (a) Explain how a decoder can be converted into a de-multiplexer with relevant block diagrams and truth tables. 7M  
(b) Explain the function of Digital magnitude comparator using a neat diagram. 7M

**(OR)**

6. (a) What is decoder? Construct 3\*8 decoder Using logic gates and truth table. 7M  
(b) Implement the following multiple output combinational logic using 4 line to 16 line decoder? 7M

**UNIT – IV**

7. (a) Derive the PLA programming table for the combinational circuit that squares a 3-bit number. 7M  
(b) Design a BCD to excess-3 code convert using: (i) ROM. (ii) PAL. 7M

**(OR)**

8. (a) Implement the following Boolean function using PROM:  $F(A,B,C)=\Sigma(1,3,4,5,6)$ . 8M  
(b) Compare PLA and PAL. 6M

**UNIT-V**

9. (a) Convert the following: (i) JK flip-flop to T flip-flop. (ii) RS flip-flop to D flip-flop. 8M  
(b) Draw the circuit diagram of 4-bit Ring Counter D flip-flop and explain its Operation with the help of bit pattern 6M

**(OR)**

10. (a) Compare synchronous and asynchronous Sequential circuits with examples 7M  
(b) Design a Mod-6 synchronous counter using JK flip-flops? With state Table and K-map simplification. 7M



**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Analog Electronic Circuits (EEE)***

**Time: 3 Hours****Max. Marks: 70****Answer any FIVE Questions choosing one question from each unit.****All questions carry Equal Marks.****UNIT - I**

1. (a) Analyze a Common Base Amplifier with  $R_s = 50 \Omega$ ,  $R_B = 50 K\Omega$  and  $R_L = 2 K\Omega$  at low frequencies for Voltage gain, Current Gain, Input impedance and Output impedance? 7M
- (b) Analyze the Common Emitter Amplifier with an emitter resistor at low frequencies for Voltage gain, Current Gain, Input impedance and Output impedance? 7M

**(OR)**

2. (a) Analyze a Common Emitter Amplifier with  $R_s = 100 \Omega$  and  $R_L = 4K\Omega$  at low frequencies for Voltage gain, Current Gain, Input impedance and Output impedance? 7M
- (b) State the Miller's theorem with the aid of a circuit diagram? Repeat for the dual of Miller's theorem? 7M

**UNIT – II**

3. (a) Discuss the effect of emitter bypass capacitor and input & output coupling capacitors on the lower cut-off frequency if number of amplifiers are cascaded? 7M
- (b) Three identical stages of amplifiers cascaded with lower and upper cut off frequencies given by 300 Hz and 5 kHz respectively, compute the overall lower and higher cut off frequencies? 7M

**(OR)**

4. (a) A two-stage cascaded amplifier system is built with stage voltage gains 25 and 40. Both the stages have same bandwidth of 220 kHz with identical lower cut-off frequency of 500 Hz. Find the overall gain and bandwidth product? 7M
- (b) Explain the working of RC coupled amplifier with the help of neat diagram. Explain the effect of coupling capacitor on low frequency response of RC coupled amplifier? 7M

**UNIT – III**

5. (a) An amplifier with an open loop voltage gain of 1000 delivers 10 W of power output at 10% harmonic distortion when input is 10 mV. If 40 dB negative feedback is applied and output power is to remain at 10 W, determine required input signal and second harmonic distortion with feedback. 7M
- (b) What are the different types of negative feedback? Briefly explain how the input and output impedances of an amplifier are affected by the different types of negative feedback? 7M

**(OR)**

6. (a) Sketch the circuit of a RC phase shift oscillator? Derive the expression for frequency of oscillations? 7M
- (b) Sketch the circuit of a Hartley oscillator? Derive the expression for frequency of oscillations? 7M

**UNIT – IV**

7. (a) What are Phase inverters? Explain any two types of Phase inverters with neat diagrams? 7M
- (b) What is push-pull amplifier? Why is it named so? Explain the operation of push-pull amplifier operation with appropriate example? 7M

**(OR)**

8. (a) Draw a practical circuit of a complimentary symmetry push pull amplifier circuit? 7M

Explain its function?

- (b) Explain the origin of cross over distortion? Describe a method to minimize this distortion? 7M

**UNIT-V**

9. (a) Describe how a transistor acts as a switch with neat sketches? 7M  
(b) Define Clamper? Explain positive Clamper with neat sketches? 7M

**(OR)**

10. (a) Explain the operation of Astable Multivibrator with neat sketches? 7M  
(b) Define Clipper? Explain positive Clipper with neat sketches? 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Probability Theory & Stochastic Processes (ECE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) Explain in detail about Bayes theorem. 8M  
(b) When a die is tossed find the probabilities of the event  $A = \{\text{odd number shown up}\}$ ; 6M  
 $B = \{\text{Number larger than 3 shown up}\}$  then find out  $A \cup B$  and  $A \cap B$ .

