Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

Reexamination

~~END SEMESTER/RE~~ EXAMINATION JANUARY/ FEBRUARY 2025

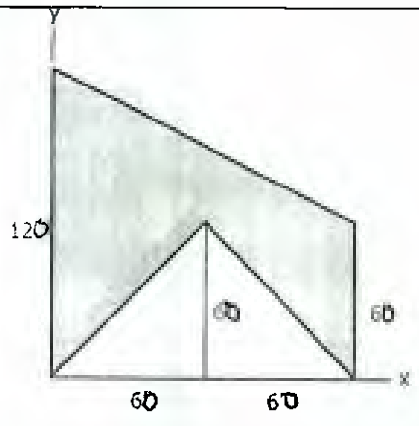
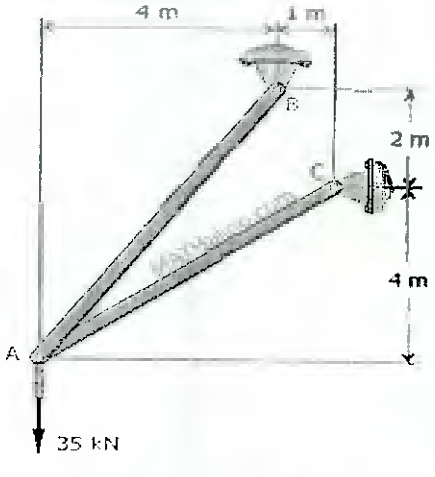
Program: F. Y. B. Tech(Electrical) **Duration: 1.5 hrs**

Course Code: ES-BTE-101 **Maximum Points: 30**

Course Name: Engineering Mechanics **Semester: I**

Note: Solve any 5 problems

12/02/2026

Q.No.	Questions	Points	CO	BL	Module No.
1(a)	 Calculate C. G of section with reference to X and Y axis Dimensions in mm.	10	CO3	3	3
1(b)	Explain importance of calculation of C. G. of section	03	CO3	2	3
1(c)	Determine the forces P and F acting respectively along bars AB and AC that maintain equilibrium of pin A. 	07	CO1	3	1

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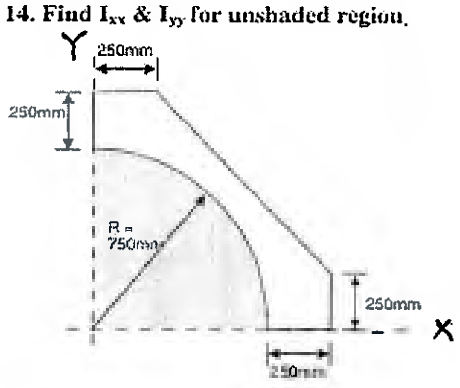
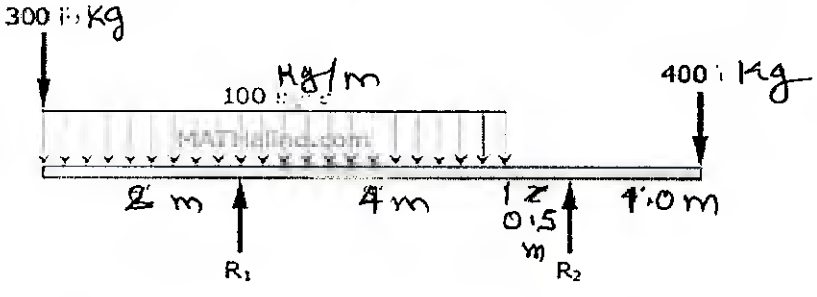
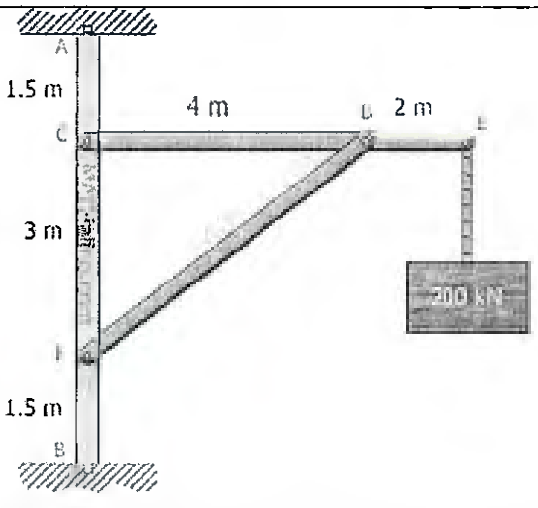
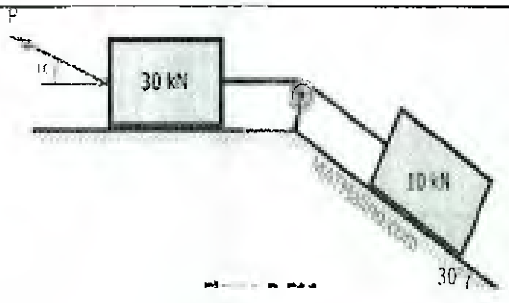
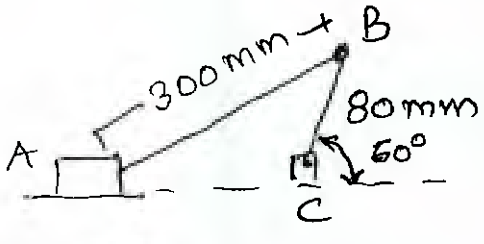
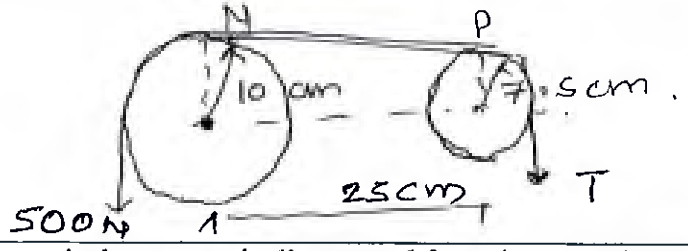
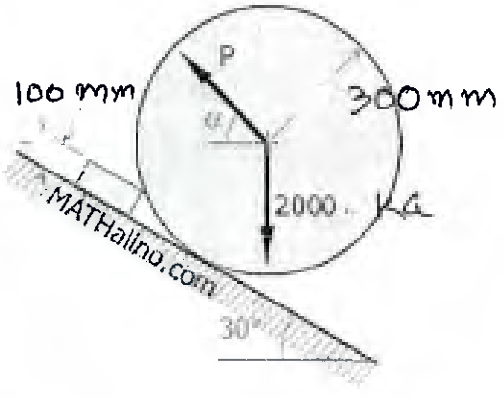
END SEMESTER/RE EXAMINATION JANUARY/ FEBRUARY 2025

2(a)	**14. Find I_{xx} & I_{yy} for unshaded region.**  Calculate moment of inertia with reference to X and Y as shown (dimensions in mm)	10	CO3	3	3
2(b)	A beam of span 7.5 met is hinged at 1 and Rollers at 2. The load on beam is as shown , Calculate reaction at 1 and 2  	05	CO1	3	1
2(C)	 The frame shown in Fig. is supported in pivots at A and B. Each member weighs 5 kN/m. Compute the horizontal reaction at A and the horizontal and vertical components of the reaction at B.	05	CO1	3	1

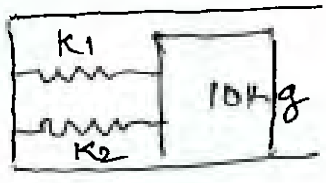
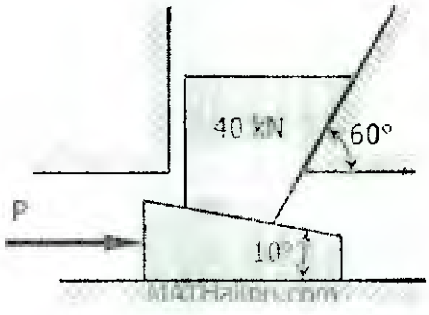
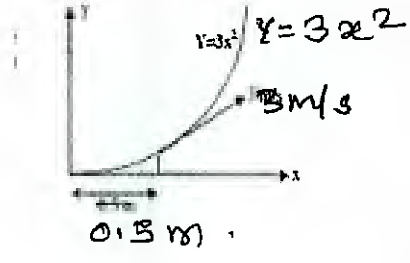
~~END SEMESTER~~/RE EXAMINATION JANUARY/ FEBRUARY 2025

3(a)	Two cars A and B travelling in the same direction on same adjacent lanes are stopped at traffic signal. As the signal turns green car A accelerates at a constant rate of 2m/sec2.Three seconds later car B starts and accelerate at 3.6 m/sec2. Calculate when and where B will overtake A and speed of each car at that time. .	0 6	CO4	3	4
3(b)	Two cars of the same mass collide head on at C. After collision the cars skid on the road with locked brakes and come to a stop position as shown. If speed of car A just before impact is 5kmph and μk= 0.3 Calculate speed of car just before impact and coefficient of restitution.	14	CO4	3	5
4(a)	 Find the least value of P required to cause the system of blocks shown in Fig. to have impending motion to the left. The coefficient of friction under each block is 0.20.	07	CO2	3	2
4(b)	The crank CB of a slider crank mechanism is rotating at a constant speed of 40 rpm clockwise. Determine the velocity of the cross head A at the given instant. AB = 300mm & BC is 80 mm. 	07	CO4	3	5

~~END SEMESTER~~/RE EXAMINATION JANUARY/ FEBRUARY 2025

4(c)	An open belt drive connecting two pulleys of diameter 20 cm and 15 cm are 25 cm apart if μ- 0.3 for both pulleys find the torque that can be transmitted by driving pulleyif maximum allowable tension is 500 N. also calculate tension in position B of rope,. 	06	CO2	3	2
5(a)	A stone is thrown vertically upward from the ground with a velocity of 14.72 m per sec. One second later another stone is thrown vertically upward with a velocity of 29.44 m per sec. How far above the ground will the stones be at the same level?	08	CO4	3	4
5(b)	Determine the amount and direction of the smallest force P required to start the wheel in Fig. over the block. What is the reaction at the block? Diameter of wheel 600 mm and height of block 100mm weight of wheel 2000kg 	12	CO1	3	1
6(a)	A train moving with constant acceleration travels 7.32 m during the 10th second of its motion and 5.49 m during the 12th second of its motion. Find its initial velocity and its constant acceleration.	06	CO4	3	4
6(b)	A block of mass 10 kg can slide without friction in a slot and is attached to 2 springs as shown. The springs are initially un stretched. The block is pushed to the left 35 mm and released.	14	CO4	3	5

