Q.P. Code: 258812 **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Engineering Geology (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)	Study of Geology is essential for Civil Engineering. Justify with examples.	7M
	(b)	Define weathering. Explain the types of physical weathering.	7M
		(OR)	
2.	(a)	Explain the types of chemical weathering.	7M
	(b)	Describe the agents and signs of the weathering. State its significance.	7M

UNIT – II

3.	(a)	Give a comparative account of different methods of identification of minerals.	7M
	(b)	Describe the physical properties and uses of (i) Quartz (ii) Olivine	7M
		(OR)	
4.	(a)	Diagrammatically explain the various forms of minerals with examples.	7M
	(b)	Describe the physical properties and uses of (i) Magnetite (ii) Galena	7M

UNIT – III

5.	(a)	Explain the Geological classification of rocks and rock cycle.	7M
	(b)	Describe the common structures of Igneous rocks.	7M
		(OR)	
6.	(a)	Describe the genesis Sedimentary rocks.	7M
	(b)	Describe the structures and textures of Metamorphic rocks.	7M

UNIT – IV

7.	(a)	Define folding. Describe the folds like Anticline, Drag, and synclinorium.	7M
	(b)	Enumerate types of folding. Explain the significance of folding in Civil Engineering works.	7M
		(OR)	
8.	(a)	Describe the Step fault, Normal fault and Graben.	7M
	(b)	Explain the soil horizon, soil profile and types of soils.	7M

UNIT-V

9.	(a)	Explain the structural geological controls on selection of dam sites.	7M
	(b)	Explain the causes and remedial measures to prevent landslides.	7M
		(OR)	
10.	(a)	What is the 'Life of Reservoir'? Explain the measures to improve the Life of Reservoir.	7M
	(b)	Explain the terminology of earthquakes and state the precautionary measures to be followed in earthquake prone areas.	7M

Q.P. Code: 259012 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Fluid Mechanics (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) Calculate the specific weight, mass density and specific gravity of one litre of a liquid which weighs 7 N. 7M
   (b) Define surface tension. Obtain the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure. 7M

(OR)

2. (a) Differentiate between: (i) Absolute and gauge pressure (ii) Simple manometer and differential manometer and (iii) Piezometer and pressure gauge. 7M
   (b) Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of the plate is 3 m below the free surface of water. Find the position of centre of pressure also. 7M

UNIT – II

3. (a) Explain the classification of fluid flow. 7M
   (b) A fluid flow field is given by 7M
   $V = x^2yi + y^2zj - (2xyz + yz^2)k$
   Prove that it is a case of possible steady incompressible fluid flow. Calculate the velocity at the point (2, 1, 3).

(OR)

4. (a) Derive the continuity equation for a three-dimensional flow. 7M
   (b) The stream function for a two-dimensional flow is given by $\Psi = 2xy$. Calculate the velocity at the point P (2, 3). Find the velocity potential function Φ. 7M

UNIT – III

5. (a) Derive the Bernoulli's energy equation along a stream line. 7M
   (b) Define an orifice and a mouthpiece. What is the difference between the two? Give the classification of orifices. 7M

(OR)

6. (a) State the momentum equation. How will you apply momentum equation for determining the force exerted by a flowing liquid on a pipe bend? 7M
   (b) The head of water over a rectangular notch is 900 mm. The discharge is $0.3m^3/s$. Find the length of the notch, when $C_d = 0.62$. 7M

UNIT – IV

7. (a) What are the characteristics of laminar and turbulent flows? Explain. 7M
   (b) Derive the Darcy-Weisbach equation for the loss of head due to friction in pipes. 7M

(OR)

8. (a) Define and explain the terms: (i) Hydraulic gradient line and (ii) Total energy line. 7M
   (b) Derive the expression for loss of head due to sudden contraction in a pipe line. 7M

UNIT-V

9. (a) Define: laminar boundary layer, turbulent boundary layer, laminar sub-layer and boundary layer thickness. 7M
   (b) What do you mean by separation of boundary layer? What is the effect of pressure gradient on boundary layer separation? 7M

(OR)

10. (a) What is Von – Karman momentum integral equation? Explain. 7M
    (b) Explain the following: (i) Drag on an airfoil and (ii) Lift on a cylinder. 7M

Q.P. Code: 259212 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Building Materials (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 the properties and uses of stones in construction.	7M
	(b)	Describe the various components in the structure of tree.	7M
		(OR)	
2.		Explain in detail the manufacture of bricks with neat sketches.	14M
		UNIT – II	
3.		Explain the composition, properties and uses of (a) Mortar and (b) Concrete.	14M
		(OR)	
4.		What are the elements of Reinforced cement concrete? Explain in detail the advantages and disadvantages of RCC.	14M
		UNIT – III	
5.	(a)	Discuss briefly, the properties and uses of steel in construction.	7M
	(b)	What are the types of fibers used in concrete? Explain the advantages of Steel Fiber Reinforced concrete.	7M
		(OR)	
6.		Explain in detail the advantages and applications of (a) Light weight concrete and (b) High strength concrete.	14M
		UNIT – IV	
7.	(a)	Explain in detail the types of paints and defects in paints.	7M
	(b)	Describe the composition and properties of Distempers.	7M
		(OR)	
8.		Discuss in detail the applications of (a) Asbestos and (b) Plastic.	14M
		UNIT-V	
9.		Explain in detail the advantages and limitations of (a) Reactive powder concrete and (b) Geopolymer concrete.	14M
		(OR)	
10.	(a)	Explain the advantages of self-compacting concrete.	7M
	(b)	What are the applications of various types of tiles used for flooring?	7M

Q.P. Code: 259412 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Surveying - 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) Describe the direct and indirect methods of ranging with neat sketches. 7M
   (b) A line was measured by a 30 m chain which was accurate before starting the day's work. After chaining 1100 m, the chain was found to be 5 cm too long. After chaining a total distance of 1800 m the chain was found to be 9 cm too long. Find the true distance of the line. 7M

(OR)

2. (a) What is the significance and principles of chain surveying? 6M
   (b) A survey line AB is obstructed by a high building. To prolong the line beyond the building, a perpendicular BC, 121.92 m long, is set at B. From C, two lines CD and CE are set out at angles of 30^0 and 40^0 with CB, respectively. Determine the lengths CD and CE so that D and E may be on the prolongation of AB. If the chainage of B is 95.10 m, find the chainage of D. Draw a sketch showing all the points. 8M

UNIT – II

3. (a) What is closing error of traverse? Explain the graphical method of adjustment of closing error. 6M
   (b) The following perpendicular offsets were taken at 10 m intervals from a chain line to an irregular boundary line: 3.10, 4.20, 5.35, 6.45, 7.15, 8.25, 7.95 and 5.20. Find the area by (i) Trapezoidal rule and (ii) Simpson's rule 8M

(OR)

4. (a) A railway embankment is 10 m wide with side slopes 1.5 to 1. Assuming the ground to be level in a direction transverse to the centre line, determine the volume contained in a length of 120 m, the centre heights at 20 m intervals being in meters 2.2, 3.7, 3.8, 4.0, 3.8, 2.8 and 2.5. 6M
   (b) The following bearings were taken in running a compass traverse : 8M

Line	F.B.	B.B.
AB	$124^0$30',	$304^0$30',
BC	$68^0$15',	$246^0$0',
CD	$310^0$30'	$135^0$15',
DA	$200^0$15'	$17^0$45'

At what stations do you suspect local attraction? Find the correct bearings of lines.

UNIT – III

5. (a) What is profile leveling? Describe the procedure for conducting profile leveling of a proposed highway. 7M
   (b) Describe various methods of contouring. 7M

(OR)

6. (a) Discuss the uses of contour maps with sketch. 6M
   (b) The following consecutive readings were taken with a dumpy level and 3 meter leveling Staff on continuously sloping ground at a common interval of 20 m: 8M
   0.602, 1.234, 1.86, 2.574, 0.238, 0.914, 1.936, 2.872, 0.568, 1.824, 2.722
   The reduced level of the first point was 192.122. Rule out a page of level field book and enter the above readings. Calculate the reduced levels of the other points.

UNIT – IV

7. (a) Define the following terms: 8M
   (i) Horizontal axis (ii) Vertical axis (iii) Transiting (iv) Swinging
   (b) Describe the procedure of measuring horizontal angles by Repetition method. 6M

(OR)

8. (a) List out the different types of errors with explanation in theodolite survey. 4M

(b) A traverse is run to set out a line MQ: 1900 m at right angles to a given line MN. The lengths and bearings of traverse legs are observed as follows : 10M

Line	Length	Bearing
MN	-	$360^0 0'$
MO	850 m	$120^0 0'$
OP	1000 m	$86^0 30'$
PQ	-	-

Compute the length and bearing of PQ

UNIT-V

9. (a) Explain the tangential method of tacheometry. 4M

(b) Following observations were taken with a tacheometer fitted with an anallatic lens having value of constant to be 100. 10M

Inst. station	Staff Station	R.B	Vertical angle	Staff Readings		
O	P	N 37º W	4º 12'	0.910	1.510	2.110
O	Q	N 23º E	5º 42'	1.855	2.705	3.555

Calculate the horizontal distance between P and Q.