**(OR)**

2. (a) Consider the experiment of tossing four fair coins. The random variable X is 7M  
associated with the number of tails showing. Compute and sketch the CDF of X.  
(b) Define probability density function. List its properties. 7M

**UNIT – II**

3. (a) State and Prove properties of Characteristic function. 7M  
(b) State and Prove properties of Moment generating function. 7M

**(OR)**

4. Define Expected value, Skew and Coefficient of skewness and also prove all the 14M  
properties of variance.

**UNIT – III**

5. Define Covariance and prove all the Properties of Covariance. 14M

**(OR)**

6. (a) State and Prove properties of Joint Characteristic function. 7M  
(b) State and Prove properties of Joint Moment generating function. 7M

**UNIT – IV**

7. (a) Explain about mean-ergodic process. 6M  
(b) If  $x(t)$  is a stationary random process having mean = 3 and auto correlation function: 8M  
 $R_{XX}(\tau) = 9 + 2e^{-|\tau|}$ . Find the mean and variance of the random variable.

**(OR)**

8. Given  $\bar{X} = 6$  and  $R_{XX}(t, t+\tau) = 36 + 25 \exp(-\tau)$  for a random process  $X(t)$ . Indicate 14M  
which of the following statements are true based on what is known, with certainty  
: $X(t)$   
a) Is First order stationary    b) has total average power of 61 W    c) is ergodic  
d) is WSS    e) has a periodic component    f) has an AC power of 36 W

**UNIT-V**

9. (a) Explain the concept of band limited process and list out its properties. 7M  
(b) Explain the relationship between the cross-correlation function and the cross 7M  
power spectral density.

**(OR)**

10. (a) Explain different types of Random processes 8M  
(b) State the properties of Band Limited Random processes. 6M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Electromagnetic Waves & Transmission Lines (ECE)***

**Time: 3 Hours****Max. Marks: 70****Answer any FIVE Questions choosing one question from each unit.****All questions carry Equal Marks.****UNIT - I**

1. (a) Explain the relations between E and H in Uniform plane wave. 7M  
(b) An EM wave travelling in air is incident normally on boundary between air and a dielectric having permeability same as free space and permittivity as 4. Prove that one-ninth of the incident power is reflected and eight-ninths of it is transmitted into the second medium 7M

**(OR)**

2. (a) Derive the expression for intrinsic impedance in a uniform plane wave in lossy dielectric. 7M  
(b) What are the wave equations for a lossless medium and a conducting medium for sinusoidal variations? 7M

**UNIT – II**

3. (a) Explain oblique incidence wave propagation with perpendicular polarization. 7M  
(b) Explain the concept of critical angle and total internal reflections 7M

**(OR)**

4. (a) State and prove Poynting theorem. 7M  
(b) An EM wave travelling in air is incident normally on boundary between air and a dielectric having permeability same as free space and permittivity as 4. Prove that one-ninth of the incident power is reflected and eight-ninths of it is transmitted into the second medium. 7M

**UNIT – III**

5. (a) Draw an equivalent circuit of a two-wire transmission line and mention its applications 7M  
(b) A two-wire line has a characteristic impedance of  $300\Omega$  and is fed to a  $90\Omega$  resistor at 100 MHz. A quarter wave line is to be used as a tube, 0.25 inch in diameter. Find centre-to-centre spacing in air? 7M

**(OR)**

6. (a) Derive the expression for propagation constant of infinite transmission line. 7M  
(b) What is loading? Explain different types of loading in transmission lines. 7M

**UNIT – IV**

7. (a) Derive the expression for input impedance of a line when it is terminated by  
i)  $Z_0$  ii) Shorted line iii) Open line. 7M  
(b) Explain the principle of impedance matching with quarter wave transformer. 7M

**(OR)**

8. (a) Explain how double stub is used for matching with suitable diagram? Derive equations for its length and location. 7M  
(b) Give details about smith chart and write steps how to calculate impedance, reactance and wavelength using this chart 7M

**UNIT-V**

9. Explain the significance of the following terms as applicable to parallel plane waveguides. 14M  
i) Wave impedance ii) Phase and group velocities.  
iii) Principal wave and its characteristics.

**(OR)**

10. (a) Derive the expression for cut off frequency of rectangular cavity resonator. 7M  
(b) Find the broad wall dimensions of a rectangular waveguide when the cut-off frequency for  $TE_{21}$  mode is 3GHz 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Pulse and Digital Circuits (ECE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) A 10 V Step is switched on to a 50 K $\Omega$  resistor in series with a 500pF capacitor. Calculate the rise time of the Capacitor Voltage, the time for the capacitor to charge to 63.2% of its maximum voltage and the time for the capacitor to be completely charge. 6M
- (b) Draw the output waveform of an RC high-pass circuit with a square wave input under different time constants. Derive the expression for percentage of tilt. 8M
- (OR)
2. (a) Explain in detail about different types of Attenuators. 7M
- (b) Explain in detail about RC High Pass Circuit with pulse Input with neat diagrams for different time constants? 7M