~~END SEMESTER~~/RE EXAMINATION JANUARY/ FEBRUARY 2025

	Determine maximum velocity of block and velocity of block when it is 15 mm from initial position. K1= 1 Kn/m, K2 = 4 Kn/m , 				
7(a)	Determine the value of P just sufficient to start the 10° wedge under the 40-kN block. The angle of friction is 20° for all contact surfaces. 	10	CO2	3	2
7(b)	A particle moves with constant speed of 3m/s along the path y=3x2. Find the acceleration of the particle when x=0.5m. 	10	CO4	3	4

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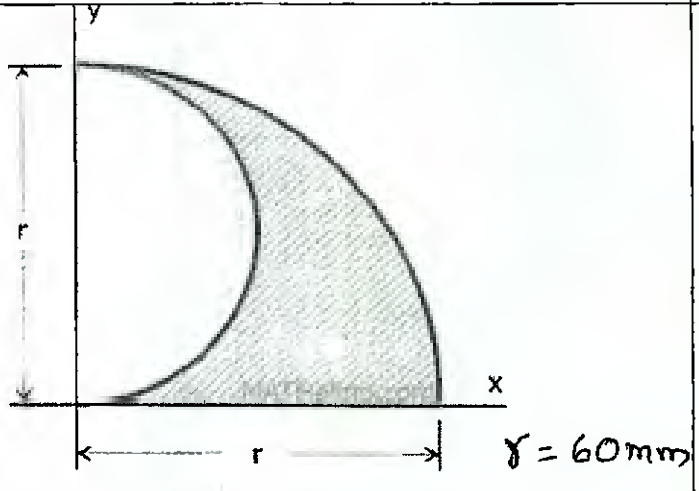
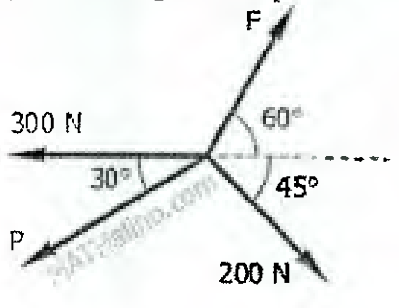
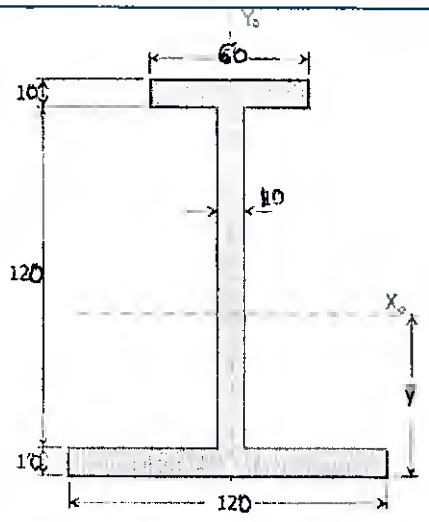
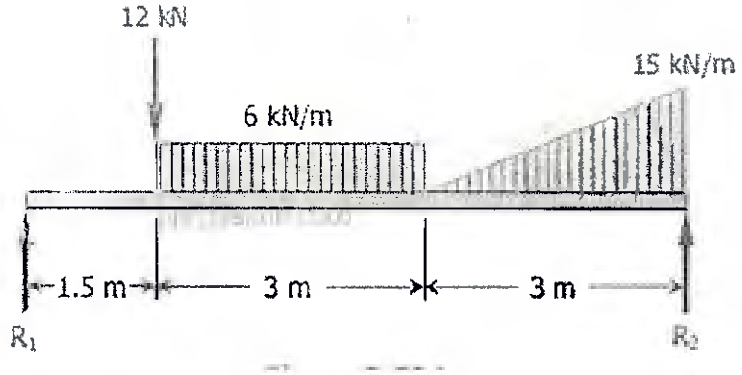
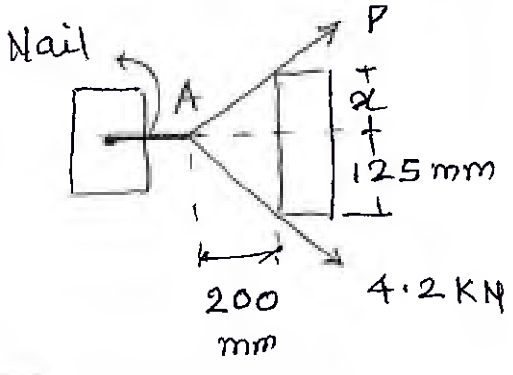
END SEMESTER/RE EXAMINATION JANUARY/ ~~FEBRUARY~~ 2026

Program: F. Y. B. Tech(Electrical) Sem - I
Duration: 1.5 hrs
Course Code: ES-BTE-101
Maximum Points: 100
Course Name: Engineering Mechanics
Semester: I
Note: Solve any 5 problems

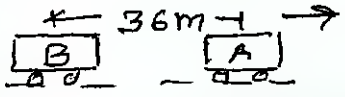
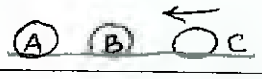
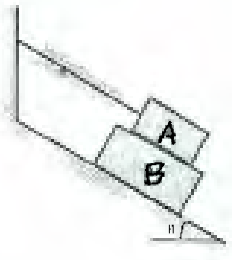
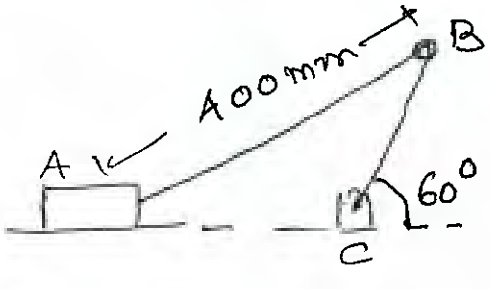
05/01/26

Q.No.	Questions	Points	CO	BL	Mod No.
1(a)	 Calculate C. G of section with reference to X and Y axis	10	CO3	3	3
1(b)	Explain importance of calculation of C. G. of section	03	CO3	2	3
1(c)	Determine the magnitude of P and F necessary to keep the concurrent force system in Figure in equilibrium. 	07	CO1	3	1

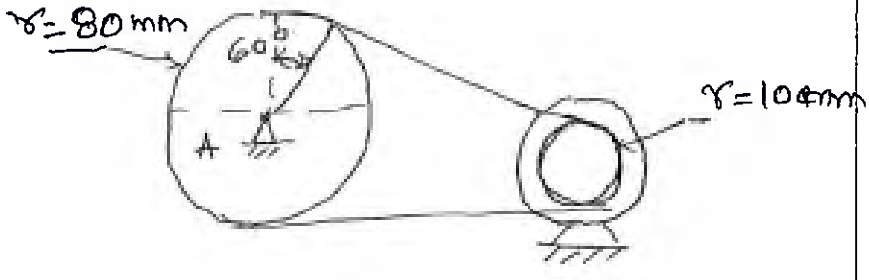
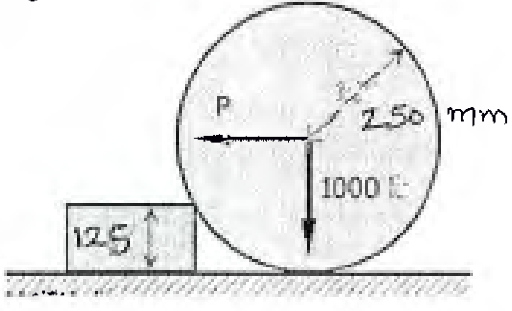
END SEMESTER/RE EXAMINATION JANUARY/ ~~FEBRUARY~~ 2026

2(a)	 Calculate moment of inertia with reference to Xo and Yo as shown (dimensions in mm)	10	CO3	3	3
2(b)	A beam of span 7.5 met is hinged at 1 and Rollers at 2. The load on beam is as shown , Calculate reaction at 1 and 2 	05	CO1	3	1
2(C)	A nail is to be removed from a block by applying forces in horizontal direction. Due to obstruction direct access is not possible so forces P and 4.2 kn are applied as shown. Determine minimum value of P to remove the nail and depth of obstruction. 	05	CO1	3	1

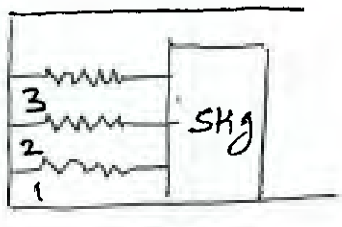
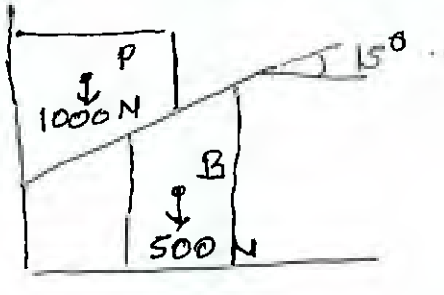
END SEMESTER/ EXAMINATION JANUARY/ FEBRUARY 2025

3(a)	Two cars A and B travelling at a constant speed of 170 kmph . The car A is leading B by 36 mAt t=0 they accelerate at constant rates. Knowing that when B passes A, t=8sec and Va= 220kmph Find acceleration of A and B 	0 6	CO4	3	4
3(b)	Two identical balls A and B are at rest. A ball C of different material but of same mass moving with velocity of 1.5 m/sec and strikes ball B. If coefficient of restitution between B and C is 0,8 and that between A and B is 0.5 Determine velocity of each ball after collision takes place. 	14	CO4	3	5
4(a)	 Block A in figure weighs 120 kg and block B weighs 200 kg . The connecting cord is parallel to the inclined surface. If the coefficient of friction for all surfaces in contact is 0.25, determine the angle θ of the incline of which motion of B impends.	07	CO2	3	2
4(b)	The crank CB of a slider crank mechanism is rotating at a constant speed of 30 rpm clockwise. Determine the velocity of the cross head A at the given instant. AB = 400mm & BC is 100 mm. 	07	CO4	3	5