(OR)

10. (a) Describe the basic principle of tacheometry. 7M

(b) Observations were taken with a tacheometer having additive constant equal to zero and multiplying constant equal to 100, and an intercept of 0.685 m with a vertical angle of 12^0 was recorded on a staff believed to be vertical. Actually, the staff which was 3.5 m long, was 100 mm out of plumb leaning backwards away from the instrument. Determine the error in the horizontal distance. 7M

Q.P. Code: 259612 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Engineering Mechanics (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) Two forces equal to 2P and P respectively act on a particle. If first be doubled and second increased by 12 N, the direction of the resultant is unaltered. Find the value of P. 7 M

   (b) The five coplanar forces are acting at a point as shown in Fig.1. Determine the magnitude and direction of the resultant. 7 M

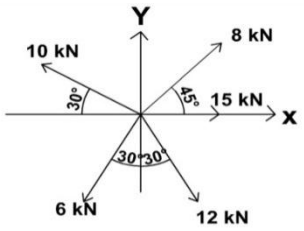


Fig-1

(OR)

2. (a) State the transmissibility of force and triangle law of forces. 4 M

   (b) Two spheres each of weight 50 N and of radius 10 cm rests in a horizontal channel of width 36 cm as shown in figure given below. Find the reactions on the points of contact at A, B and C. 10 M

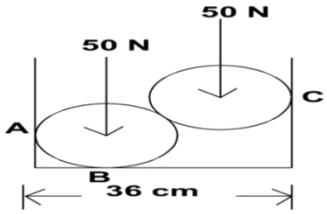


Fig-2

UNIT – II

3. (a) Explain the types of supports and beams with neat sketch. 6 M

   (b) A uniform ladder of length 5 m and weighing 250 N is placed against a smooth vertical wall with its lower end 4 m from the wall. If the ladder is just to slip, determine (i) the coefficient of friction between ladder and floor (ii) frictional force acting on the ladder at the point of contact between ladder and floor. 8 M

(OR)

4. (a) Determine the reactions at the supports for the given beam as shown in the Fig.3. 7 M

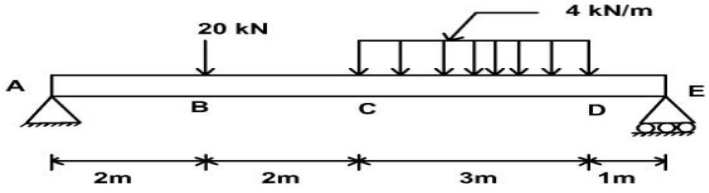
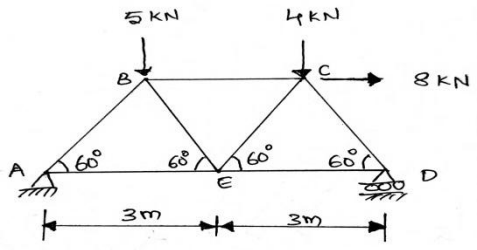


Fig-3

   (b) A load of 1.5 kN, resting on an inclined rough plane, can be moved up the plane by a force of 2 kN applied horizontally or by a force 1.25 kN applied parallel to the plane. Find the inclination of the plane and the coefficient of friction. 7 M

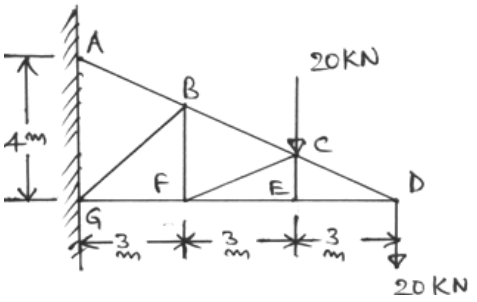
UNIT – III

5. Determine the forces in all members of the truss as shown in figure. 14 M



(OR)

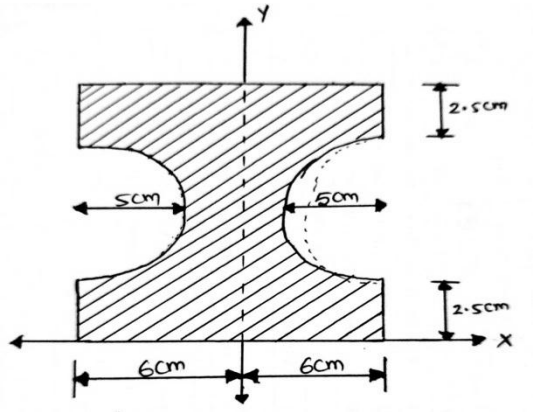
6. Determine the forces in all the members of the cantilever truss as shown in figure and also indicate the magnitude and nature of forces. 14 M



UNIT – IV

7. (a) Derive an expression for the centroid of semi-circle with radius 'R'. 5 M

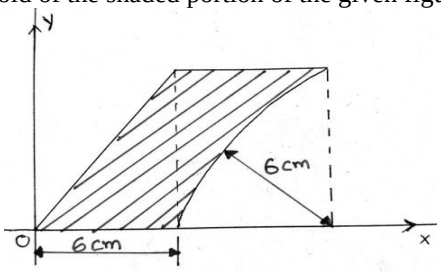
(b) Determine the moment of inertia about centroidal X and Y axes of the shaded portion of the given figure. 9 M



(OR)

8. (a) State and prove perpendicular axis theorem. 6 M

(b) Determine the position of centroid of the shaded portion of the given figure. 8 M



UNIT-V

9. (a) A stone is dropped from the top of a tower 50 m high. At the same time another stone is thrown up from the foot of the tower with a velocity of 25 m/s. At what distance from the top and after how much time the two stones cross each other? 6 M

(b) A stone is projected upwards from the ground with velocity of 16 m/s at an angle of 60^o to the horizontal. With what velocity must another stone be projected at an angle of 45^o to the horizontal from the same point in order (i) to have the same horizontal range and (ii) to attain the same maximum height? 8 M

(OR)

10. An elevator weighing 7000 N is ascending with an acceleration of 5 m/s^2. During this ascent its operator whose weight is 900 N is standing on scales placed on the floor. What is scale reading? What will be the total tension in the cables of the elevator during motion? 14 M

Q.P. Code: 259812 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Probability and Statistics (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 random variable X has the following probability function — 14M

X=x	0	1	2	3	4	5	6	7
P(X=x)	0	k	2k	2k	3k	K^2	$2k^2$	$7k^2+k$

Determine (i) k (ii) $P(X \geq 6)$ (iii) $P(0 < X < 5)$, (iv) If $P(X \leq k) > 1/2$ find the minimum of k

(OR)

2. Let X denote the minimum of the two numbers that appear when a pair of fair dices is thrown once. Determine the (i) Determine Discrete probability distribution (ii) Expectation (iii) Variance. — 14M

UNIT – II

3. (a) Find the mean and variance of Poisson distribution. — 7M

(b) 4 buses arrive at a specified stop at 15 minute intervals starting at 7 a.m. That is, they arrive at 7.00,7.15,7.30,7.45 a.m. and so on. If a passenger arrives at the stop at a time that is uniformly distributed between 7.00 and 7.30 a.m., find the probability that he waits (i) less than 5 minutes for a bus (ii) more than 10 minutes for a bus — 7M

(OR)

4. In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. — 14M

UNIT – III

5. Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. — 14M

(OR)

6. In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance. — 14M

UNIT – IV

7. In a partially destroyed laboratory record, only the lines of regression of y on x and x on y **are** available as $4x - 5y + 33 = 0$ and $20x - 9y - 107 = 0$. Calculate $\bar{x}$, $\bar{y}$ and the coefficient of correlation between x and y. — 14M

(OR)

8. (a) Find the coefficient of correlation for the following table: — 7M

x	10	14	18	22	26	30
y	18	12	24	6	30	36

(b) By the method of least squares, find the straight line that best fits the following data: — 7M

x	12	15	21	25
y	50	70	100	120

UNIT-V

9. Each telephone call is consider a product and the time to answer the call indicates the quality of service. Five calls chosen at random and times recorded at a busy hour. Results for the last 10 hours shown below (in seconds). — 14M

Sample	1	2	3	4	5	6	7	8	9	10
Mean	20	34	45	39	26	29	13	34	37	23
Range	13	9	15	5	20	17	21	11	10	10

Construct $\bar{X}$ and R chart and determine whether the product is under control.

(OR)

10. The following data provides the number of defective apples which were found in an inspection of 10 samples of 100 apples each. — 14M

Sample no	1	2	3	4	5	6	7	8	9	10
No of defectives	10	8	5	3	5	7	3	5	8	10

Construct a suitable control chart for the above data and state your conclusions.