**UNIT – II**

3. Define Clamping and explain different types of Clamping circuits? 14M
- (OR)
4. (a) Explain in detail about different types of Shunt Clippers? 7M
- (b) Explain in detail about Transistor Clippers? 7M

**UNIT – III**

5. Design a collector coupled astable multivibrator using NPN silicon transistors with  $h_{fc}=30$ ,  $r_{bb}=150$  ohms supplied with  $V_{cc}=10V$  and circuit component values are  $R_c=1.5K\Omega$  and  $C=250pF$ . 14M
- (OR)
6. Explain in detail about Schmitt trigger with the help of neat diagram and derive expressions for UTP and LTP? 14M

**UNIT – IV**

7. (a) Explain the working of a transistor Bootstrap sweep circuit 7M
- (b) Explain in detail about UJT and Sweep Circuit generation using UJT? 7M

**(OR)**

8. Explain in detail about Transistor Bootstrap Time Base generator? 14M

**UNIT-V**

9. (a) Explain the characteristics and implementation of CMOS & ECL digital logic family. 7M
- (b) Draw the circuit diagram of TTL logic OR, AND gates and explain its operation 7M

**(OR)**

10. (a) Explain the function of a sampling gate used in sampling scopes also explain how sampling gate is used in chopping amplifiers. 8M
- (b) Compare IC Logical families 6M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Electronic Circuit Analysis (ECE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT – I**

1. (a) Define the terms: voltage gain, current gain, and conversion efficiency 6M  
(b) Draw an amplifier circuit using FET amplifier and explain its operation. 8M

**(OR)**

2. (a) What is half power point? What is its importance in amplifier design? 6M  
(b) Explain different FET biasing methods. Also explain their limits. 8M

**UNIT – II**

3. (a) What are the effects of various capacitors on frequency response? 6M  
(b) A CE amplifier has the H-parameters given as  $h_{ie}=1000\Omega$ ,  $h_{re}=2 \times 10^{-4}$  and  $h_{oe}=25\mu mho$  both the load and source resistance are  $1k\Omega$  determine current gain and voltage gain. 8M

**(OR)**

4. (a) Write short notes on coupling schemes in amplifiers. 7M  
(b) Explain the operation of cascade amplifier with suitable diagram. 7M

**UNIT – III**

5. (a) Write a short note on choice of transistor configuration in cascade amplifiers. 6M  
(b) Derive the expression for  $A_i$ ,  $A_v$ ,  $R_i$ ,  $R_o$  of two stage RC coupled CE amplifier. 8M

**(OR)**

6. (a) Discuss the high frequency response of FET amplifier. 7M  
(b) Explain the operation of Bootstrap emitter follower circuit. 7M

**UNIT – IV**

7. (a) Write a note on LC tank circuit operation with necessary diagrams. 6M  
(b) Derive the frequency expression of colpitts oscillator. 8M

**(OR)**

8. (a) Derive the expression for voltage series feedback amplifier. 8M  
(b) Discuss the classification of feedback amplifiers. 6M

**UNIT-V**

9. (a) Explain the operation of stagger tuned amplifier with necessary diagrams. 7M  
(b) Discuss the complementary symmetry pushpull amplifier in detail. 7M

**(OR)**

10. (a) What are the effects of cascading double tuned amplifiers on bandwidth? 7M  
(b) Derive the power efficiency of class D power amplifier. 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Analog Communications (ECE)***

**Time: 3 Hours****Max. Marks: 70****Answer any FIVE Questions choosing one question from each unit.****All questions carry Equal Marks.****UNIT - I**

1. (a) Explain Hilbert transform with any two properties 7M  
(b) Briefly explain VSB modulation with a neat diagram and waveforms 7M

**(OR)**

2. (a) Explain the working principle of FDM system with a neat diagram 7M  
(b) Explain different types of modulation and its need. 7M

**UNIT – II**

3. (a) Explain the indirect method of generation of FM wave and any one method of demodulating an FM wave 7M  
(b) Explain phase modulation with an example 7M

**(OR)**

4. (a) Explain about i) Multi-tone FM ii) Narrow band FM 7M  
(b) Derive expression for single tone modulated FM wave and plot the necessary waveforms. 7M

**UNIT – III**

5. (a) With block diagram explain the FM Stereo broadcasting Transmitter. 7M  
(b) Briefly explain about (i) Choice of intermediate frequency (IF) 7M  
(ii) Automatic gain control (AGC)

**(OR)**

6. (a) With the help of the block diagram explain the working principle of super heterodyne receiver in detail. List out the advantages 7M  
(b) Explain the block diagram of radio broadcast AM and FM transmitters 7M

**UNIT – IV**

7. (a) Derive the equation for noise figure of FM receiver 7M  
(b) Explain the terms i) Noise calculations ii) Noise equivalent resistant 7M