END SEMESTER/RE EXAMINATION JANUARY/ ~~FEBRUARY~~ 2025

4(c)	A flat belt connects pulley a which drives pulley b attached to an electric motor μs =0.25 and μk =0.2 between both pulleys and belt..If maximum allowable tension in the belt is 600N determine the largest torque which can be exerted by belt on pulley 	06	CO2	3	2
5(a)	A ball is shot vertically into the air at a velocity of 58.9 m per sec. After 4 sec, another ball is shot vertically into the air. What initial velocity must the second ball have in order to meet the first ball 117.8 m from the ground?	08	CO4	3	4
5(b)	A wheel of 250 mm radius carries a load of 1000 kg, as shown in Fig.  (a) Determine the horizontal force P applied at the center which is necessary to start the wheel over a 125 mm block. Also find the reaction at the block. (b) If the force P may be inclined at any angle with the horizontal, determine the minimum value of P to start the wheel over the block, the angle P makes with the horizontal; and the reaction at the block.	12	CO1	3	1

END SEMESTER/RE EXAMINATION JANUARY/ FEBRUARY 2025

6(a)	A car weighing 1000 kg and travelling at 30 m/s stops at a distance of 50 m decelerating uniformly. Determine time required to stop the car and coefficient of friction between tires and road.	10	CO4	3	4
6(b)	A block of mass 5 kg can slide without friction in a slot and is attached to 3 springs as shown. The springs are initially un stretched. The block is pushed to the left 45 mm and released. Determine maximum velocity of block and velocity of block when it is 18 mm from initial position. K1= 1 Kn/m, K2 = 2 Kn/m , K3 = 4 Kn/m 	10	CO4	3	5
7(a)	Wedge B weighing 500 N , assuming the coefficient of friction between all the surfaces to be 0.2, determine what minimum horizontal force P should be applied to raise the block P 	10	CO2	3	2
7(b)	A particle moves in xy-plane with velocity components Vx = (8t-2) & Vy = 2. If it passes through point (x,y) = (14 , 4) when t=2sec, determine the equation of the path traced by the particle. Find also the resultant acceleration at t=2 sec.	10	CO4	3	4

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RE ~~END SEMESTER December 2025~~ / RE - EXAM February 2026

16/02/26

Program: Electrical Engineering F.Y. B.Tech

Course Code: ES-BTE102

Course Name: Engineering Graphics

Duration: 03 hour

Maximum Points: 100 marks

Semester: I

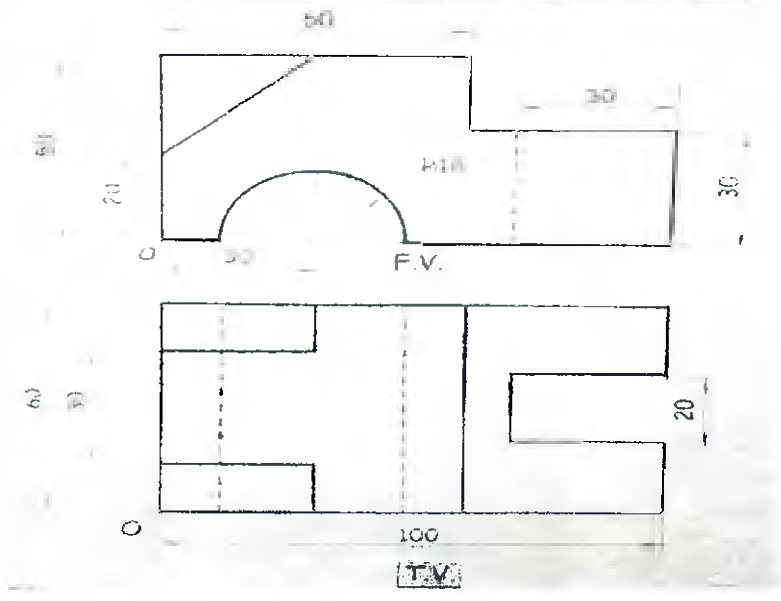
Notes: AutoCAD file name for each question should be :
SEATNO_ENDSEM_JAN2026_Q1(Example:E25100XX_ENDSEM_JAN26_Q1)

1. **Question No 1 is compulsory**
2. **Attempt any four questions out of the remaining six.**
3. Draw neat schematic diagrams,**highlight** important points.
4. Assume suitable data if necessary and mention it.
5. **Use first angle method of projection only.**
6. **Return question paper** to Invigilator.

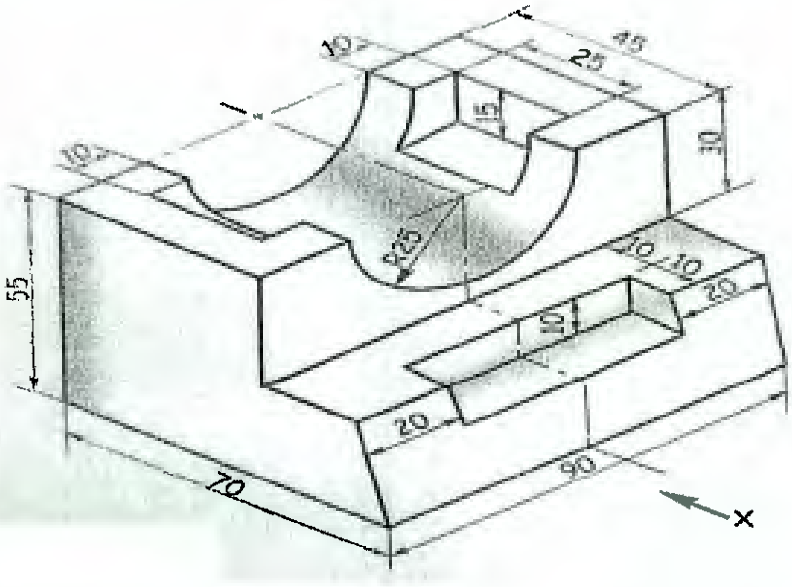
Exam Seat No	
Reg.NO.	
Machine NO.	
Sign of Invigilator	

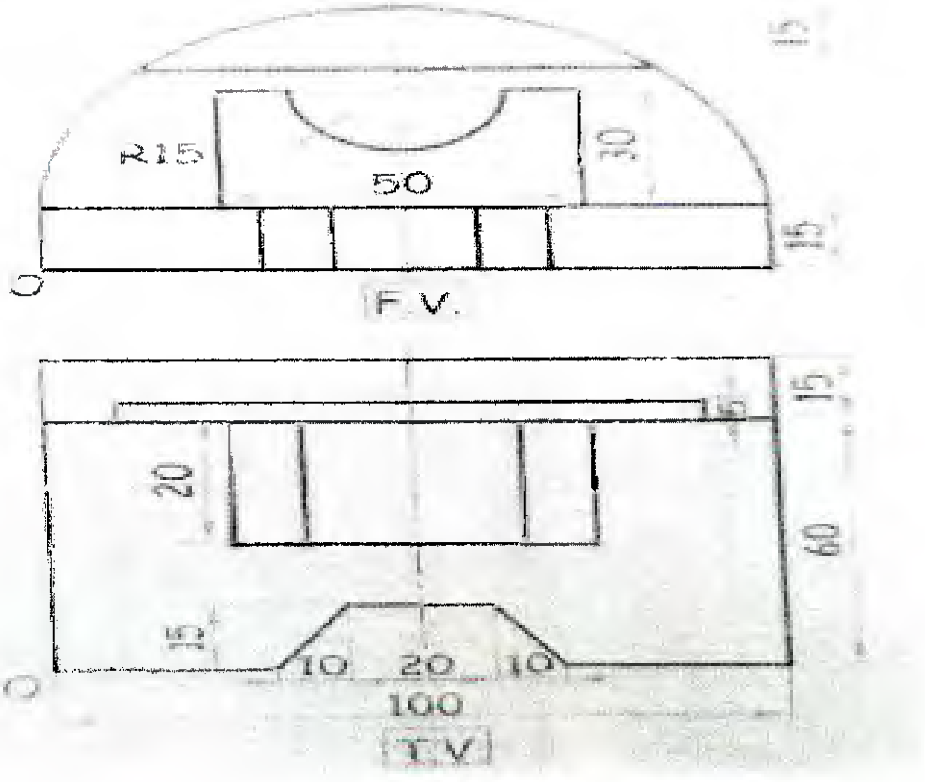
Q NO	Questions	Marks	CO	BL	Module nO
Q1 A	A line MN 105 mm long has its plan and elevation lengths 75 mm and 85 mm long respectively. One end of the line M is in H.P. and the other end N is in V.P. Assume the line in the 3rd quadrant.Draw the projections of the line and find its inclination with H.P. and V.P.	10	1, 2	2	2
Q1 B	Draw an isometric view of the following using natural scale.	10	1, 2	2	5

~~END SEMESTER December 2025~~ / RE - EXAM February 2026

					
Q2 A	Hexagonal pyramid, side of base 40mm and axis 85 mm is tilted towards the observer on one of its base edge in such a way that the triangular face containing the edge on which the pyramid rest, appears in front view as an isosceles triangle of 40 mm base and 50mm altitude. Draw the projections and find the inclination of the base of the pyramid with the H.P.	10	2	2	4
Q2 B	A square lamina ABCD of 50mm side rests on the corner C such that the diagonal AC is inclined at 35 degrees to V.P. the two sides BC and CD containing the corner C make equal angles with H.P. and the surface of the lamina is inclined at 40 degrees to the H.P. draw the front and top views of the lamina.	10	1, 2	2	3
Q3 A	The end S of a straight line SQ 80mm long is in the second quadrant, and 20 mm from both HP and V.P. end Q is the third quadrant the line is inclined at 30 degrees with the H.P. and DBEP 65mm. Draw the projections of the line, and find its inclination with the V.P.	10	1, 3	2	2
Q3 B	Hexagonal lamina of side 30mm is resting in the V.P. on one of its corners. Draw its projection, the diagonal passing through that corner makes an angle 40 degree and 30 degree to HP and V.P.respectively.	10	2, 3	2	3
Q4 A	Construct a curve generated by a circle of diameter 50 mm, when it rolls outside of base circle of radius 70mm. name the curve.	10	1	2	1