Q.P. Code: 358812 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Electrical Machines-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. Explain the construction details of DC machine with neat diagram 14M

(OR)

2. (a) Draw the developed winding diagram of progressive lap winding for 4-Poles, 16-slots with two coil sides per slot, double layer showing there in position of the poles, direction of motion, direction of induced emf's and position of brushes? 8M
   (b) Derive EMF equation of DC Generator? 6M

UNIT – II

3. What are the different types of DC Generators and explain with neat circuit diagram and terminal voltage equations? 14M

(OR)

4. (a) Explain the procedure to obtain 0.C.C of a DC-Shunt Generator? 7M
   (b) What are the reasons for failure of self excited shunt generator to build up voltage? 7M

UNIT – III

5. (a) What are conditions for parallel operation of DC Generators? 4M
   (b) The two shunt generators are operating in parallel. The emf induced in one machine is 210V and that induced in other machine is 220V. The supply together a load current of 4000A. If each machine has an armature resistance of 0.01Ω and field resistance of 20Ω, determine 10M
   (i) Terminal voltage (ii) Output of each machine.

(OR)

6. (a) Describe the internal and external characteristics of DC-Shunt generator? 7M
   (b) What is the use of equalizer and cross connection of field winding? 7M

UNIT – IV

7. (a) Describe with neat sketches the principle of operation of DC-Motors? 7M
   (b) Derive the equation for torque developed in DC shunt motor. 7M

(OR)

8. (a) Why the DC series cannot operate at no-load condition? 7M
   (b) Explain the speed control method of DC series motor? 7M

UNIT-V

9. (a) Explain about different losses in DC-Machines? 7M
   (b) Derive condition for maximum efficiency in a DC Machine? 7M

(OR)

10. (a) Explain with neat diagram, procedure of Swinburne's test? 7M
    (b) In a brake test on a small shunt motor the speed was 1500rpm the load on one side of the brake band was 28.9N and on the other 1.67N. The diameter of the brake pulley was 15.2cm. If the input current was 2A at 250V, calculate: 7M
    (i) the output torque (ii) efficiency (iii) the brake horse power.

Q.P. Code: 359012 | **SET - 1**

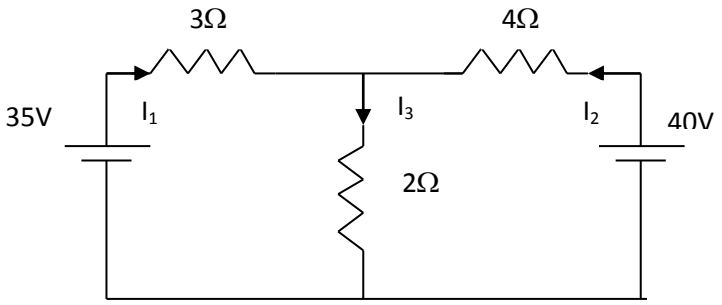
K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Network Theory (EEE & ECE)

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

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

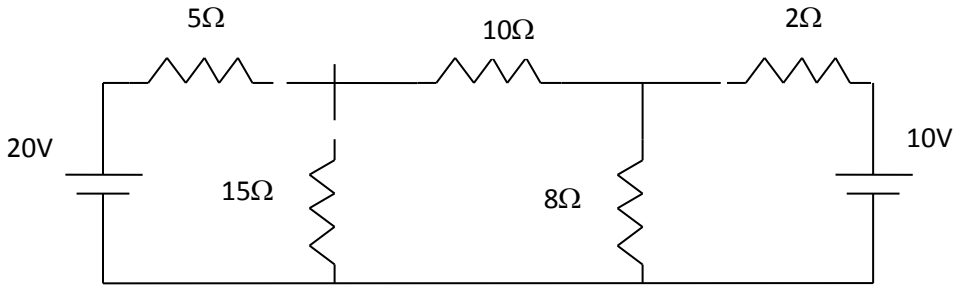
UNIT – I

1. (a) With a suitable example state the super position theorem 6M
   (b) In the given network find the all branch currents by super position principle 8M



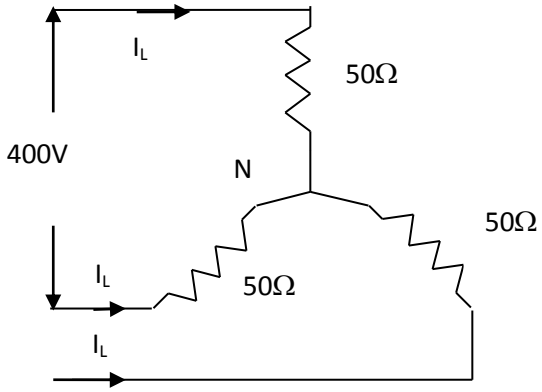
(OR)

2. (a) State the Thevenin"s theorem 4M
   (b) Find the current in the 10Ω resister in the given network using Thevenin"s theorem 10M



UNIT – II

3. (a) Give the phase and line currents and voltages in balanced three phase star and delta systems. 7M
   (b) Three 50Ω resisters are connected in star across 400V , 3-phase supply find 7M
   (i) Phase current and line current and power taken from the mains
   (ii) What would be the above values if one of the resisters were disconnected



(OR)

4. (a) Explain star – delta transformation in three phase systems 8M
And also the advantages of three phase systems

(b) Three coils, connected in star take a total power of 1.5kW at a p.f of 0.2 lagging from three phase 400V, 50HZ supply. Calculate the resistance and inductance of the coil. 6M

UNIT – III

5. (a) Find the transient response of series RC circuit having DC excitation (for first order circuit) 7M

(b) Find the current in a series RL circuit having R=2Ω and L=10H while DC voltage of 100V is applied. What is the value of this current after 5sec of switching on 7M

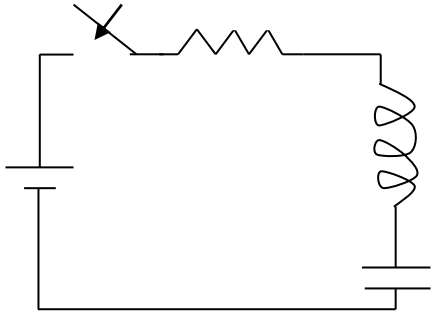
(OR)

6. (a) Find the transient response in RLC circuit with DC excitation (second order circuit) 14M

UNIT – IV

7. (a) Using laplace transform find the step response of series RL circuit 7M

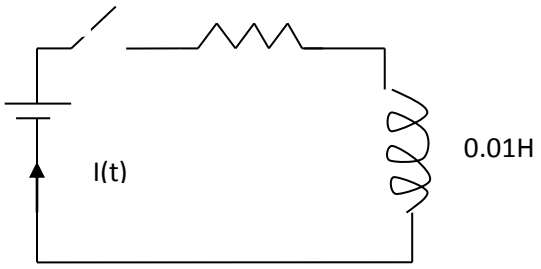
(b) In the circuit shown , find the transient current i(t) when the switch closed at t=0. Assuming the initial zero condition 7M



(OR)

8. (a) Using laplace transform approach find the step response of series RC circuit 7M

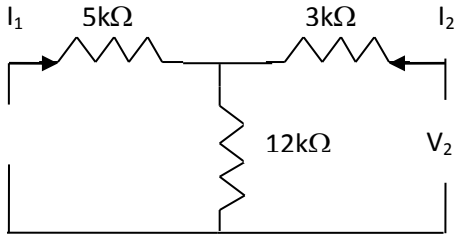
(b) Find the current i(t) ,After closing the switch s at t=0, the current i(t) at any instant t in the network shown in the fig. 7M



UNIT-V

9. (a) Find the open circuit parameters of two port network 7M

(b) Find the Z- parameters of the given circuit



7M

(OR)

10. (a) Find the inverse hybrid parameters of the two port network 7M

(b) Explain the series and cascade connection of two port networks 7M

Q.P. Code: 359212 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Electromagnetic Fields (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)	(a) State and prove Gauss's law in integral form, considering static charges in free space	7M
	(b)	Four concentrated charges Q_1 = 0.3 μ c, Q_2 = 0.2 μc, Q_3 = -0.3 μc, Q_4 = 0.2 μc are located at the vertices of a plane rectangle. The length of rectangle is 5 cm and breadth of the rectangle is 2 cm. Find the magnitude and direction of resultant force on Q_1.	7M
		(OR)	
2.	(a)	State and explain Coulomb's law of electrostatic field in vector form.	7M
	(b)	It is required to hold four equal point charges to each in equilibrium at the corners of a square. Find the point charge, which will do this if placed at the center of the square.	7M

UNIT – II

3.	(a)	Calculate the capacitance of a parallel plate capacitor with following details. Plate area = 150 sq.cm. Dielectric εr_1 = 3, d_{12} = 4mm Dielectric εr_2 = 5, d_{12} = 6 mm If 200 V is applied across the plates what will be the voltage gradient across each dielectric.	7M
	(b)	Derive the expression for the capacitance of co-axial cable with two dielectrics	7M
		(OR)	
4.	(a)	Derive Ohm's law in point form and Equation of continuity	7M
	(b)	Derive the expression for the capacitance of co-axial cable with two dielectrics	7M