**(OR)**

8. (a) Derive the Noise Figure for cascade stages. 7M  
(b) What is significance of Pre-emphasis and De-emphasis explain with neat sketch. 7M

**UNIT-V**

9. (a) Draw the circuit of PPM demodulator and explain the operation 7M  
(b) Describe the generation and demodulation of PPM with the help of block diagram 7M

**(OR)**

10. (a) Explain the generation of PAM with neat block diagram. 7M  
(b) Compare the pulse modulation systems and continuous modulation systems 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Manufacturing Technology (ME)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) List out the various types of pattern and explain any three patterns with suitable sketch? 7M  
(b) Discuss the importance the gating system in metal casting? 7M

**(OR)**

2. (a) Classify the pattern materials and describe any four pattern materials based on the merits and demerits of them? 7M  
(b) What are properties of the molding sand and explain any three important properties? 7M

**UNIT – II**

3. Sketch and describe the operation of the centrifugal casting along with its applications? 14M

**(OR)**

4. (a) Explain the function of riser? 7M  
(b) List of the various casting defects and describe the remedy for blowhole and shrinkage cavity? 7M

**UNIT – III**

5. Describe the principle and operation of the resistance welding? 14M

**(OR)**

6. Explain the oxy-acetylene cutting and explain its advantages and limitations? 14M

**UNIT – IV**

7. Sketch and explain the friction welding? List out the merits and demerits? 14M

**(OR)**

8. Distinguish the soldering, welding and brazing with suitable sketch? 14M

**UNIT-V**

9. Explain the hot and cold extrusion with suitable sketches? 14M

**(OR)**

10. Differentiate the roll forging and rotary forging with respect to the principle and operation? 14M





**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Thermal Engineering - I (ME)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. Illustrate the constructional details of I.C engines Explain briefly about the important components and its materials? 14M

**(OR)**

2. Explain the working principle of four stroke S.I engine with valve timing diagram? 14M

**UNIT – II**

3. Explain the working of Zenith carburetor with a neat sketch? 14M

**(OR)**

4. With a neat sketch explain the Magneto coil ignition system? 14M

**UNIT – III**

5. What are the different stages of combustion in C.I engines? Explain with p-θ diagram? 14M

**(OR)**

6. Explain what do you understand by octane number(S.I engine) and cetane number (C.I engine) rating of a fuel? 14M

**UNIT – IV**

7. (a) Describe the method of measuring mean effective pressure of an I.C engine? 7M  
(b) Name the various measurements which are to be taken in a test of an I.C engine and explain the purpose of engine testing? 7M

**(OR)**

8. A four cylinder two stroke cycle petrol engine develops 23.5KW brake power at 2500rpm. The mean effective pressure on each piston is 8.5 bar and mechanical efficiency is 85%. Calculate the diameter and stroke of each cylinder, assuming the length of stroke equal to 1.5 times the diameter of cylinder 14M

**UNIT-V**

9. (a) Describe the working of a single stage reciprocating air compressor? 7M  
(b) Determine the size of the cylinder for a double acting air compressor of 40KW indicated power in which air is drawn in at 1 bar and 15<sup>0</sup> C and compressed according to the law  $PV^{1.2} = \text{Constant}$ , to 6 bar. The compressor runs at 100 rpm, with average piston speed of 152.5 m/min. Neglect clearance volume. 7M

**(OR)**

10. (a) When is multi stage compression used for air? What are its advantages? 7M  
(b) Find the percentage saving in work by compressing air in two stages from 1 bar to 7 bar instead of in one stage. Assume compression index 1.35 in both the cases and optimum pressure and complete inter cooling in two stage compressor? 7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
**SUB: Kinematics of Machinery (ME)**

Time: 3 Hours

Max. Marks: 70

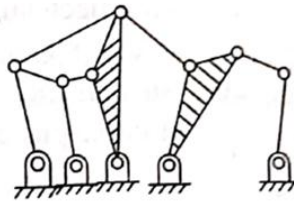
**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. Explain the inversions of a Four bar chain with neat sketches. 14M

**(OR)**

2. (a) Define the following: (i) Machine (ii) Mechanism (iii) kinematic pair 6M  
 (b) Calculate the mobility for the given figure. 8M

**UNIT – II**

3. Explain Tchebicheff Mechanism and its mathematical proof by using a neat sketch. 14M

**(OR)**

4. Derive an expression for the ratio of shafts velocities for Hooke's joint and draw the polar diagram depicting the salient features of driven shaft speed? 14M

**UNIT – III**

5. In a slider crank mechanism, the crank is 200 mm long and rotates at 40 rad/sec in a CCW direction. The length of the connecting rod is 800 mm. When the crank turns through  $60^\circ$  from Inner-dead center. 14M