~~END SEMESTER December 2025~~ / RE - EXAM February 2026

Q4 B	A square prism with 35 mm sides of base and 55 mm axis length rests on HP on one of its comers of the base such that the two base edges containing the corner on which it rests make equal inclinations with HP. Draw the projections of the prism when the axis of the prism is inclined to HP at 35° and to VP at 40°.	10	1, 2	2	4
Q5 A	A point move such that sum of its distance from its two focus is 120 mm, draw the locus of a point if the distance between two focus is 80mm.	10	1, 2	2	1
Q5 B	The top view of a 85mm long line AB measures 55 mm. A is 45 mm in front of the V.P. and 20mm below the H.P. B is 20mm in front of the V.P. and is above the H.P.draw the front view of AB and find its inclination with the H.P. and the V.P.	10	1	2	2
Q6 A	Draw the following orthographic projection view of figure 1 1}FRONT VIEW 2} TOP VIEW 3} RHSV 	20	1, 2, 3	2	5
Q7 A	Rhombus of the longer diagonal of 70mm and smaller diagonal 35mm is resting on the corner of a larger diagonal on the V.P. such that the front view is a square of 35mm diagonals. Draw its projection if the front view of the larger diagonal makes an angle of 40 degree with the H.P. Find surface inclination angle with V.P.	10	3	2	3

Q7 B	Draw an isometric view of the following using natural scale. 	10	3	2	5

Mukesh Patel School's

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Munshi Nagar, Andheri (W) Mumbai – 400058

END SEMESTER ~~December~~ Jan 2025 / ~~RE EXAM February 2026~~

Program:Electrical Engineering F.Y.B.Tech ele - Sem I Duration: 03 hour

Course Code: ES-BTE102 Maximum Points:100 marks

Course Name:Engineering Graphics Semester:I

14/01/26

Notes: AutoCAD file name for each question should be :
SEATNO_ENDSEM_JAN2026_Q1(Example:E25100XX_ENDSEM_JAN26_Q1)

1. **Question No 1 is compulsory**
2. **Attempt any four questions out of the remaining six.**
3. Draw neat schematic diagrams,**highlight** important points.
4. Assume suitable data if necessary and mention it.
5. **Use first angle method of projection only.**
6. **Return question paper** to Invigilator.

Exam Seat No	
Reg.NO.	
Machine NO.	
Sign of Invigilator	

Q. NO	Questions	Marks	CO	BL	Module nO
Q1 A	A line PQ 105 mm long has its plan and elevation lengths 75 mm and 85 mm long respectively. One end of the line P is in H.P. and the other end Q is in V.P. Assume the line in the 3rd quadrant.Draw the projections of the line and find its inclination with H.P. and V.P.	10	1, 2	2	2

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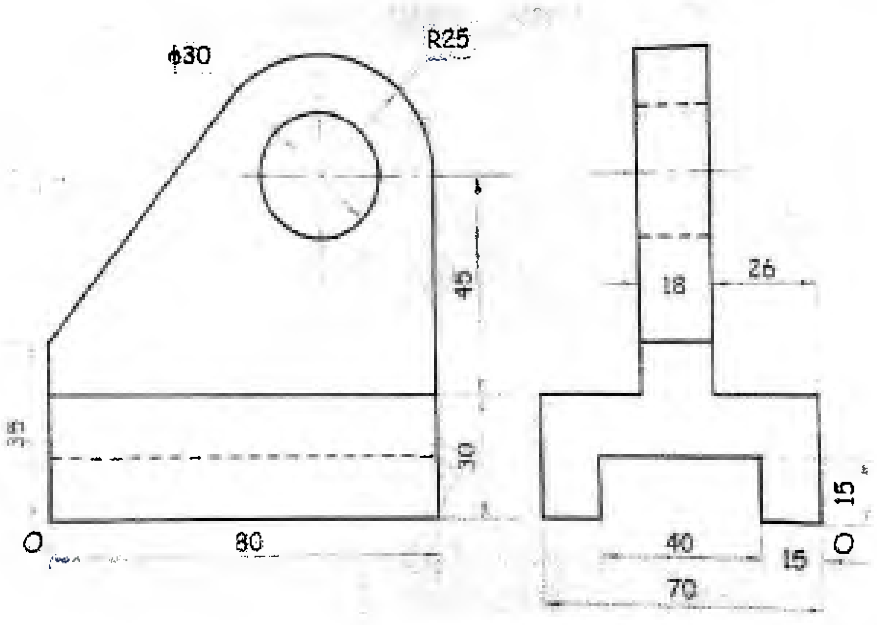
END SEMESTER December 2025 / ~~RE – EXAM February 2026~~

Q1 B	Draw an isometric view of the following using natural scale. 	10	1.2	2	5
Q2 A	Hexagonal pyramid, side of base 40mm and axis 80 mm is tilted towards the observer on one of its base edge in such a way that the triangular face containing the edge on which the pyramid rest, appears in front view as an isosceles triangle of 40 mm base and 55mm altitude. Draw the projections and find the inclination of the base of the pyramid with the H.P.	10	2	2	4
Q2 B	The square lamina ABCD of 50 mm side rests on corner A in the HP.such that the plane is seen as Rhombus in the top view with diagonal contained by Corner A measuring 25 mm. and other diagonal inclined at 40 degrees to the V.P. parallel to HP. Draw its projections and determine the surface inclination of a plane with the H.P.	10	1.2	2	3
Q3 A	The end S of a straight line SQ 85mm long is in the second quadrant, and 20 mm from both HP and V.P. end Q is the third quadrant the line is inclined at 35 degrees with the H.P. and DBEP 60mm. Draw the projections of the line, and find its inclination with the V.P.	10	1.3	2	2
Q3 B	Hexagonal lamina of side 30mm is resting in the V.P. on one of its corners. Draw its projection, the diagonal passing through that corner makes an angle 40 degree and 30 degree to HP and V.P.respectively.	10	2,3	2	3

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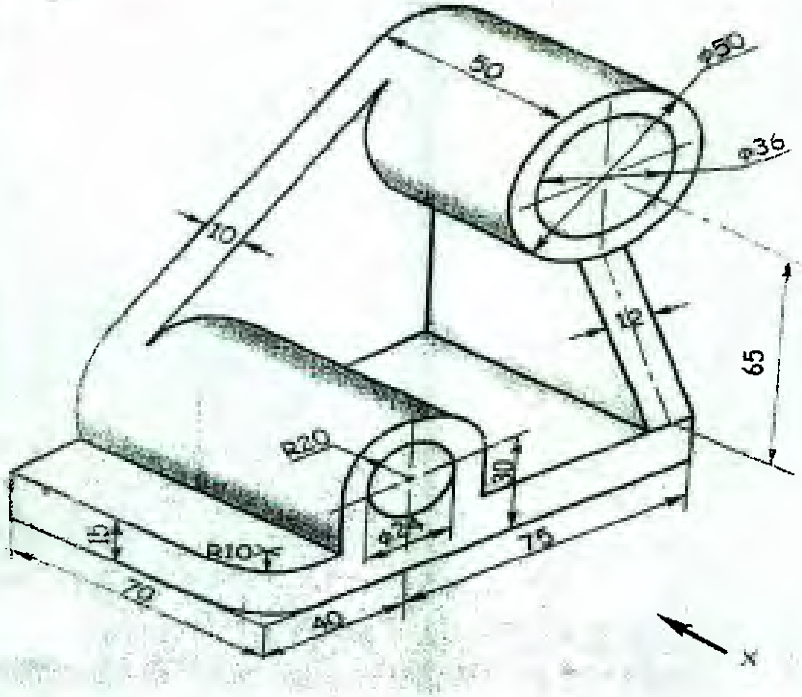
END SEMESTER December 2025 / ~~RE – EXAM February 2026~~

Q4 A	Construct a curve generated by a circle of diameter 55 mm, when it rolls outside of base circle of radius 80mm. name the curve.	10	1	2	1
Q4 B	A square prism with 40 mm sides of base and 60 mm axis length rests on HP on one of its comers of the base such that the two base edges containing the corner on which it rests make equal inclinations with HP. Draw the projections of the prism when the axis of the prism is inclined to HP at 35° and to VP at 40°.	10	1 , 2	2	4
Q5 A	A fish pond of elliptical shape is to be inscribed inside a rectangular plot of size 110 m × 55 m. Draw the boundary of the elliptical fish pond. Use appropriate scale.	10	1 , 2	2	1
Q5 B	The top view of a 80mm long line AB measures 55 mm. A is 50 mm in front of the V.P. and 15mm below the H.P. B is 15mm in front of the V.P. and is above the H.P.draw the front view of AB and find its inclination with the H.P. and the V.P.	10	1	2	2
Q6 A	Draw the following orthographic projection view of figure 1 1}FRONT VIEW 2} TOP VIEW 3} RHSV  	20	1 , 2 , 3	2	5

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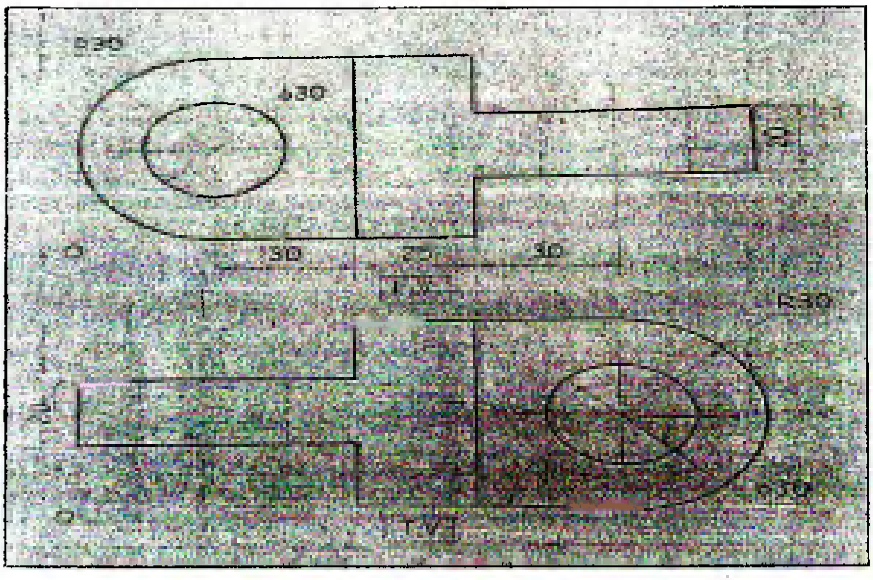
END SEMESTER December 2025 / ~~RE – EXAM February 2026~~