UNIT – III

5.	(a)	Starting from Biot - Savart's law, obtain the expression for the magnetic field *B* due to a steady surface current in free space.	7M
	(b)	Derive an expression for magnetic field intensity at a height `h' on the axis of a circular wire carrying a current of I amps.	7M
		(OR)	
6.	(a)	State and explain Amperes force law.	7M
	(b)	Show that **T** = m **B** also holds for the torque on a solenoid situate in a uniform magnetic field.	7M

UNIT – IV

7.	(a)	Derive an expression for mutual inductance use Neumann's formulae.	7M
	(b)	A solenoid with 300 turns is 300mm long and 30mm in diameter. If the current is 500 mA determine i. Inductance and ii. Energy stored in solenoid. Assume μ_r = 1.	7M
		(OR)	
8.	(a)	Derive the magnetic vector potential.	7M
	(b)	Derive an expression for magnetization from dipole moment.	7M

UNIT-V

9.	(a)	Obtain the integral form of Maxwell's equation from Amperes circuital law in the generalized form	7M
	(b)	Write all Maxwell's equations for i. Time varying ii. Time invariant iii. Harmonically varying fields iv. Good Conductor v. Dielectric	7M
		(OR)	
10.	(a)	Derive the expression for one of the Maxwell's equation . $\nabla XE = -\frac{\partial B}{\partial t}$	7M
	(b)	Find the frequency at which conduction current density and displacement current density are equal in a medium with $\sigma = 2 \times 10^{-4}$ mho/m and ε_r=81.	7M

Q.P. Code: 359612 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Fluid Mechanics & Hydraulic Machinery (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) Define surface tension. Prove that the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure is given by $p = 4\sigma / d$. 7M
   (b) An oil of viscosity 5 poise is used for lubrication between a shaft and sleeve. The diameter of shaft is 0.5m and it rotates at 200 r.p.m. Calculate the power lost in the oil for a sleeve length of 100 mm. The thickness of oil film is 1 mm. 7M

(OR)

2. (a) Explain the terms: 7M
   (i) Path line, (ii) Streak line (iii) Stream line and (iv) Stream tube.
   (b) If for a two-dimensional potential flow, the velocity potential is given by $\Phi = x(2y - 1)$. determine the velocity at the point P (4, 5). Determine also the value of stream function Ψ at the point P. 7M

UNIT – II

3. (a) Derive the Bernoulli's energy equation for steady flow of an incompressible fluid. 7M
   (b) An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20cm and throat diameter 10 cm. The oil – mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take $C_d = 0.98$. 7M

(OR)

4. (a) Derive the Darcy-Weisbach equation for the loss of head due to friction in pipes. 7M
   (b) Three pipes of lengths 800 m, 500 m and 400 m and of diameters 500 mm, 400 mm and 300 mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1700 m. Find the diameter of the single pipe. 7M

UNIT – III

5. (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 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: 7M
   (i) the force on the plate, (ii) the work done and (iii) the efficiency of jet.

(OR)

6. (a) Explain the classification of hydraulic turbines. 7M
   (b) A Pelton wheel has a mean bucket speed of 10 m/s with a jet water flowing at the rate of 700 litres/s under a head of 30 m. The buckets deflect the jet through an angle of 160^0. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume Co – efficient of velocity as 0.98. 7M

UNIT – IV

7. (a) Define the specific speed of a turbine. Derive an expression for the specific speed. 7M
   (b) A turbine develops 500 kW power under a head of 100 m. at 200 r.p.m. What would be its normal speed and output under a head of 81 m? 7M

(OR)

8. (a) What is a centrifugal pump? Explain the working of a single - stage centrifugal pump with a neat sketch. 7M
   (b) Explain the characteristic curves of a centrifugal pump. 7M

UNIT-V

9. (a) What is a hydropower plant? What are the different types of hydropower plants? 7M
   (b) Explain the terms: Forebay, Intake structure and Penstock. 7M

(OR)

10. (a) Explain how the power available for a hydel project be estimated. 7M
    (b) Explain: 7M
    (i) Load factor (ii) Capacity factor and (iii) Utilization factor.

Q.P. Code: 359812 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Mathematics - IV (EEE & 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. State and Prove relation between Beta and Gamma Functions. 14M

(OR)

2. (a) Prove that $\Gamma(m)\Gamma\left(m+\frac{1}{2}\right)=\frac{\sqrt{\pi}}{2^{2m-1}}\Gamma(2m)$ 7M

(b) Prove that $\int_0^1 \frac{x^2}{\sqrt{1-x^4}}dx \text{X} \int_0^1 \frac{1}{\sqrt{1+x^4}}dx=\frac{\pi}{4\sqrt{2}}$ 7M

UNIT – II

3. (a) Show that $\frac{d}{dx}\left[x^{-n}J_n(x)\right]=-x^nJ_{n+1}(x)$ 7M

(b) Prove that $J_{-1/2}(x)=\sqrt{\frac{2}{\pi x}}\cos x$ 7M

(OR)

4. State and prove Rodrigue's formula. 14M

UNIT – III

5. Show that $f(z)=\sqrt{|xy|}$ is not analytic at $z=0$, although the Cauchy-Riemann equations are satisfied at the origin. 14M

(OR)

6. Determine the analytic function $f(z)=u+iv$, $u-v=\frac{\cos x+\sin x-e^{-y}}{2(\cos x-\cosh y)}$ and $f\left(\frac{\pi}{2}\right)=0$. 14M

UNIT – IV

7. Determine the bilinear transformation that maps the points $z_1=1,\ z_2=1,\ z_3=-1$ into the points $w_1=1,\ w_2=0,\ w_3=-i$ respectively. Hence find the invariant points. 14M

(OR)

8. Evaluate $\oint_c \frac{e^{2z}}{(z-1)(z-2)}dz$ where c is the circle $|z|=3$. 14M

UNIT-V

9. (a) State and Prove Cauchy's Residue theorem. 7M

(b) Evaluate $\oint_c \frac{z}{(z-1)(z-2)}dz$ where c is the circle $|z|=3$. 7M

(OR)

10. Show that $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta}=\frac{2\pi}{\sqrt{3}}$ 14M

Q.P. Code: 458812 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Electrical Machines (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 principle of operation of DC generator.	7M
	(b)	A 6-pole, Lap wound armature has 840 conductors and flux per pole of 0.018 Wb. Calculate the EMF generated when the machine is running at 600 rpm	7M
		(OR)	
2.	(a)	Explain Magnetization and load characteristics of DC generators.	7M
	(b)	A 4-pole DC shunt generator with lap connected armature supplies a load of 100 A at 200 V. The armature resistance 0.1 ohms and the shunt field resistance is 80 ohms find the Total armature current and generated emf.	7M

UNIT – II

3.	(a)	Derive from the fundamentals, the E.M.F equation of a single phase transformer.	7M
	(b)	Explain the operation of transformer on No-load.	7M
		(OR)	
4.	(a)	Describe O.C and S.C tests on Single phase transformer	10M
	(b)	A 1000/200 V transformer takes 0.3 A at 0.2 p.f. on open circuit. Find the magnetizing, and iron loss component of no-load primary current.	4M

UNIT – III

5.	(a)	Why starters are necessary for starting of 3-phase induction motors?	7M
	(b)	A 3-phase, 12 pole delta connected Induction motor has a full load slip of 5% if the supply frequency is 100Hz.Find the full load speed, synchronous speed and frequency of rotor emf.	7M
		(OR)	
6.	(a)	Explain the construction, working principle and operation of 3-phase Induction motor	7M
	(b)	A 3-phase, 6 pole induction motor is rated 400Hz, 150V, 10hp, 3% slip at rated power output. The windage and friction loss is 200W at rated speed. With the motor operating at rated voltage, frequency, slip, and output power. Determine: a) Rotor speed. b) Frequency of the rotor current. c) Power crossing the air gap. d) Rotor copper loss. e) Output torque.	7M

UNIT – IV

7.	(a)	Derive the relation between speed, frequency and number of poles in an alternator.	6M
	(b)	Enumerate the constructional details of both salient pole and cylindrical rotor synchronous machines	8M
		(OR)	
8.	(a)	Describe the starting methods of Synchronous motor	8M
	(b)	A 3 phase, 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.02 Wb, sinusoidally distributed and the speed is 375 rpm. Find the frequency of the induced emf, phase emf and line emf. Assume the coil as full pitched.	6M

UNIT-V

9.	(a)	What are the salient features of AC Servomotors?	7M
	(b)	Briefly discuss the various types of Capacitor motors	7M
		(OR)	
10.	(a)	Explain the working principle and operation of the single phase induction motor with neat diagram	7M
	(b)	Explain the construction and operation of stepper motor	7M