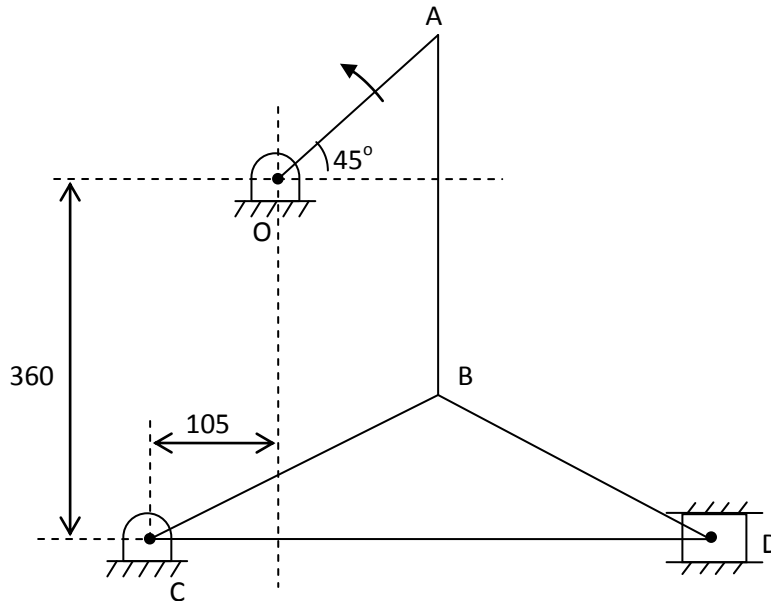
Determine,

- (i) The velocity of the slider
- (ii) Velocity of point E located at a distance of 200 mm on the connecting rod extended.
- (iii) The position and velocity of point F on the connecting rod having the least absolute velocity.
- (iv) The angular velocity of connecting rod.
- (v) The velocity of rubbing of pins of crank shaft, crank and cross head having pins diameters 80, 60 and 100 mm respectively.

**(OR)**

6. In the toggle mechanism shown in figure the slider D is constrained to move in a horizontal path the crank OA is rotating in CCW direction at a speed of 180 rpm the dimensions of various links are as follows:

$$\begin{aligned} OA &= 180 \text{ mm} & CB &= 240 \text{ mm} \\ AB &= 360 \text{ mm} & BD &= 540 \text{ mm} \end{aligned}$$



Find using IC Method,

- (i) Velocity of slider                      (ii) Angular velocity of links AB, CB and BD.

#### UNIT – IV

7. Discuss the displacement, velocity and acceleration diagrams when the follower moves with uniform acceleration and retardation. 14M

(OR)

8. Explain with sketches the different types of cams and followers. 14M

#### UNIT-V

9. Derive an expression for the condition of constant velocity ratio for transmission of motion with a neat sketch. 14M

(OR)

10. Derive an expression for the minimum number of teeth required on the pinion in order to avoid interference in involute gear teeth when it meshes with wheel. 14M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA****B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022*****SUB: Composite and Nano Materials (ME)*****Time: 3 Hours****Max. Marks: 70****Answer any FIVE Questions choosing one question from each unit.****All questions carry Equal Marks.****UNIT - I**

1. (a) What are the induced effects due to increase in surface area of nanoparticles? 7M  
(b) Write some applications of Composites? 7M

**(OR)**

2. (a) Explain the fabrication methods of fiber glass reinforced composites by prepreg production process with neat sketch ? 8M  
(b) What are zero, one and two dimensional nano structures? 6M

**UNIT – II**

3. Describe the properties and applications of Polymer Matrix Composites(PMC) and Metal Matrix Composites.(MMC) 14M

**(OR)**

4. (a) What are the advantages and disadvantages in mechanical synthesis of nano powders? 8M  
(b) How electrical properties of nano particles are different than its bulk value. 6M

**UNIT – III**

5. Describe the Ceramic Composite Materials 14M  
(i) Reinforced Cement Concrete (RCC)  
(ii) Pre-stressed Concrete (PC)

**(OR)**

6. Explain briefly about Post Tensioning in Reinforced Concrete (PTRC) and applications of PTRC 14M

**UNIT – IV**

7. Define Ceramics? List out the classifications and applications of Ceramic materials. 14M

**(OR)**

8. How electrical properties of nano particles are different than its bulk value. 14M

**UNIT-V**

9. Explain Chemical Vapor Deposition of Carbon Nanotubes 14M

**(OR)**

10. Explain the different types of advanced ceramics with properties and applications. 14M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
**SUB: Probability & Statistics (ME & CSE)**

Time: 3 Hours

Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**

**All questions carry Equal Marks.**

**UNIT - I**

1. (a) A random variable  $X$  has the following probability function: 7M

$x$	0	1	2	3	4	5	6	7
$p(x)$	0	$k$	$2k$	$2k$	$3k$	$k^2$	$2k^2$	$7k^2 + k$

(i) Find the value of  $k$  (ii) Evaluate  $P(X < 6)$ ,  $P(X \geq 6)$  (iii)  $P(0 < X < 5)$

- (b) A variate  $X$  has the probability distribution 7M

$x$	-3	6	9
$P(X = x)$	1/6	1/2	1/3

Find  $E(X)$  and  $E(X^2)$ . Hence evaluate  $E(2X + 3)^2$ .