Q7 A	Rhombus of the longer diagonal of 60mm and smaller diagonal 35mm is resting on the corner of a larger diagonal on the V.P. such that the front view is a square of 35mm diagonals. Draw its projection if the front view of the larger diagonal makes an angle of 45 degree with the H.P. Find surface inclination angle with V.P.	10	3	2	3
Q7 B	Draw an isometric view of the following using natural scale. 	10	3	2	5

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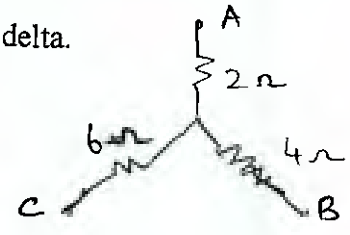
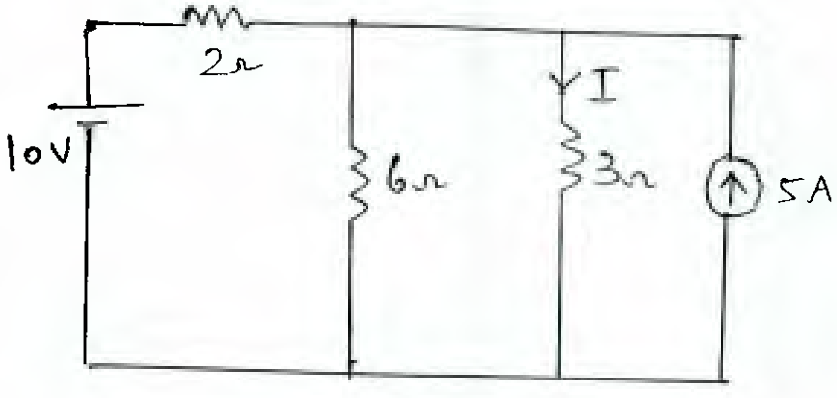
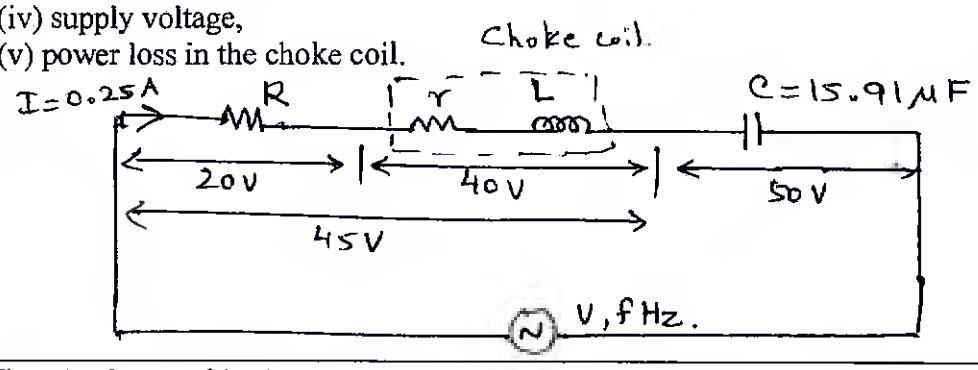
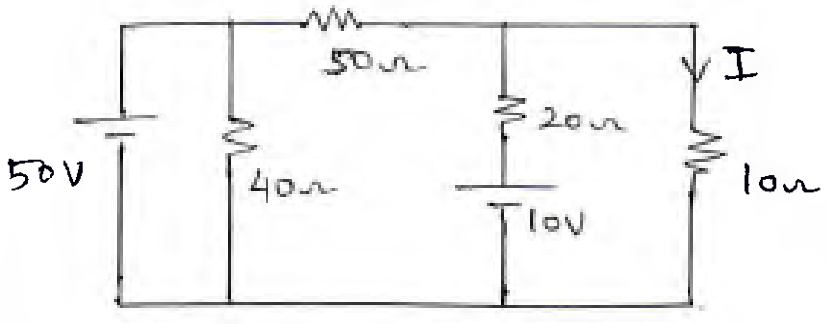
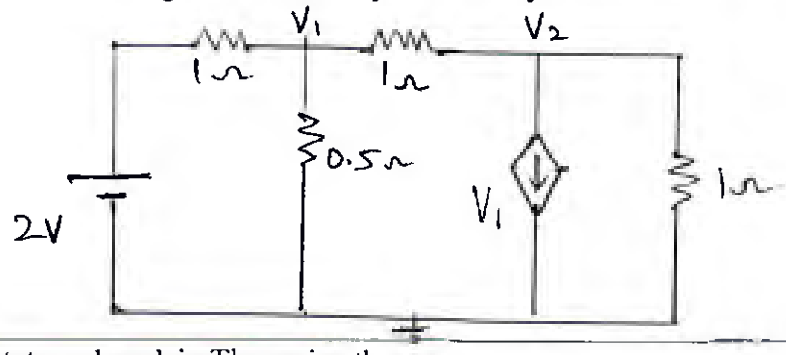
~~End sem~~/Re-exam JAN 2026 11/02/26

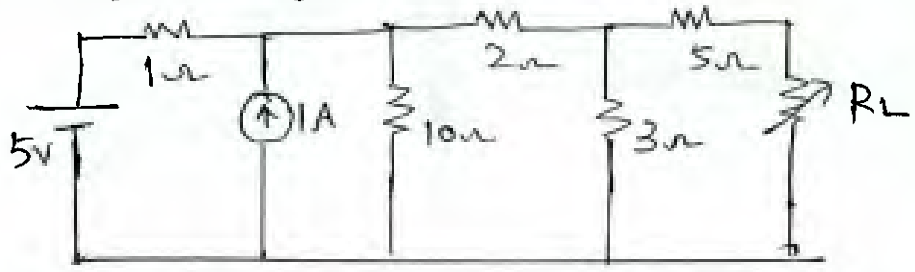
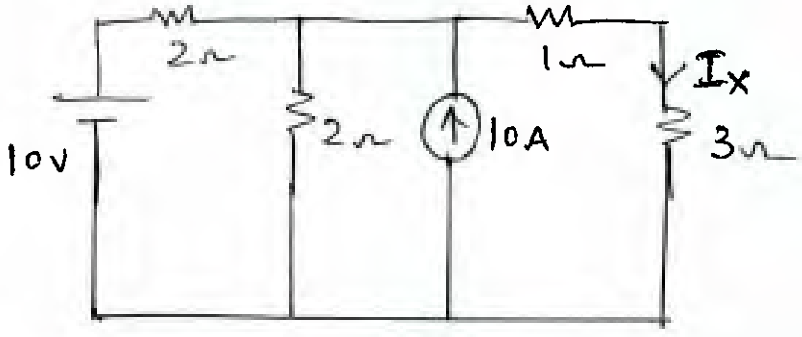
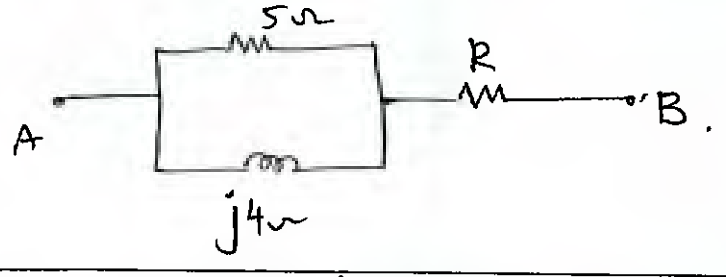
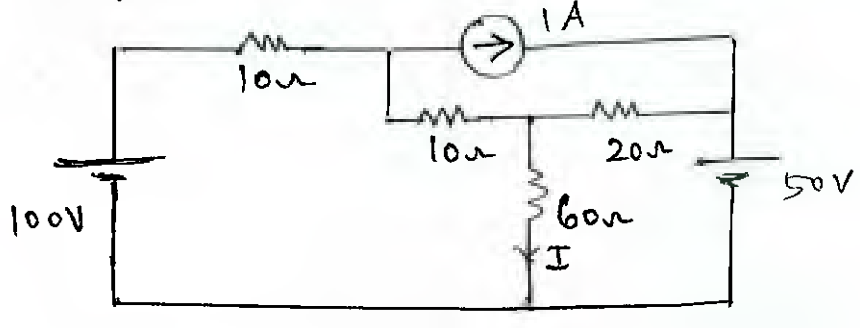
Program: FY-B tech -Electrical Sem - I
Course Code: ES-BTE103
Course Name: BEE-I

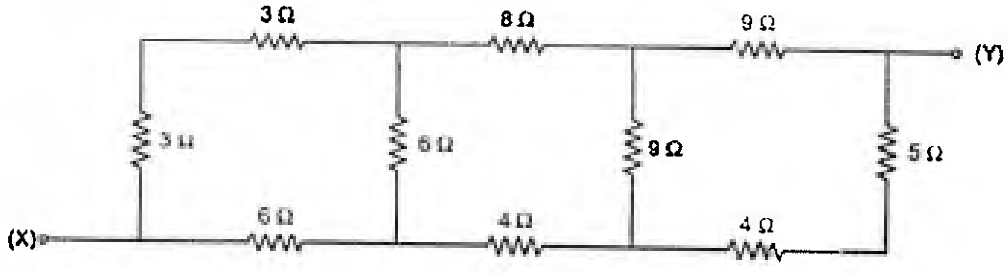
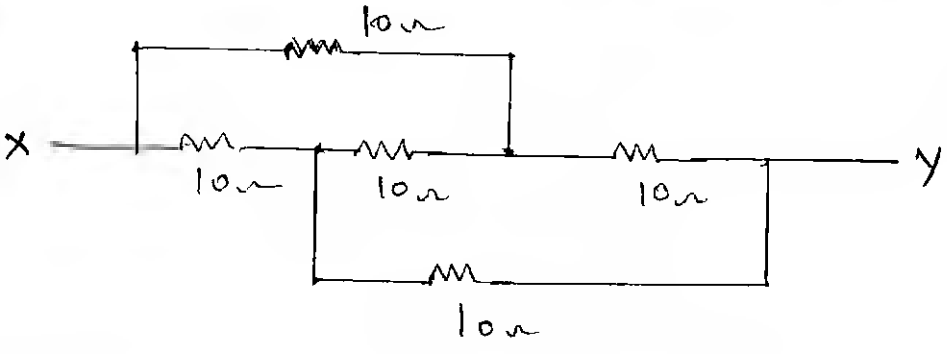
Duration: 3hrs
Semester: I
Maximum Points: 100

- Answer any five questions. Make suitable assumptions wherever necessary.

