

Maximum Marks: 30	Semester: Aug 2024 – Dec 2024 Examination: In-Semester Examination	Duration: 1 Hr 15 Min
Programme code:	Class: FY	Semester: I (SVU R-2023)
Programme: B.Tech		2023
Name of the Constituent College: K. J. Somaiya College of Engineering	Name of the department: COMP/ETRX/EXTC/IT/MECH	
Course Code: 216U06C101	Name of the Course: Applied Mathematics-I	

Question No.		Max. Marks
Q:1	Attempt any FIVE from the following.	30
1	Express the matrix $A = \begin{bmatrix} 2 & 3-i & 2+i \\ i & 0 & 1-i \\ 1+2i & 1 & 3i \end{bmatrix}$ as $P + iQ$ where P and Q are Hermitian matrices.	06
2	Reduce to the normal form and find rank of $\begin{bmatrix} 1 & -1 & -2 & -3 \\ 4 & 1 & 0 & 2 \\ 0 & 3 & 1 & 4 \\ 0 & 1 & 0 & 2 \end{bmatrix}$	06
3	Determine the values of $\lambda$ for which the following system of equations possess a non-trivial solution and obtain these solutions for each value of $\lambda$ . $\begin{aligned} 3x_1 + x_2 - \lambda x_3 &= 0 && \text{infinity} \\ 4x_1 - 2x_2 - 3x_3 &= 0 \\ 2\lambda x_1 + 4x_2 + \lambda x_3 &= 0 \end{aligned}$	06
4	Solve the following equations by Gauss-Seidel method. (Three iterations): $\begin{aligned} 28x + 4y - z &= 32, \\ 2x + 17y + 4z &= 35, \\ x + 3y + 10z &= 24 \end{aligned}$	06
5	If $\alpha, \beta$ are the roots of the equation $x^2 - 2x + 2 = 0$ , prove that $\alpha^n + \beta^n = 2 \cdot 2^{n/2} \cos n\pi/4$ , Hence, deduce that $\alpha^8 + \beta^8 = 32$	06
6	If $(1+x)^6 + x^6 = 0$ then using DeMoivre's theorem, how that $x = -\frac{1}{2} - \frac{i}{2} \cot \frac{\theta}{2}$ where $\theta = (2n+1)\pi/6, n = 0, 1, 2, 3, 4, 5$ .	06
7	If $u = \log(\tan x + \tan y)$ , prove that $\sin 2x \cdot \frac{\partial u}{\partial x} + \sin 2y \cdot \frac{\partial u}{\partial y} = 2$	06



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Programme code: 06

Programme: B.Tech

Name of the Constituent College:

K. J. Somaiya College of Engineering

Semester: I (SVU R-

2023

Course Code: 216U06C106

Name of the Course: Elements of Electrical and  
Electronics Engineering

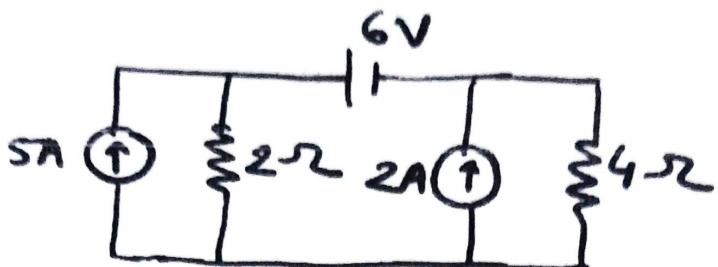
COMP / IT (AIDS)

Question No.		Max. Marks
Q1	<p>Using Norton's theorem, find current flowing through <math>5\Omega</math> resistor in the following network.</p>	10
Q1	<p>OR</p> <p>In the following circuit, calculate the value of <math>R_L</math> for maximum power transfer and what will be the amount of maximum power available at load?</p>	10
Q2(a)	<p>Find current supplied by the battery using delta-star transformation method.</p>	05

Q2(a)

**OR**

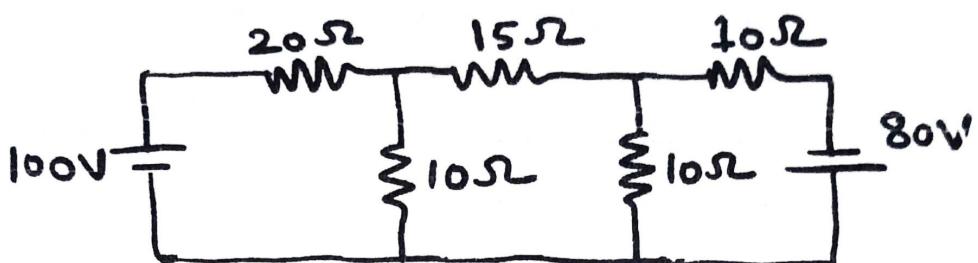
By source transformation method, find current in  $4\ \Omega$  resistor in the following given network.