Q.P. Code: 459212 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Signals and Systems (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) State and prove any four properties of an impulse function 8M
   (b) Examine whether the following signals are periodic or not? If periodic determine the fundamental period. (i) Sin6πt (ii) sin10πt+cos20πt 6M

(OR)

2. (a) Explain Dirichlet's conditions for the convergence of Fourier series. 6M
   (b) Find the exponential Fourier Series for the rectified sine wave shown in Figure 1 8M

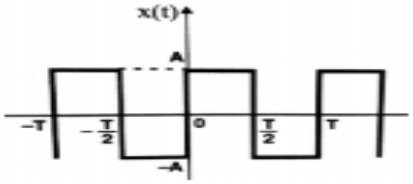


Fig.2

UNIT – II

3. (a) Find the Fourier Transform of the signal x(t) using differentiation property 7M
   x(t)={1 for |t| ≤a
   0 for |t| >a
   (b) Explain the Fourier transform of periodic signal 7M

(OR)

4. (a) State and prove any four properties of Fourier Transform 8M
   (b) Obtain the Fourier Transform of the following signals 6M
   (a) cosω₀t (b) Unit Step signal (c) unit impulse function

UNIT – III

5. (a) State and prove sampling theorem for lowpass signal and also explain how the signal is reconstructed from sample values 6M
   (b) Determine the Nyquist rate corresponding to each of the following signals 8M
   (i) x(t)=1+cos2000πt+sin4000πt
   (ii) x(t)=$\left(\frac{sin4000\pi t}{\pi t}\right)^2$

(OR)

6. (a) Derive the relationship between rise time and bandwidth of a low pass filter 6M
   (b) Check and determine the following systems for static, linear, time invariant , causal $y(t)=x^2(t)$ 8M

UNIT – IV

7. (a) Identify whether the following system is (i) Linearity (II) Time Invariant (iii) Stability (iv) Causal 8M
   $Y(n=\log_{10}x(n)$
   (b) Find the impulse response of a discrete time linear system whose the difference equation is given by 6M
   y(n)=y(n-1)+0.5y(n-2)+x(n)+x(n-1)

(OR)

8. (a) Discuss about the properties of correlation. 6M
   (b) Perform the convolution between the following signals 8M
   $x_1[n]$={-2, 4, 1, -1} and $x_2[n]$ = {2,-1,4, 3}

UNIT-V

9. (a) Discuss about the Region of Convergence properties 7M
   (b) Obtain the inverse Laplace transform for $X(s)=\frac{1}{(s+2)(s+4)}$ Re{s}>-2 7M

(OR)

10. (a) State and prove initial and final value theorem 6M
    (b) Find the Laplace transform of $x(t)=te^{-t}u(t)$ and mention its ROC 8M

Q.P. Code: 459412 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021

SUB: Electronic Devices and Circuits (EEE & 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 about Hall Effect and derive the relation for Hall Voltage and Hall coefficient. 7M
   (b) Calculate the hole diffusion constant in cm^2/v-s at 300 ^{0}K if the hole mobility of a semiconductor is 500 cm^2/v-s and V_T = 26 mV. 7M

(OR)

2. (a) Explain the effect of temperature on reverse saturation current of a diode. 7M
   (b) The voltage across a silicon diode at room temperature (300 K) is 0.7 volts when 2 μA reverse saturation current flows through it. Calculate the diode current (assume V_T = 26 mV). 7M

UNIT – II

3. (a) With the help of a neat circuit diagram, input and output waveforms, describe the operation of Half-wave rectifier (HWR) and derive the parameters Rectifier Efficiency and TUF. 7M
   (b) A Half Wave Rectifier circuit supplies 100 mA D.C to a 250 Ω load. Find 7M
   a) Maximum Peak Current b) Maximum Peak Voltage c) D.C output voltage
   d) RMS value of load current

(OR)

4. (a) With the help of a neat circuit diagram, input and output waveforms, describe the operation of Bridge rectifier. 7M
   (b) An AC supply of 220V is applied to a Bridge rectifier circuit through a transformer with a turn's ratio of 10:1. Find (i) DC output voltage (ii) PIV 7M

UNIT – III

5. (a) With neat diagram explain the operation of NPN & PNP transistor. 7M
   (b) What is the value of α for a BJT that has a β of 90? Find the base and the emitter current if the collector current is 4mA. 7M

(OR)

6. (a) Draw the circuit and explain the input and output characteristics of Common Base transistor configuration. 7M
   (b) For a given BJT, β = 100, I_{CBO} = 0.1 μA, I_B = 80 μA. Determine I_E. 7M

UNIT – IV

7. (a) With a neat construction diagram explain the principle of operation of a JFET and draw its characteristics. 7M
   (b) An n-channel JFET has I_{DSS} = 10mA, V_{DS} = 5V and V_P= -2V. Determine the drain source resistance 'r_{DS}' for (i) V_{GS} = 0V 7M

(OR)

8. (a) With neat structure explain the principle of operation of Enhancement type MOSFET also draw drain and transfer characteristics. 7M
   (b) Write five Comparisons of JFET and MOFET. 7M

UNIT-V

9. (a) Discuss Fixed-bias with the help of Stability factors and give suggestions to improve stability of operating point. 7M
   (b) Explain how transistor acts like an Amplifier. 7M

(OR)

10. (a) Elaborate on the tunneling mechanism of Tunnel diode along with its VI characteristics. 7M
    (b) Explain the working principle of a Light Dependent Resistor. 7M

Q.P. Code: 459612 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Electromagnetic Fields (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) State and explain Coulomb's law. Obtain an expression in vector form. 7M
   (b) Two uniform line charges of density 8nC/m are located in a plane with y=0 at x= ± 4m. Find the Electric field at a point P(0m, 4m, 10m) 7M

(OR)

2. (a) State and Prove Gauss's law in integral form. Write the applications of Gauss's law 7M
   (b) In a Spherical Region the electric displacement density is given by $\bar{D}=10r^2\bar{a}_r$ **mC/ m^2.** Find the total charge enclosed by volume specified by **r** =40cm, **ɵ**=π/4, ø=2π. 7M

UNIT – II

3. (a) What do you mean by electric dipole?and derive the expression for electric field intensity due to dipole with center at origin. 7M
   (b) Derive the Maxwell's equations for electro static fields in integral and differential forms. 7M

(OR)

4. (a) Define potential difference? Mention the characteristics of potential difference? 7M
   (b) A line charge ρ_L= 400pC/m lies along the X-axis. The surface of zero potential passes through the point P(0,5,12)m. Find the potential at point (2,3,-4)m. 7M

UNIT – III

5. (a) Illustrate poisons and Laplace's equations and mention their applications? 7M
   (b) Calculate the capacitance of a coaxial capacitor of length l where the inner conductor has diameter d and the outer has diameter D. 7M

(OR)

6. (a) Derive the Capacitance of a coaxial cable with two dielectrics conductor. 7M
   (b) A point charge of 25nC is located in free space at P(2,-3,5) and a perfectly conducting plane is at z=2.Find i)V at (3,2,4) ii)$\bar{E}$ at (3,2,4) iii)ρ_s at (3,2,2). 7M

UNIT – IV

7. (a) Derive the expression for force on a differential current element. 7M
   (b) A charge of 12C has a velocity of $5\bar{a_x}+2\bar{a_y}-3\bar{a_z}$ **m/s**.Determine force($\overline{F}$) on the charge in the field of (i)$\bar{E}=18\bar{a_x}+5\bar{a_y}+10\bar{a_z}$ **V/m**. (ii) $\bar{B}=4\bar{a_x}+4\bar{a_y}+3\bar{a_z}$ **Wb/m^2.** 7M

(OR)

8. (a) Explain the concept of vector magnetic potential? 7M
   (b) A vector magnetic potential $\bar{A}$ due to direct current in a conductor in free space is given by $\bar{A}=(X^2+Y^2)\overline{a_Z}$ **μ wb/m^2**.Determine the magnetic field produced by the current element at (1,2,3). 7M

UNIT-V

9. (a) Derive the Boundary conditions for the tangential and normal components of Magneto-static fields at the boundary between two perfect dielectrics. 7M
   (b) X < 0 defines region 1 and X>0 defines region 2 . Region 1 is characterized by μ_{r1} =3.0 and region 2 characterized by μ_{r2}= 5.0. If the magnetic field in region 1 is given by $\mathbf{H_1}$ = **4.0 a$_x$ +1.5 a $_y$+ 3.0 a$_z$**, A/m , find $\mathbf{H_2}$ and B_2. 7M

(OR)

10. (a) What is the inconsistency in Ampere's law? How is it rectified by Maxwell? 7M
    (b) Write the Maxwell's equations for time varying fields in integral and differential forms with their word statements. 7M

Q.P. Code: 558812 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021

SUB: Machine Drawing (ME)