Q.No	Questions	Points	CO	BL	module
Q1.a	Draw the power triangle and name its sides along with its expression and units.	4	2	3	5
1 b.	State and prove Maximum power transfer theorem.	4	1	2	3
1c	Two currents $i_1=100 \sin(\omega t+\frac{\pi}{4})$ and $i_2=25 \sin(\omega t-\frac{\pi}{6})$ are fed to a common conductor .Find the total current.If the conductor resistance is 10Ω. What is the power dissipated in the conductor.	4	2	3	4
1d	Convert star to delta. 	4	1	3	2
1e	Using source transformation find the value of I 	4	1	3	2

Q2.a	A resistor of 20 ohm, inductor of 0.2 H and a capacitor of 100 μF are connected in series. A supply voltage 220 V,50 Hz is connected across the series combination. Calculate the following: (a) impedance, (b) current drawn by the circuit, (c) voltage drop across each element d) power consumed e)power factor of the circuit.	10	2	3	5
2b	A pure resistor R, a choke coil and a pure capacitor of 15.91 μF are connected in series across a supply of V volt and carries a current of 0.25A. The voltage across the choke coil is 40V and the voltage across the capacitor is 50V. Voltage across the resistor is 20V. Voltage across the combination of R and the choke coil is 45V. Calculate:- (i) the supply frequency, (ii) coil resistance r, (iii) inductance value, (iv) supply voltage, (v) power loss in the choke coil. 	10	2	3	5
Q3.a.	Find the Current I in the network by using Nortons theorem. 	8	1	3	3
3b	Find the voltages V_1 and V_2 by nodal analysis 	8	1	3	3
3c.	State and explain Thevenins theorem.	4	1	3	3

Q4.a.	Find the value of resistance R_L for maximum power transfer and calculate the maximum power for the given circuit. 	10	1	3	3
4b.	State Superposition theorem.Find I_X using Superposition theorem without using source transformation.Verify the same by Thevenins theorem. 	10	1	3	3
Q5a	Two impedances $Z_1 = (12+j16)\Omega$, $Z_B = (10-j20)\Omega$ are connected in parallel across 230V supply .Find the KW,KVA,KVAR and power factor of each branch.	10	2	3	5
5 b	A voltage of 150V is applied between the terminals AB produces a current of 32A for the circuit shown. Find the value of R and the power factor of the circuit. 	10	2	3	5
Q6a.	Find the current through the 60Ω resistor by nodal analysis and verify the same by mesh analysis 	12	1	3	2

6b.	A coil of 3 Ω resistance and an inductance of 0.22H is connected in series with an imperfect capacitor .When such a series circuit is connected across a 200V ,50Hz supply, it has been observed that the combined impedance is (3.8+j6.4) Ω.Calculate the resistance and capacitance of the imperfect capacitor.	8	2	3	4 · 5
Q7a	Discuss the disadvantages of low power factor and methods to improve the power factor.	6	2	2	5
7b.	List the dependent sources with their symbols.	4	1	1	1
7c.	Calculate the equivalent resistance between X and Y.	5+5	1	1	1
i)					
ii)					

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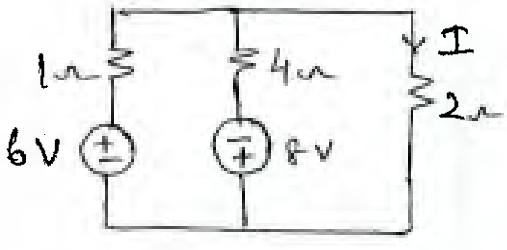
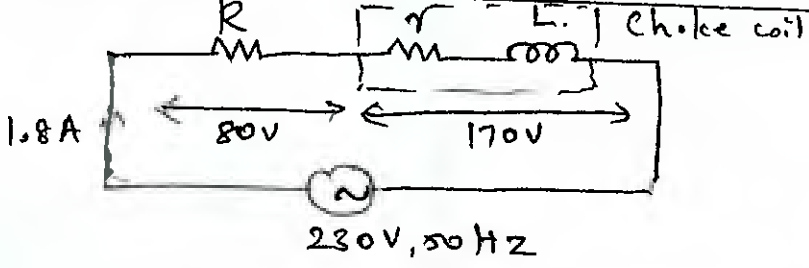
End sem/[redacted]-exam JAN 2026

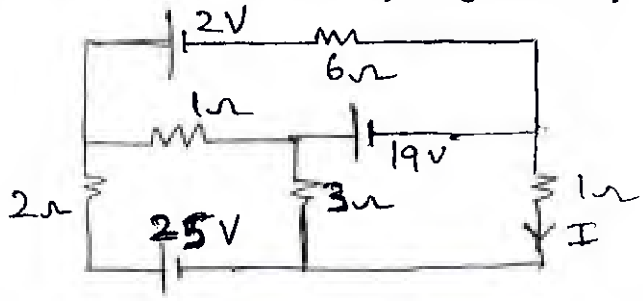
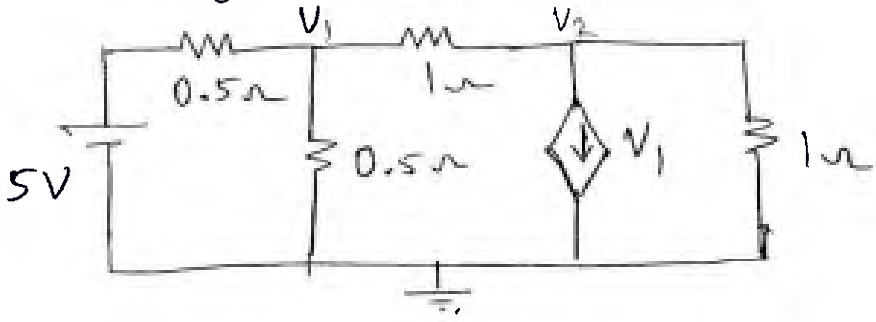
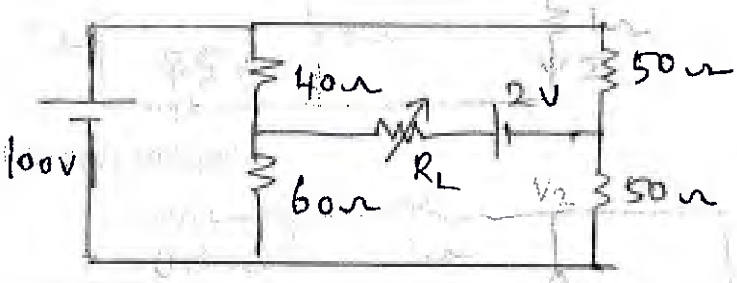
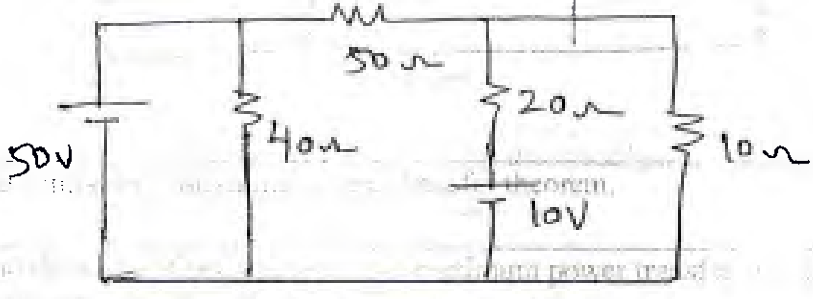
02/01/26

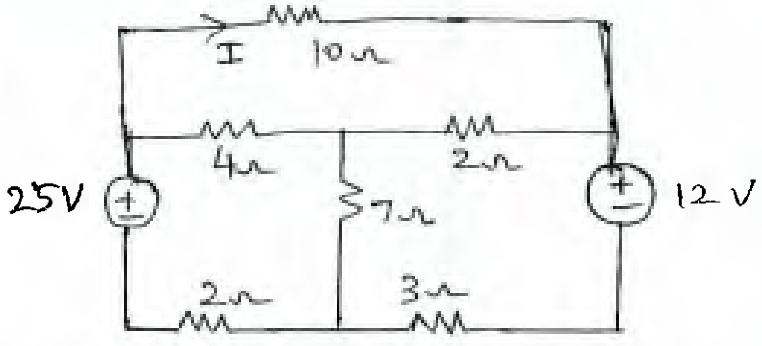
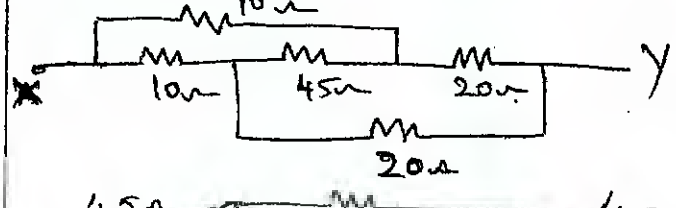
Program: FY-B tech -Electrical Sem - I
Course Code: ES-BTE103
Course Name: BEE-I

Duration: 3hrs
Semester: I
Maximum Points:100

- Answer any five questions. Make suitable assumptions wherever necessary.