**(OR)**

2. The frequency function of a continuous random variable is given by 14M  
 $f(x) = y_0 x(2 - x)$ ,  $0 \leq x \leq 2$ . Find the value of  $y_0$ , mean and variance of  $x$ .

**UNIT – II**

3. (a) In sampling a large number of parts manufactured by a machine, the mean number of defectives in a sample of 20 is 2. Out of 1000 such samples, how many would be expected to contain at least 3 defective parts. 7M

- (b) Fit a Poisson distribution to the following: 7M

$x$	0	1	2	3	4
$f$	46	38	22	9	1

**(OR)**

4. (a) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and S.D. of the distribution. 7M

- (b) A random variable  $X$  has a uniform distribution over  $(-3, 3)$ , find  $k$  for which 7M  
 $P(X > k) = \frac{1}{3}$ . Also evaluate  $P(X < 2)$  and  $P(|X - 2| < 2)$ .

**UNIT – III**

5. (a) The mean life time of a sample of 100 fluorescent light tubes produced by a company is computed to be 1570 hours with a standard deviation of 120 hours. The company claims that the average life of the tubes produced by the company is 1600 hours. Using the LOS of 0.05, is the claim acceptable? 7M

- (b) Before an increase in excise duty on tea, 800 people out of a sample of 1000 were consumers of tea. After the increase in duty, 800 people were consumers of tea in a sample of 1200 persons. Find whether there is a significant decrease in the consumption of tea after the increase in duty. 7M

**(OR)**

6. (a) The following data relate to the marks obtained by 11 students in two tests, one held at the beginning of a year and the other at the end of the year after intensive coaching. 7M

Test 1:	19	23	16	24	17	18	20	18	21	19	20
Test 2:	17	24	20	24	20	22	20	20	18	22	19

Do the data indicate that the students have benefitted by coaching?

- (b) Two samples of sizes 9 and 8 gave the sums of squares of deviations from their respective means equal to 160 and 91 respectively. Can they be regarded as drawn 7M

from the same normal population?

**UNIT – IV**

7. (a) Psychological tests of intelligence and of engineering ability were applied to 10 students. Here is a record of ungrouped data showing intelligence ratio (I.R.) and engineering ratio (E.R.). Calculate the co-efficient of correlation. 7M

Student	A	B	C	D	E	F	G	H	I	J
I.R.	105	104	102	101	100	99	98	96	93	92
E.R.	101	103	100	98	95	96	104	92	97	94

- (b) In a partially destroyed laboratory record, only the lines of regression of  $y$  on  $x$  and  $x$  on  $y$  available as  $4x - 5y + 33 = 0$  and  $20x - 9y = 107$  respectively. Calculate  $\bar{x}$ ,  $\bar{y}$  and the coefficient of correlation between  $x$  and  $y$ . 7M

**(OR)**

8. (a) Find the regression line of  $x$  on  $y$  for the following data. 7M

$x$	2	4	6	8	10
$y$	5	7	9	8	11

- (b) Three Judges A, B, C give the following ranks. Find which pair of judges has common approach. 7M

A	1	6	5	10	3	2	4	9	7	8
B	3	5	8	4	7	10	2	1	6	9
C	6	4	9	8	1	2	3	10	5	7

**UNIT-V**

9. The following are the samples means and ranges for 10 samples each of size 5. Construct a  $\bar{X}$  – chart and a  $R$  chart and determine whether the process is in control. 14M

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	20	34	45	39	26	29	13	34	37	23
Range	23	39	15	05	20	17	21	11	40	10

**(OR)**

10. (a) Explain the procedure of construction of p-chart. 7M  
 (b) Construct a control chart for the number of defectives from the following data pertaining to the number of imperfections in 20 pieces of cloth of same length in a certain make of polyester and infer whether the process is in a state of control. 7M  
 2, 3, 5, 8, 12, 2, 3, 4, 6, 5, 6, 5, 6, 10, 4, 6, 5, 7, 9, 3

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Computer Organization (CSE)***

**Time: 3 Hours****Max. Marks: 70****Answer any FIVE Questions choosing one question from each unit.****All questions carry Equal Marks.****UNIT - I**

1. (a) Explain about Basic performance equation of computer in detail 7M  
(b) Explain about Functional unit of a computer with neat diagram? 7M

**(OR)**

2. (a) Explain about Floating point addition and subtraction with suitable example. 7M  
(b) Explain about Basic performance equation of computer in detail 7M

**UNIT – II**

3. Explain about Addressing modes with neat Diagrams in Detail. 14M

**(OR)**

4. (a) Design a 4-bit adder/sub tractor using full adder and explain its function. 7M  
(b) Design 4-bit Binary incrementor and explain 7M

**UNIT – III**

5. (a) Explain about Micro program sequencer with its neat diagram. 7M  
(b) Explain about control memory? 7M