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

Section -I (Answer any two questions,2X4 = 8 Marks)

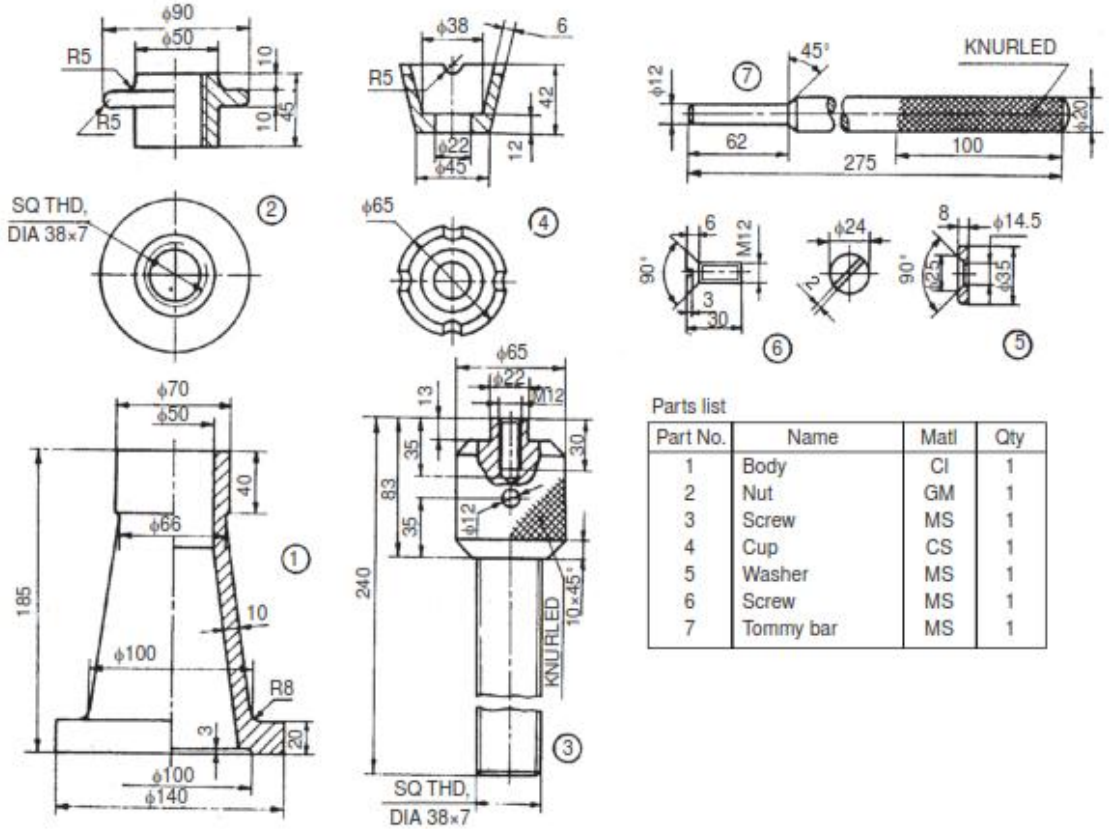
1. Sketch the conventional representation of the following materials: 4M
   (i) Steel and (ii) wood
2. Sketch the conventional representation of the following machine elements 4M
   Semi-elliptic leaf spring with eyes (ii) Straight knurling
3. Sketch the following types of keys 4M
   (a) Hollow saddle key, and (b) Woodruff key

Section -II (Answer any two questions,2X10= 20 Marks)

4. Draw the Hexagonal headed bolt with a nut and washer in position for right hand threaded bolt of diameter 25mm. 10M
5. Draw the sectional view from the front of a knuckle joint used to connect two rods of 50 mm diameter each. 10M
6. Draw the sectional front view and top view of the double strap single riveted zig- zag butt joint to join plates of thickness 15mm. 10M

Section- III (Compulsory question, 1X42 = 42 Marks)

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



Parts list

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

Q.P. Code: 559012 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021

SUB: Thermodynamics (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 is a Quasi-Static process? What are the differences between a homogeneous system and heterogeneous system? Give a few examples of homogeneous and heterogeneous systems. 7M
   (b) An engine cylinder as a piston of area $0.12m^2$ and contains gas at a pressure of 1.5 MPa. The gas expands according to a process which is represented by a straight line of pressure-volume diagram. The final pressure is 0.15 MPa. Calculate the work done by the gas on the piston if the stroke is 0.03m. 7M

(OR)

2. (a) What are the comparisons of heat and work. 7M
   (b) Explain the following terms 7M
   (i) Thermodynamic equilibrium (ii) Zeroth law of thermodynamics

UNIT – II

3. (a) Derive the expression for heat transfer in the polytropic process. 7M
   (b) Air at 1.02bar, 22^0C, initially occupying a cylinder volume of $0.015m^3$, is compressed reversibly and adiabatically by a piston to a pressure of 6.8bar. Calculate 7M
   i) The final temperature ii) The final volume iii) The work done

(OR)

4. (a) Make a comprehensive energy analysis of the centrifugal air compressor. 7M
   (b) In a test of water cooled air compressor, it is found that the shaft work required to drive the compressor is 175KJ/Kg of air delivered and the enthalpy of air leaving is 70KJ/Kg greater than that entering and that the increase in enthalpy of circulating water is 92KJ/Kg. Compute the amount of heat transfer to the atmosphere from the compressor per Kg of air. 7M

UNIT – III

5. (a) State and explain the second law of thermodynamics? 7M
   (b) A heat engine receives heat at the rate of 1500KJ/min and gives an output of 8.2KW. 7M
   Determine (i) The thermal efficiency (ii) The rate of heat rejection

(OR)

6. (a) Define clausius inequality and prove it. 7M
   (b) 300KJ/sec of heat is supplied at a constant fixed temperature of 290^0C to a heat engine. The heat rejection takes place at 8.5^0C. The following results were obtained 7M
   i) 215KJ/s are rejected ii) 150KJ/s are rejected iii) 75KJ/s are rejected. Classify which of the result report a reversible cycle or irreversible cycle or impossible results.

UNIT – IV

7. (a) Define dryness fraction and explain any one method of measuring it. 7M
   (b) Steam enters an engine at a pressure of 12bar with a 67^0C of super heat. It is exhausted at a pressure of 0.15bar and 0.95 dry. Find the drop in enthalpy of the steam. 7M

(OR)

8. Write the various forms of Tds equations and hence prove $Tds=mc_pdT-vT\beta dP$. 14M

UNIT-V

9. (a) Prove that for an ideal gas, the slope of the constant volume line on the T-S diagram is more than that of the constant pressure line. 7M
   (b) A certain gas has $C_p=1.968$ and $C_v=1.507$KJ/Kg K. Find its molecular weight and the gas constant.A constant volume chamber of $0.3m^3$ capacity contains 2Kg of this gas at 5^0C. Heat is transferred to the gas until the temperature is 100^0C. Find the work done, the heat transferred and the changes in internal energy, enthalpy and entropy. 7M

(OR)

10. (a) Derive an expression for an air standard efficiency of otto cycle. 7M
    (b) A diesel engine has a compression ratio of 14 and cut off takes place at 6% of the stroke. Find the air standard efficiency. 7M

Q.P. Code: 559212 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Material Science & Metallurgy (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)	Describe the significance of Engineering materials?	7M
	(b)	Explain the Hume-Rothery rule with suitable example?	7M
		(OR)	
2.	(a)	Describe the mechanism of crystallization of metal?	7M
	(b)	Differentiate the substitutional and Interstitial solid solution?	7M

UNIT – II

3.	(a)	Explain the Gibbs phase rule with suitable example?	7M
	(b)	Distinguish the eutectic and eutectoid reaction system?	7M
		(OR)	
4.		Explain the Fe-Fe_3C equilibrium diagram and explain its salient points?	14M

UNIT – III

5.	(a)	Explain the various elements present in the white cast iron structure?	7M
	(b)	Describe the various salient properties of plain carbon steel?	7M
		(OR)	
6.	(a)	Describe the properties of the malleable cast iron?	7M
	(b)	Explain the structure of the Manganese steel?	7M

UNIT – IV

7.	(a)	Describe the need for heat treatment of the steel?	7M
	(b)	What is role of sintering in the powder metallurgy process?	7M
		(OR)	
8.		Sketch and explain the various salient points in the TTT diagram?	14M

UNIT-V

9.	(a)	Discuss the various elements present in the aluminum alloy structure?	7M
	(b)	Describe the various salient properties of the Titanium alloy?	7M
		(OR)	
10.		Explain the structure and properties of copper alloy?	14M