Q.No	Questions	Points	CO	BL	module
Q1.a	Name its sides of a power triangle along with its expression and units.	4	2	3	5
1 b.	State and explain Superposition theorem.	4	1	2	3
1c	Two currents are $i_1=10\sqrt{2}\sin \omega t$ and $i_2=20\sqrt{2}\sin(\omega t+60)$ .Find the expression for the sum of the total current..	4	2	3	5
1d	List the dependent sources with their symbols.	4	1	3	3
1e	Using source transformation find the current I. 	4	1	3	2
Q2.a	In a series parallel circuit two parallel branches A and B are in series with C. The impedances are $Z_A=(4+j3)\Omega$, $Z_B=(10-j7)\Omega$, $Z_C=(6+j5)\Omega$..If the voltage applied across the circuit is 200V at 50Hz Calculate the values of I_A, I_B ,I_c and total power factor of the circuit.	10	2	3	5
2b	A choke coil is connected in series with a fixed resistor. A 230V,50Hz supply is applied and a current of 1.8 A flows. If the voltage drops across the coil and fixed resistor are 170 and 80V respectively, calculate i) the value of the fixed resistance, ii) resistance and inductance of the coil iii) Phase difference between current and supply voltage iv) Draw the phasor diagram. 	10	2	3	5

Q3.a.	Find the Current I in the network by using mesh analysis. 	8	1	3	3
3b	Find the node voltages. 	8	1	3	2
3c.	State and prove Maximum power transfer theorem.	4	1	3	3
Q4.a.	Find the value of resistance R_L for maximum power transfer and calculate the maximum power for the given circuit. 	8	1	3	3
4b.	State Nortons theorem .Find current in 10 ohm resistor using Nortons theorem and Verify the same by Nodal analysis.. 	12	1	3	3

Q5a	Two impedences $Z_1 = (10+j15)\Omega$, $Z_B = (6-j8)\Omega$ are connected in parallel.The total current supplied is 15A. Find branch currents and power taken by each branch.	10	2	3	5
5 b .	A resistor of 10 ohm, inductor of 0.1 H and a capacitor of 150 μF are connected in series. A supply voltage 200 V. 50 Hz is connected across the series combination. Calculate the following: (a) inductive reactance, (b) impedance ,c) current drawn by the circuit, (c) voltage drop across each element d)power factor of the circuit.	10	2	3	5
Q6a.	Find the current through the 5Ω resistor by Super position theorem and verify the same by Thevenins theorem 	12	1	3	2
6b.	An inductive coil draws 10A current and consumes 1KW power from a 200V,50Hz ac supply. Determine i) impedence in Cartesian and polar forms, ii) power factor, iii) reactive iv) and apparent power.	8	2	3	4 5
Q7a	Discuss the disadvantages of low power factor and methods to improve the power factor.	5	2	2	5
7b.	An alternatoris supplying a load of 300KW at a pf of 0.6 lagging.If power factor is raised to unity,how many kilowatts can altermnator supply for the same KVA loading	5	2	3	5
)7c. i)	Calculate the equivalent resistance between X and Y. 	10	1	3	1
ii)					

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~~End Semester~~/Re-examination December 2025/ January 2026 09/02/26

Program: F.Y.B.Tech (Electrical) Sem-I **Duration: 3 Hours**

Course Code: BS-BTE101 **Maximum Points: 100**

Course Name: Differential Calculus and Complex Numbers

Semester: I

Note:

1. **Attempt Any Five Questions**
2. **Answers to the sub questions should be grouped together**

		Questions	Points	CO	BL	Module
1	a	If $\arg(z+1)=\frac{\pi}{6}$ and $\arg(z-1)=\frac{2\pi}{3}$, find z	6	2	BL2	3
	b	If $y=\cos^3 x\cdot\sin^2 x$, find y_n	6	1	BL3,5	SL
	c	If $u\cdot x+v\cdot y=0$ and $\frac{u}{x}+\frac{v}{y}=1$; Prove that $\frac{u}{x}\left(\frac{\partial x}{\partial u}\right)_v+\frac{v}{y}\left(\frac{\partial y}{\partial v}\right)_u=0$	8	1	BL3	1
2	a	Prove that $\tan 5\theta=\frac{5\tan\theta-10\tan^3\theta+\tan^5\theta}{1-10\tan^2\theta+5\tan^4\theta}$	6	2	BL3	3
	b	Evaluate $\int_0^3\frac{1}{\sqrt{x^3+1}}dx$ by (i) Trapezoidal rule (ii) Simpson's $\frac{1}{3}^{rd}$ rule (iii) Simpson's $\frac{3}{8}^{th}$ rule	6	3	BL3,5	5
	c	If $y=\left(\sin^{-1}x\right)^2$, prove that $\left(1-x^2\right)y_{n+2}-(2n+1)xy_{n+1}-n^2y_n=0$	8	1	BL3	SL

End Semester/Re-examination December 2025/ January 2026

3	a	Prove that $\cos^{-1}(ix)=\frac{\pi}{2}-i\log\left(x+\sqrt{x^2+1}\right)$	6	2	BL4	4
	b	Find the point on the surface $z^2=xy+1$, nearest to origin. Also find the distance.	6	1	BL4 2,5	2
	c	Solve the following system of Equation using Gauss Seidel's Iterative method $15x+2y+z=18$ $3x-6y+25z=22$ $2x+20y-3z=19$	8	3	BL3	5
4	a	Find the root of the equation $x^x=10$, correct to four places of decimals using Newton Raphson method	6	3	BL4	5
	b	If $\tan(\alpha+i\beta)=e^{i\theta}$, Prove that $\alpha=\frac{n\pi}{2}+\frac{\pi}{4}$ and $\beta=\frac{1}{2}\log\left[\tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right)\right]$	6	2	BL3 ,5	4
	c	If $z=x\log(x+r)-r$, where $r^2=x^2+y^2$. Prove that $\frac{\partial^2 z}{\partial x^2}+\frac{\partial^2 z}{\partial y^2}=\frac{1}{x+r}$	8	1	BL3	1
5	a	If $\sin(\theta+i\phi)=\cos\alpha+i\sin\alpha$ prove that $\cos^4\theta=\sin^2\alpha=\sinh^4\phi$	6	2	BL4 ,5	3
	b	Find the root of the equation $2x^3-3x^2+5x-1=0$, correct to four places of decimals using Regula Falsi method	6	3	BL4	5
	c	Find the maximum and minimum distance of the point $(3,4,12)$ from the sphere $x^2+y^2+z^2=1$	8	1	BL2 BL4	2
6	a	If $x+iy=\tan\left(\frac{\pi}{3}+i\alpha\right)$, Prove that $x^2+y^2-\frac{2x}{\sqrt{3}}-1=0$	6	2	BL3	4

End Semester/Re-examination December 2025/ January 2026

	b	Find nth derivative of $y=\log\left[(1+2x)^3(3x-2)^2\right]$	6	1	BL3	SL
	c	State and Prove Euler's Theorem for homogeneous functions of 3 variables.	8	1	BL1 ,3	1
7	a	If $u=x^2-y^2$, $v=2xy$ and $z=f(u,v)$, Prove that $\left(\frac{\partial z}{\partial x}\right)^2+\left(\frac{\partial z}{\partial y}\right)^2=4\sqrt{u^2+v^2}\left\{\left(\frac{\partial z}{\partial u}\right)^2+\left(\frac{\partial z}{\partial v}\right)^2\right\}$	6	1	BL2	1
	b	If $u=\log\left(x^2y^3+xy^4+x^5+y^5\right)$, Prove that $(i)\ x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=5$ $(ii)\ x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}=-5$	6	1	BL2	1
	c	If $u+iv=\frac{1}{i}\log\left[\frac{1+ie^{i\theta}}{1-ie^{i\theta}}\right]$, prove that $u=\frac{\pi}{2}$ and $v=\log\left(\sec\theta+\tan\theta\right)$	8	2	BL3	4

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End Semester/Re-examination December 2025/ ~~January 2026~~

Program: F.Y.B.Tech (Electrical) Sem-I **Duration: 3 Hours**

Course Code: BS-BTE101 **Maximum Points: 100**

Course Name: Differential Calculus and Complex Numbers

Semester: I 29/12/2026

Note:

1. **Attempt Any Five Questions**
2. **Answers to the sub questions should be grouped together**

		Questions	Points	CO	BL	Module
1	a	If α and β are the roots of the quadratic equation $x^2-2x+4=0$, prove that $\alpha^n+\beta^n=2^{n+1}\cos\left(\frac{n\pi}{3}\right)$	6	2	BL2	3
	b	If $y=\frac{2x^2-x+1}{(x+1)^2(x+2)(x-3)}$, find y_n	6	1	BL3,5	SL
	c	If $u\cdot x+v\cdot y=0$ and $\frac{u}{x}+\frac{v}{y}=1$; Prove that $\left(\frac{\partial u}{\partial x}\right)_y-\left(\frac{\partial v}{\partial y}\right)_x=\frac{x^2+y^2}{y^2-x^2}$	8	1	BL3	1
2	a	Prove that $\tan 7\theta=\frac{7\tan\theta-35\tan^3\theta+21\tan^5\theta-\tan^7\theta}{1-21\tan^2\theta+35\tan^4\theta-7\tan^6\theta}$	6	2	BL3	3
	b	Evaluate $\int_1^{1.6}\frac{1}{2+\log_e x}dx$ by (i) Trapezoidal rule (ii) Simpson's $\frac{1}{3}^{rd}$ rule (iii) Simpson's $\frac{3}{8}^{th}$ rule	6	3	BL3,5	5
	c	If $y=\log\left[x+\sqrt{1+x^2}\right]$, prove that $(1+x^2)y_{n+2}+(2n+1)xy_{n+1}+n^2y_n=0$	8	1	BL3	SL

End Semester/Re-examination December 2025/ January 2026.

3	a	If $\sin(\alpha+i\beta)=x+iy$, Prove that $(i)\ \frac{x^2}{\cosh^2\beta}+\frac{y^2}{\sinh^2\beta}=1\quad (ii)\ \frac{x^2}{\sin^2\alpha}-\frac{y^2}{\cos^2\alpha}=1$	6	2	BL4	4
	b	Divide 150 into three parts so that the sum of their products taken two at a time will be maximum.	6	1	BL4 2,5	2
	c	Solve the following system of Equation using Gauss Jacobi's Iterative method $15x+2y+z=18$ $3x-6y+25z=22$ $2x+20y-3z=19$	8	3	BL3	5
4	a	Find the root of the equation $x^x=100$, correct to four places of decimals using Newton Raphson method	6	3	BL4	5
	b	If $\cot(\alpha+i\beta)=x+iy$, Prove that $(i)\ x^2+y^2-2x\cot 2\alpha-1=0$ $(ii)\ x^2+y^2+2y\coth 2\beta+1-0$	6	2	BL3 ,5	4
	c	If $z=x\log(x+r)-r$, where $r^2=x^2+y^2$. Prove that $\frac{\partial^2 z}{\partial x^2}+\frac{\partial^2 z}{\partial y^2}=\frac{1}{x+r}$	8	1	BL3	1
5	a	Prove that $\sin^{-1}\left(e^{i\theta}\right)=\cos^{-1}\left(\sqrt{\sin\theta}\right)+i\log\left(\sqrt{\sin\theta}+\sqrt{1+\sin\theta}\right)$	6	2	BL4 ,5	3
	b	Find the root of the equation $x^3-3x^2+5x-1=0$, correct to four places of decimals using Regula Falsi method	6	3	BL4	5
	c	Find the maximum and minimum value of the function $f(x,y)=x-2y+z$ on the sphere $x^2+y^2+z^2=9$	8	1	BL2 BL4	2
6	a	Find all the roots of the equation $x^7+x^4+ix^3+i=0$	6	2	BL3	4

	b	Find n^{th} derivative of $y = \cos^4 x$	6	1	BL3	SL
	c	If u is a homogeneous function of degree n in two variables x and y, then prove that $(i)\ x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=nu$ $(ii)\ x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}=n(n-1)u$	8	1	BL1 ,3	1
7	a	If $u=x^2-y^2$, $v=2xy$ and $z=f(u,v)$, Prove that $\left(\frac{\partial z}{\partial x}\right)^2+\left(\frac{\partial z}{\partial y}\right)^2=4\sqrt{u^2+v^2}\left\{\left(\frac{\partial z}{\partial u}\right)^2+\left(\frac{\partial z}{\partial v}\right)^2\right\}$	6	1	BL2	1
	b	If $u=\tan^{-1}\left(\frac{x^3-y^3}{x+y}\right)$, Prove that $(i)\ x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=\sin 2u$ $(ii)\ x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}=2\sin u\cdot\cos 3u$	6	1	BL2	1
	c	If $u+iv=\frac{1}{i}\log\left[\frac{1+ie^{i\theta}}{1-ie^{i\theta}}\right]$, prove that $u=\frac{\pi}{2}$ and $v=\log(\sec\theta+\tan\theta)$	8	2	BL3	4