**(OR)**

6. (a) How the Address sequencing in Computer for Micro Program Explain? 10M  
(b) Draw the Booth multiplication for 2's complement numbers Flow Chart? 4M

**UNIT – IV**

7. What is "Cache Memory"? Explain about various mapping procedures. 14M

**(OR)**

8. Explain the following. 14M  
(i) Virtual Memory  
(ii) DMA Transfer

**UNIT-V**

9. (a) What is Parallel Processing? Explain. 4M  
(b) Explain about Pipelining with 4-segment pipeline? 10M

**(OR)**

10. (a) Explain about Hyper Cube Network? 7M  
(b) Explain about parallel arbitration procedure? 7M



**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Java Programming (CSE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) Explain in detail about buzz words of Java 7M  
(b) Describe the four object oriented programming features 7M

**(OR)**

2. (a) Explain about access control in java. 7M  
(b) Write a java program to print first 100 Fibonacci numbers. 7M

**UNIT – II**

3. (a) Write a java program to perform matrix multiplication 7M  
(b) Explain about multilevel inheritance. 7M

**(OR)**

4. (a) What is the difference between classes and inheritance with example 7M  
(b) Define package. Write down steps to create a package with example. 7M

**UNIT – III**

5. Write a java program to read the input from the user. If the input is –ve number then program should raise the user defined exception. 14M

**(OR)**

6. (a) Write a java program that creates a thread by extending the thread class. 7M  
(b) Explain about thread priorities in java with suitable example. 7M

**UNIT – IV**

7. Write a java program that counts number of lines, words, alphabets and special characters in a text 14M

**(OR)**

8. (a) Explain in detail about mouse and keyboard events in java 7M  
(b) Explain button and text components in java 7M

**UNIT-V**

9. (a) Explain about Jframes and JComponents in Swings. 7M  
(b) Explain checkboxes and Radio button in swings with example program 7M

**(OR)**

10. Create a applet to display the greeting message to the user “Good Morning” or “Good Evening” based on character pressed ‘M’ or ‘E’ respectively. 14M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Formal Languages and Automata Theory (CSE)***

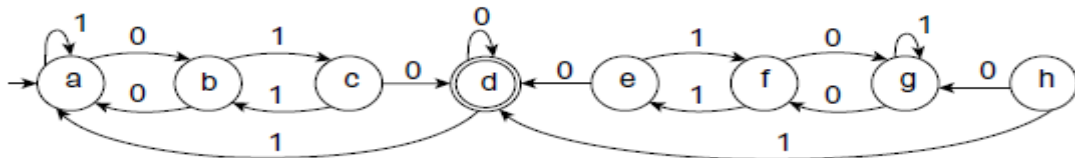
**Time: 3 Hours**

**Max. Marks: 70**

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. Minimize the following DFA 14M



**(OR)**

2. Design a Moore machine for a binary input sequence such that if it has a substring 101, the machine output A, if the input has substring 110, it outputs B otherwise it outputs C 14M

**UNIT – II**

3. (a) State and prove Arden’s theorem 7M  
 (b) Write the closure properties of Regular languages 7M

**(OR)**

4. Write res for the following languages: 14M  
 i)Accepting all combinations of a’s over the set  $\Sigma = \{a\}$   
 ii)Accepting all combinations of a’s over the set  $\Sigma = \{a\}$  except null string  
 iii)Accepting any no of a’s and b’s  
 iv)Strings ending with 00 over the set  $\{0,1\}$   
 v)Strings starts with 1 and ends with 0 over the set  $\{0,1\}$   
 vi)Any no of a’s followed by any no of b’s then followed by any no of c’s  
 vii)starting and ending with a and having any combination of b's in between.

**UNIT – III**

5. (a) Construct CFG for defining palindrome over  $\{a \text{ or } b\}$ . 7M  
 (b) Prove that the grammar is ambiguous.  $S \rightarrow E + E / E * E / id$  7M

**(OR)**

6. Convert the grammar into CNF.  $S \rightarrow bA/aB, A \rightarrow bAA/aS/a, B \rightarrow aBB/bS/a$  14M

**UNIT – IV**

7. Design a PDA which accepts equal number of a’s and b’s over  $\Sigma = \{a, b\}$ . Test whether the string abbbaa is accepted or not 14M

**(OR)**

8. (a) Convert the following CFG in to PDA  $S \rightarrow aAA, A \rightarrow aS/bS/a$  14M

**UNIT-V**

9. (a) Design a TM for palindrome strings over  $\{a,b\}$  7M  
 (b) Design TM for Multiplication of two integers 7M

**(OR)**

10. (a) Write the variations of the TM 7M  
 (b) Consider the following sequence and find whether it has a solution (decidable) or not. 7M

i	List A	List B
1	1	111
2	10111	10
3	10	0



**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Database Management Systems (CSE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) Differentiate Data base system and File system. List the Data base system applications. 8M  
(b) Write short notes on Database Users and Administrators. 6M