Q.P. Code: 559412 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021

SUB: Basic Electrical & Electronics Engineering (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)	Derive the Voltage, Current, Power and Energy relations for the circuit elements i) Resistor ii) Capacitor and iii) Inductor	10M
	(b)	Explain the Kirchhoff's current law.	4M
		(OR)	
2.	(a)	Derive the Expression for Resistance when R1, R2, and R3 are connected in series.	10M
	(b)	Briefly Explain the need of Star-Delta Transformations in the Electrical Circuits.	4M
		UNIT – II	
3.	(a)	Derive the Emf equation of the Single-Phase transformer.	10M
	(b)	Explain the following Terms i)Flemings Left Hand rule ii) Flemings Right Hand rule	4M
		(OR)	
4.	(a)	Classify the Different types of Dc Generator with a Neat Diagram.	10M
	(b)	List out the Applications of Transformer in our day-today life.	4M
		UNIT – III	
5.	(a)	With a Neat Diagram explain the torque – slip Characteristics of the three Phase Induction motor.	6M
	(b)	Derive the EMF equation of the Alternator.	8M
		(OR)	
6.	(a)	Derive the Ripple factor and Efficiency of Bridge Rectifier.	8M
	(b)	Explain the operation of Unbiassed PN Junction diode.	6M
		UNIT – IV	
7.	(a)	Explain the operation of NPN Transistor in biased form.	8M
	(b)	Discuss how a Transistor will acts as an Amplifier.	6M
		(OR)	
8.	(a)	Explain the V-I Characteristics of SCR with a neat diagram.	8M
	(b)	Derive the voltage gain and bandwidth of CE Amplifier.	6M
		UNIT-V	
9.		With a Neat Diagram and discuss briefly explain the construction of Alternator.	14M
		(OR)	
10.	(a)	Briefly explain the Lissajous Patterns in CRO for Measurement of Phase angle.	8M
	(b)	Explain the following terms used in Boolean algebra i)Identity Law ii) Complement law iii) Distributive Law	6M

Q.P. Code: 559612 | **SET - 1**

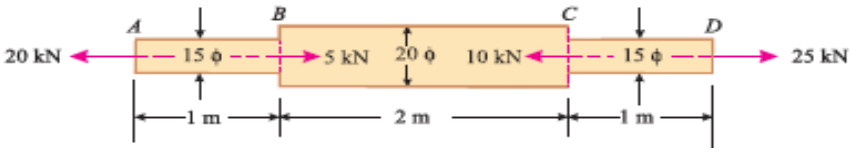
K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Mechanics of Solids (ME)

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 steel bar ABCD of 4 m long is subjected to forces as shown in fig. find the elongation of the bar by considering E for the steel as 200 GPa. 14M



(OR)

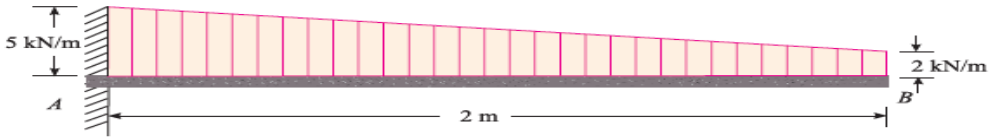
2. A steel bar 2 m long, 40 mm wide and 20 mm thick is subjected to an axial pull of 160 KN in the direction of its length. Find the change in length, width and thickness in the bar. Take E = 200 GPa and poisons ratio = 0.3. 14M

UNIT – II

3. A simply supported beam 6 m long is carrying a U.D.L of 5 KN/m over a length of 3 m from the right end. Draw the S.F and B.M diagrams and also calculate the Maximum B.M of the section. 14M

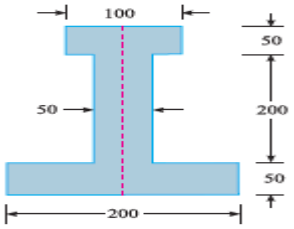
(OR)

4. A cantilever beam of 2 m span is subjected to a gradually varying load from 2 KN/m to 5 KN/m as shown in the figure. 14M



UNIT – III

5. The following figure shows a rolled steel beam of an un-symmetrical I – section. If the maximum bending stress in the beam section is not to exceed 40 MPa. Find the moment which beam can resist. 14M



(OR)

6. Derive and draw the Shear stress distribution for a Rectangular cross section. 14M

UNIT – IV

7. A cantilever AB of 2 m long is carrying a load of 20 KN at a free end and 30 KN at a distance of 1 m from free end. Find the slope and deflection at free end. Take E = 200 GPa & I = 150 x 10^6 mm^4. 14M

(OR)

8. A solid shaft is subjected to a torque of 1.6 KN-m. Find the necessary diameter of the shaft, if the allowable shear stress is 60 MPa. The allowable twist is 1 degree for every 20 diameters length of the shaft. Take C = 80 GPa. 14M

UNIT-V

9. A cylindrical vessel 2 m long and 500 mm in diameter with 10 mm thick plates is subjected to an internal pressure of 3 MPa. Calculate the change in volume of the vessel by taking E = 200 GPa and Poisson's ratio = 0.3 for the vessel material. 14M

(OR)

10. Derive the expressions for stresses in thick cylindrical shell. 14M

Q.P. Code: 559812 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Engineering Mechanics (ME)

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

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

UNIT - I

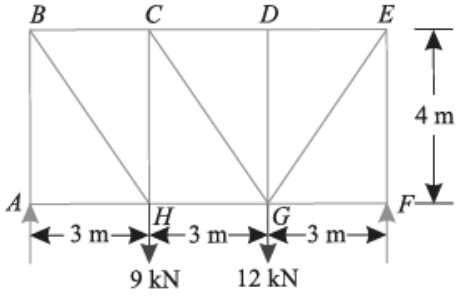
1. Define the following terms: **14M**
   (i) Rigid Body
   (ii) Principle of Transmissibility
   (iii) Triangle law of forces
   (iv) Deformable body

(OR)

2. The following particulars refer to a screw jack, Diameter of screw rod = 62.5 mm, Length of the handle = 250mm, Pitch of the square thread = 12.5mm, Coefficient of friction = 0.05. **14M**
   (i) Find the effort required to lift up a load of 5000N
   (ii) Find the effort required to lift down a load of 5000N

UNIT – II

3. A 9 m span truss is loaded as shown in Fig. Find the forces in the members BC, CH and HG of the truss **14M**



(OR)

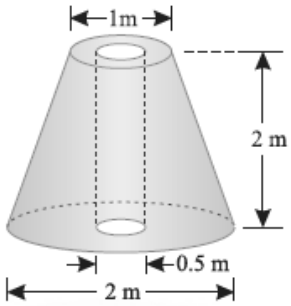
4. (a) A body weighing 30 N is projected up a 250 inclined plane with a velocity of 15 m/s, coefficient of friction is 0.20. Find **7M**
   (i) The maximum distance S, that the body will move up the inclined plane
   (ii) Velocity of the body when it returns to its original position.
   (b) A train is uniformly accelerated and passes successive kilometer stones with velocities of 20 km/hr and 38 km/hr respectively. Calculate the velocity when it passes the third kilometer stone. Also find the time taken for each of the two intervals of one kilometer. **7M**

UNIT – III

5. (a) Describe the various methods of finding out the centre of gravity of a body. **7M**
   (b) How would you find out the centre of gravity of a section, with a cut out hole? **7M**

(OR)

6. A frustum of a solid right circular cone has an axial hole of 50 cm diameter as shown in Fig. Determine the centre of gravity. **14M**



UNIT – IV

7.	(a)	Find the mass moment inertia of the solid cone of height h and base radius R about its axis of rotation	**7M**
	(b)	Prove that centroid of (i) Triangle (base b and height h) is h/3 from the base (ii) Semicircle of radius R is $4R/(3\pi)$	**7M**

(OR)

8.	(a)	State and prove parallel axis theorem	**7M**
	(b)	Derive the expression to determine moment of inertia of semicircular area about its diametrical axis	**7M**

UNIT-V

9.		A ball is thrown vertically up with a velocity of 30 m/s. Determine the time (i) When the ball is 20m above the point of projection (ii) When the velocity will be 5m/s (iii) When it returns back to original position	**14M**

(OR)

10.		A bird is sitting on the top of a tree 9m high. At what angle of elevation should a person standing at a distance of 30m from the tree, project a stone with a velocity of 25 m/s, so as to hit the bird as soon as possible?	**14M**