Set - II

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

END SEMESTER DECEMBER 2025 / [redacted]

Program: F.Y. B.Tech Electrical Sem - I

Duration: 180 Min

Course Code: BS-BTE-102

Maximum Points: 100

Course Name: Engineering Chemistry

Semester: I

31/12/26

Instructions:

1 Question No (Q6) is compulsory
2 Attempt any 4 from Q1, Q2,Q3, Q4,Q5
3 Write the chemical reactions wherever necessary

Q.No.	Questions	Points	CO	BL	Mod. No.
Q1					
a	Discuss the various factors that influence the conductance of an electrolytic solution.	5	1	1	4
b	Explain equivalent conductance and derive its expression.	5	1	2	4
c	With a neat schematic, explain the operation of a lithium-ion battery and write the anodic, cathodic, and overall reactions occurring during discharging and recharging.	10	1,4	2	4
Q2					
a	Explain bimetallic corrosion with suitable example	5	1	2	1
b	Distinguish between electrochemical and galvanic series	5	1	1	1
c	Explain in detail the mechanism of corrosion due to oxygen. Write anodic and cathodic reactions and illustrate the process with a neat diagram.	10	1,2	2	1
Q3					
a	Explain the impress current cathodic method for the protection of metal from the corrosion process	5	2,4	1	2
b	Describe the cathodic coating process with a suitable diagram and highlight its advantages.	5	2,4	2	2
c	Discuss various methods of corrosion prevention. Explain the designing, environmental modification, and corrosion inhibitor in detail.	10	1,3	2	2
Q4					

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END SEMESTER DECEMBER 2025 / ~~RE - EXAM FEBRUARY 2026~~

a	Write chemical synthesis of Kevlar	5	1,3	2	3
b	Explain cationic polymerization mechanism	5	1,3	2	3
c	What are conducting polymers and its different type? Explain it with suitable example	10	1,4	2	3
Q5					
a	Describe how composite materials are applied in dental engineering and discuss their advantages in clinical practice.	5	1,2	3	3
b	With a neat diagram, explain the mechanism of cathodic coating of tin on iron	5	1	1	2
c	Describe various organic and inorganic coating methods used for the protection of metals.	10	1	2	
Q6					
a	A conductivity cell immersed in 0.0075 M KNO at 25°C shows a resistance of 24,800 Ω. The electrode distance is 0.90 cm and the electrode area is 1.10 cm^2. Find the molar conductivity of the solution.	5	1,	4	4
b	The conductivity of a 0.008 M NaNO solution at **25°C** is 3.20 $x10^{-4}$ ohm^{-1} cm^{-1}. calculate molar conductance of solution	5	1	3	4
c	Define specific conductivity and derive its relation with conductance, length, and area of cross-section of the solution.	5	1	1	4
d	Calculate the EMF of cell. The standard of cathode and anode are given E^0 cathode = +1.731 and E^0 anode = - 0.310	5	1	3	4

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

12/01/26

End Semester Examinations/[redacted] Sem I 2025-26

January 2026/[redacted]

PROGRAM: **F.Y.B Tech (Civil/Mechanical/Elect)** TIME: **2.00 Hrs.** Sem I

COURSE CODE: **VE-BTC101/BTM-101/BTE101** COURSE NAME: **Ethics, Values and Life Skills**

MAX MARK: **50**

- **Answer any five from Q1 to Q6. Answers to MCQs should be supported by proper reasoning!**
- **For each question, Course Outcome number (CO), Blooms' Level (BL), Module Number (MN) are indicated against it respectively.**
- **There can be possibilities of multiple choices being correct. You will score complete marks if and only if you mark all the multiple choices correctly. 50% correct will not allot you 50% marks!**
- **The questions asked do not resemble anyone in particular. These are based only on certain imaginary/probably real life case studies. Any resemblance to actual persons, is purely coincidental!**
- **Marks will be given on the basis of what will be written in the paper irrespective of your intentions.**

Good luck!

	All MCQs are of 2 mark each	CO	BL	MN
Q1)				
a	A person practices honesty at home but manipulates data at work. This primarily reflects lack of harmony at which level? a. Self b.Family c. Society d. Nature	1	2	2
b.	Which is the most accurate sequence for establishing lasting harmony? a. Society → Nature → Family → Self b. Self → Family → Society → Nature c. Nature → Society → Self → Family d. Family → Self → Society → Nature	2	1	2
c.	A student spends excessive time on social media during hostel hours and feels stressed before exams. Which action best reflects effective self-management? a. Deleting all social media accounts permanently b. Efficient time-management and setting usage limits c. Studying only at night d. Ignoring stress symptoms	4	2	4
d.	A student avoids using a mobile phone in class only when the professor is present. This behavior is an example of: a. Self-control b. Ethical discipline c. Self-restraint d. Internal motivation	5	2	5
Q2)				
a	A student consistently overcommits to clubs, sports, and academics, leading to burnout. The best self-management decision is to: a Quit all activities b. Continue without rest c. Set realistic limits and prioritize commitments	4	2	4

	d. Focus only on academics			
b	A student controls personal convenience by reducing water and electricity usage in the hostel. Which stage/s of harmony is/are taken care of considering long-term sustainability mindset? a. Self b. Family c. Society d. Nature	2	1	2
c	A student tops the semester but openly acknowledges the help of classmates and seniors. This behavior best reflects: a. Self-confidence b. Humility c. Righteousness d. Sympathy	5	1	5
d	Egolessness most directly contributes to harmony at which level first? a. Self b. Society c. Family d. Nature	4	2	4
Q3)				
a.	Bouncing back from failure without losing confidence best illustrates: a. Self management b. Self resistance c. Humility d. Tolerance	5	2	5
b.	Which situation BEST represents an ethical dilemma? a. Choosing between two equally efficient designs b. Choosing between meeting a deadline and ensuring complete safety testing c. Following work policy	1	2	1
c.	Morals are often professional and legal guidelines a. True b. False	2	1	2
d.	A value-based work culture in a hostel is best sustained by: a. Tolerance b. Harmony c. Self resistance d. Integrity	2,5	1	2,5
Q4)				
a	A class topper accepts multiple responsibilities and misses deadlines. What indicates the virtue of humility in him/her? a. Seeking help b. Overcommitment without realistic planning c. Delegating tasks d. Setting priorities	2	1	2
b	Which behavior BEST reflects humility in a group project? a. Taking credit for team success b. Ignoring others' ideas c. Acknowledging team contributions (ans) d. Remaining silent during discussions	1	2	1
c	A classmate says, *"At least it's not worse"*, to someone who failed an exam. This response best represents: a. Empathy b. Sympathy c. Integrity d. Righteousness	1	2	1
d	A hostel roommate follows a different daily routine that causes minor inconvenience to his/her peers. Which virtue best shows adjusting expectations and communicating respectfully? a. Tolerance b. Self-control c. Integrity d. Humility	2	2	2

Q5)				
a	Which of the following is NOT a characteristic of humility? a. Willingness to learn b. Respect for others c. Ego-driven behavior d. Acceptance of feedback	1	2	1
b	During a difficult semester, a group of engineering students study together, share notes, and motivate each other without expecting any personal gain. This behavior best reflects: a. Friendship b. Competition c. Comradeship d. Sympathy	1	2	1
c	Empathy means: a. Feeling sorry for others b.Ignoring others' feelings c. Understanding others' emotions d.Putting yourself in others shoes	5	1	5
d	Integrity is connected in an important way to acting morally. a. True b. False	5	1	5
Q6)				
a	Which of the following do(es) not show comradeship? a. A student helps only close friends with notes but ignores others in the group. b. students enjoy spending free time together, but avoid academic collaboration. c. In a hostel, students from different batches support each other during exam stress, even without personal closeness. d. Supporting someone due to emotional closeness	5	1	5
b	Tolerance primarily involves: a. Agreeing with everyone b. Avoiding people c. Respecting differences d .Suppressing emotions	5	1	5
c	Which of the following show egolessness? a. Having a feel of defeating everything rather than doing best b. Feeling jealous of others' performance c. Getting less personal about things d Knowing that you are not the best	1	2	1
d	Harmony in life means: a. Absence of problems b.Balance at all levels c. Ignoring conflicts d. Following rules blindly	1	1	1
Q7)	(10 marks)			
a	State and describe the steps to achieve self control.	5	2	5
	OR			
b	Imagine your friend asks to put his/her proxy for a lecture since he/she does not meet the required attendance criteria in the college and is travelling for his/her sister's wedding. On the way to the wedding, an accident takes place and he/she is missing during the accident. Upon the police enquiry, they come to know that the student's proxy was marked which indicated his/her presence in the college. Q1) Mention the ethical dilemmas faced by you. Q2) Justify your decision making using the four warning signs Q3)Mention the set of virtues you should have in you while tackling the ethical dilemma/s.	1	3	1