**(OR)**

2. (a) Explain aggregation and weak entity sets with suitable examples 7M  
(b) Draw ER diagram for college environment incorporating all the ER notations with explanation. 7M

**UNIT – II**

3. (a) Write about SQL joins with an example. 7M  
(b) Explain Set Operations in SQL with examples. 7M

**(OR)**

4. (a) What is trigger? Explain with an example 7M  
(b) Discuss about Domain Relational Calculus. 7M

**UNIT – III**

5. What is Normalization? Explain the Normal Forms (1NF, 2NF, 3NF) in detail. 14M

**(OR)**

6. (a) Write short notes on Fourth Normal Form 8M  
(b) What is redundancy? Explain the problems caused by redundancy. 6M

**UNIT – IV**

7. (a) Briefly discuss about Measures of cost. 7M  
(b) Write short notes on selection operation in Query processing. 7M

**(OR)**

8. (a) What is transaction? Explain ACID properties of a transaction. 8M  
(b) Write short notes on transactions as SQL statements. 6M

**UNIT-V**

9. What is a time-stamp? Write about time-stamp based protocol. 14M

**(OR)**

10. (a) What is a log-based recovery? Explain 8M  
(b) Write short notes on failure classification 6M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Operating Systems (CSE)***

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

**Answer any FIVE Questions choosing one question from each unit.**  
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) State and explain the various types of system calls in detail. 7M  
(b) Explain in detail simple and layered approach of operating system structure. 7M

**(OR)**

2. (a) Discuss in detail the functions provided by the operating system. 7M  
(b) Explain the operating system services in detail. 7M

**UNIT – II**

3. (a) Give solution to the critical section problems using locks. 7M  
(b) What is a semaphore? Explain the usage and implementation of semaphores 7M

**(OR)**

4. (a) State and explain the various fields of a process control block. 7M  
(b) Explain Round Robin and Priority Scheduling algorithms. 7M

**UNIT – III**

5. Consider the following page-reference string: 2,3,2,1,5,2,4,5,3,2,5,2 14M  
How many page faults occur for the following replacement algorithms, assuming three frames i) FIFO ii) LRU

**(OR)**

6. (a) Explain the concept of swapping 7M  
(b) What is paging? Explain the basic method for implementing paging. 7M

**UNIT – IV**

7. (a) Explain the different types of file access methods 7M  
(b) Write short note on file-system mounting 7M

**(OR)**

8. (a) Explain deadlock prevention process in detail. 7M  
(b) Discuss in detail the deadlock recovery techniques 7M

**UNIT-V**

9. Discuss user authentication in detail. 14M

**(OR)**

10. Explain access matrix in detail. 14M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**  
**B. Tech. IV Semester (R15) Supplementary Examinations of February – 2022**  
***SUB: Mechanics of Fluids (ME)***

**Time: 3 Hours****Max. Marks: 70****Answer any FIVE Questions choosing one question from each unit.****All questions carry Equal Marks.****UNIT - I**

1. (a) State and explain the Newton's law of viscosity. Explain with examples the classification of fluids on the basis of this law. 7M
- (b) A vertical rectangular gate of 4m width and 2m depth is hinged at a point 0.25 m below the centre of gravity of the gate. If the top edge of gate is 5 m below free surface of water and total depth of water is 7 m, what horizontal force must be applied at the bottom to keep the gate closed? 7M

**(OR)**

2. Dynamic viscosity of oil used for lubrication between a shaft (journal) and bearing is 6 poise. The shaft is of diameter 400 mm and rotates at 190 rpm. Calculate the power lost in the bearing for 90 mm long Journal bearing arrangement. Thickness of oil is 1.5 mm. 14M

**UNIT – II**

3. The velocity vector for 2D incompressible, fluid flow is given by  $V = (y^3/3 + 2x - x^2)y\mathbf{i} + (xy^2 - 2y - x^3/3)\mathbf{j}$  Find a) whether the flow is possible or impossible. b) Whether the flow is rotational or irrotational. 14M

**(OR)**

4. Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC and the velocity in CE. 14M

**UNIT – III**

5. What is a Venturi meter? Derive an expression for the discharge through a venturi meter. 14M

**(OR)**

6. Explain the working principle of Pitot tube and Pitot-static tube with neat sketches. 14M

**UNIT – IV**

7. Describe the methods of preventing the separation of boundary layer. 14M

**(OR)**

8. With a neat sketch explain the development of boundary layer over a horizontal flat plate which is kept in a flow field. 14M

**UNIT-V**

9. Derive an expression for total pressure and center of pressure on an inclined plane surface submerged in a liquid. 14M

**(OR)**

10. A cylinder rotates at 150 rpm with its axis perpendicular in an air stream which is having uniform velocity of 25 m/s. The cylinder is 1.5 m in diameter and 10 m long. Assuming ideal fluid theory, find i) the circulation ii) lift force and iii) position of stagnation points. Take density of air as  $1.25 \text{ kg/m}^3$  14M