Q.P. Code: 658812 **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021

SUB: Object Oriented Programming Through C++ (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)	List out the benefits and applications of Object Oriented Programming	6M
	(b)	Explain about concepts of Object Oriented Programming in detail.	8M
		(OR)	
2.	(a)	Explain about input and output operators in C++	8M
	(b)	Write a program to find whether a given number is palindrome or not.	6M
		UNIT – II	
3.	(a)	Mention the use of Manipulators in C++ with an example	5M
	(b)	List out the operators in C++ with examples	9M
		(OR)	
4.	(a)	Define Datatype? List out the Datatypes in C++ with examples	7M
	(b)	Explain about scope resolution operator with suitable example.	7M
		UNIT – III	
5.	(a)	Define a class? Explain about the Memory allocation for objects?	5M
	(b)	Write a C++ Program to demonstrate the usage of static data member and static member function?	9M
		(OR)	
6.	(a)	Explain the concept of friend function.	7M
	(b)	Explain in detail of array of Objects?	7M
		UNIT – IV	
7.	(a)	Explain operator overloading with example.	7M
	(b)	How to overload the binary operators. Explain.	7M
		(OR)	
8.	(a)	What is Inheritance? Explain different types of Inheritances with suitable example.	7M
	(b)	What is an Abstract class? Differentiate among class and abstract class	7M
		UNIT-V	
9.	(a)	Discuss about formatted console I/O and unformatted console I/O.	7M
	(b)	Differentiate among Virtual and Pure Virtual Functions.	7M
		(OR)	
10.	(a)	What is a class template? Explain with an example.	5M
	(b)	What is an exception? List the principles of exception handling. With a suitable program explain exception handling mechanism of C++.	9M

Q.P. Code: 659012 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021

SUB: Managerial Economics & Financial Analysis (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.		Define Managerial Economics. Explain its nature and scope	14M
		(OR)	
2.		What is Demand forecasting? Discuss briefly various methods of forecasting.	14M

UNIT – II

3.		Explain the operation of the law of diminishing returns and business implications	14M
		(OR)	
4.	(a)	How do you determine optimum level of production in long –run?	7M
	(b)	State the importance of opportunity cost concept	7M

UNIT – III

5.		Perfect market is a hypothetical situation_ discuss	14M
		(OR)	
6.		What are the various popular pricing practices? Which of them most suitable for a firm facing stiff competition.	14M

UNIT – IV

7.		Define Partnership. explain main features and limitations of partnership firm	14M
		(OR)	
8.		What are various types of capital budgeting techniques? How modern techniques are superior to convention techniques?	14M

UNIT-V

9.		Briefly Explain Accounting concepts and conventions.	14M
		(OR)	
10.		Classify the ratios and explain uses of each group.	14M

Q.P. Code: 659212 **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Discrete Mathematics (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) Obtain principal conjunctive normal form (PCNF) for the formula $(\sim p \rightarrow r) \wedge (q \leftrightarrow p)$ 7 M
   .
   (b) Show that $R \rightarrow (S \rightarrow Q)$, $\sim P \vee R$ and $S \Rightarrow P \rightarrow Q$ 7 M

(OR)

2. (a) Show the following Equivalence using Truth Table $P \rightarrow (Q \rightarrow R) \Leftrightarrow P \rightarrow (\sim Q \vee R) \Leftrightarrow (P \wedge Q) \rightarrow R$. 8 M
   (b) What is a well formed formula? Give examples of well-formed formula. 6 M

UNIT – II

3. (a) Show that the function f(x, y) = x - y is primitive recursive 7 M
   (b) Draw the Hasse diagram for the poset $(P(S), \subseteq)$, where S= {1, 2, 3, 4}. 7 M

(OR)

4. (a) Explain properties of binary relations with examples. 6 M
   (b) Let X={2,3,6,12,24,36} and the relation $\leq$ be such that $x \leq y$ if 'x divides y'. Draw the Hasse diagram of $< X, \leq >$ 8 M

UNIT – III

5. (a) Discuss Algebraic system with suitable examples 7 M
   (b) Let G be the set of all non-zero real numbers and Let a * b = ½ ab. Show that <G,*> is an abelian group. 7 M

(OR)

6. (a) Define a Group. Explain the properties of Groups. 7 M
   (b) State and Prove the Lagrange's theorem. 7 M

UNIT – IV

7. (a) Write the 3-combinations and 3-permutations of {3.a, 2.b, 1.c, 3.d} 7 M
   (b) Prove Multinomial theorem 7 M

(OR)

8. (a) In how many ways we draw a heart or spade from ordinary deck of playing cards? A heart or an ace? An ace or a king? A card numbered 2 through 10? 7 M
   (b) Expand the multinomial $(X_1+X_2+X_3+X_4)^4$ 7 M

UNIT-V

9. (a) What is Spanning Tree? How to find Spanning tree of a graph G. Explain? 8 M
   (b) Discuss Euler circuits, Hamiltonian Circuits with Example 6 M

(OR)

10. Define isomorphism of graphs. Explain how to find that the graphs are isomorphic or not. 14M

Q.P. Code: 659412 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Digital Logic Design (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.		Describe i) Binary Registers ii) Binary Logic iii) Binary Codes ?	14 M
		(OR)	
2.		Convert Boolean expression in standard form F=y'+xz'+xyz	14M

UNIT – II

3.	(a)	Explain in detai about NAND Implementation Circuits with Neat Sketches.	7M
	(b)	Explain in detai about NOR Implementation Circuits with Neat Sketches.	7M
		(OR)	
4.	(a)	Minimize the following boolean function- $F(A, B, C, D) = \Sigma m(0, 2, 8, 10, 14) + \Sigma d(5, 15)$	7M
	(b)	Minimize the following boolean function- $F(A, B, C, D) = \Sigma m(3, 4, 5, 7, 9, 13, 14, 15)$	7M

UNIT – III

5.	(a)	Explain Half Adder,Full Adder and N-Bit Parallel Adder?	8M
	(b)	Explain Half Subtractor and Full Subtractor?	6M
		(OR)	
6.		Describe ROM,MROM,PROM,EPROM and EEPROM in detail?	14M

UNIT – IV

7.		Define Flip-Flop and Explain following with circuit and Truth table i) S-R Flip Flop ii) J-K Flip Flop	14M
		(OR)	
8.		Explain in detail about State Reduction and Assignment with examples?	14 M

UNIT-V

9.		Define Registers and Explain Serial input, Serial Output, SIPO and PISO	14M
		(OR)	
10.		Write in detail about Hazards and Describe types of hazards used in sequential circuit	14M

Q.P. Code: 659612 **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Advanced Data Structures (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 various types of data structures	7M
	(b)	Define Array? Explain about Array Representation with diagrams?	7M
		(OR)	
2.		Explain about the following a) Towers of Hanoi b) Circular Queue	14M

UNIT – II

3	a)	Define Binary Tree and write the properties of Binary Tree.	7M
	b)	Give the iterative algorithm for the inorder traversal of a Binary Tree.	7M
		(OR)	
4.		What is Heap? Explain about Heap sort algorithm with suitable example	14M

UNIT – III

5.		What is BST? Explain insertion and deletion operations of BST with examples	14M
		(OR)	
6.		Explain about Graphs? Write pseudo code for BFS in graphs?	14M

UNIT – IV

7.		Define Dictionary and write about liner list representation of dictionaries	14M
		(OR)	
8.		Explain various methods of implementing hash functions	14M

UNIT-V

9.	(a)	Write short notes on Hash table.	7M
	(b)	Compare B trees with B+ trees.	7M
		(OR)	
10.		What is B tree? Explain about various operations of B tree with examples.	14M

Q.P. Code: 659812 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. III Sem. (R15) Supple. Examinations of February/March - 2021
SUB: Electrical & Electronics Engineering (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)	What are the Classification of elements and explain RLC series circuit?	7M
	(b)	Explain the procedure to convert Star to Delta conversion with simple example.	7M
		(OR)	
2.	(a)	Explain in detail about RLC parallel circuit.	7M
	(b)	Three resistors R1, R2, and R3 are connected in parallel with values of 100 Ω, 200 Ω, and 300 Ω respectively. Find equivalent resistance.	7M

UNIT – II

3.	(a)	Explain principle of DC generator and derive the EMF equation.	7M
	(b)	Explain OC and SC tests for single phase transformer with simple example.	7M
		(OR)	
4.	(a)	Explain the construction of DC motor in detail. And derive the torque equation.	7M
	(b)	Derive the EMF equation of single phase transformers.	7M

UNIT – III

5.	(a)	What are the applications of Three Phase Induction Motor and explain its principle and construction.	7M
	(b)	Convert given decimal number $(8569)_{10}$ in to binary, octal and decimal number.	7M
		(OR)	
6.	(a)	What are the types of Three Phase Induction Motor? Explain about torque characteristics of Three Phase Induction Motor.	7M
	(b)	Explain how can measure the Amplitude, Frequency and Phase of the signal using CRO.	7M

UNIT – IV

7.	(a)	Explain about V-I characteristics of PN junction diode in detail.	7M
	(b)	Explain the operation of Bridge rectifier with neat diagram.	7M
		(OR)	
8.	(a)	Explain the operation of Full wave rectifier with neat diagram.	7M
	(b)	How the PN junction formed and explains about break down in normal PN junction diode.	7M

UNIT-V

9.	(a)	Draw the structure of PNP transistor and explain its working principle.	7M
	(b)	Explain about principle and operation of SCR.	7M
		(OR)	
10.	(a)	Explain the V-I characteristics of CE configuration in detail.	7M
	(b)	Explain transistor as Amplifier. Define the DC current gains in three configurations.	7M