05

Q2(b)

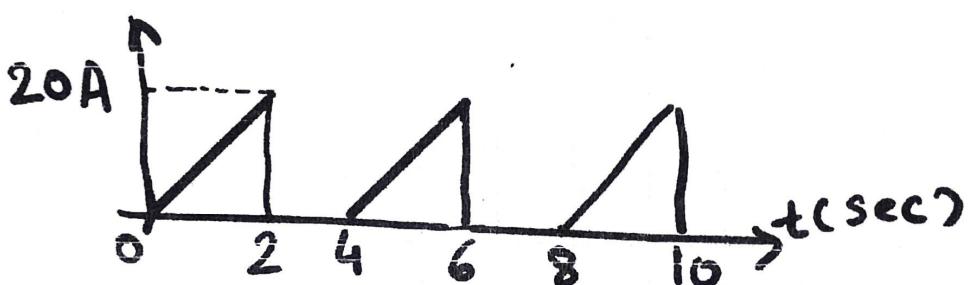
Using Nodal analysis method, find the current through  $15\ \Omega$  resistor in the given circuit.



05

Q3 (a)

Find rms value of the following waveform. (Waveform is uniform and regular)



05

Q3 (b)

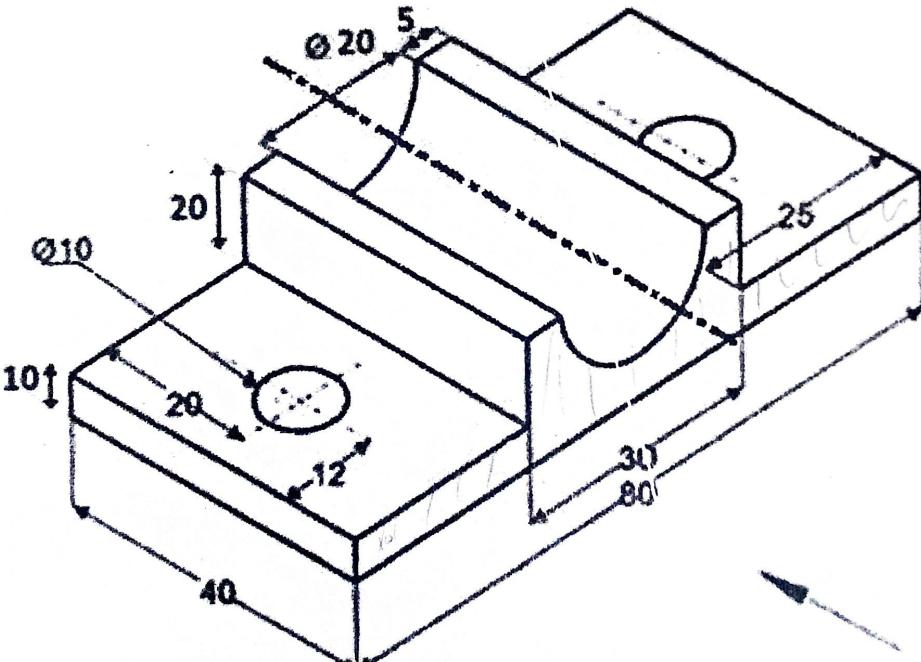
A  $20\text{mH}$  inductor has a current of  $i = 10 \cos(1000t)$  Amp. Obtain voltage  $V_L$  across it.

05

Maximum Marks: 30 Programme code: 01 Programme: B.Tech.	Semester: Aug. 2024 – Dec. 2024 Examination: In-Semester Examination	Duration: 1 Hr 15 Min
Name of the Constituent College K. J. Somaiya College of Engineering	Class: FY	Semester: I
Course Code: 216U06C103	Name of the Course: Engineering Chemistry	Name of the department: COMP/ IT/ AIDS
<ul style="list-style-type: none"> <li>• Assume suitable data, if necessary</li> <li>• Draw neat labeled diagrams wherever required</li> <li>• Atomic mass of Ca=40, Mg=24, C=12, O=16, N=14, S=32, Fe=56, Na=23, Cl=35.5, Fe= 56.</li> </ul>		

Q. No.	Solution	Max. Marks
Q1	<p><b>Attempt any One</b></p> <p>a) With the help of neat labelled diagram describe in detail the <u>Hot Lime-Soda</u> method of softening of water.</p> <p>b) Standard hard water contains 17g/L of calcium carbonate. 20ml of this sample required 22ml of EDTA solution for titration. 100ml of the sample hard water required 16ml of EDTA solution. The sample after boiling required 10ml of EDTA solution for titration. Calculate the temporary hardness.</p> <p style="text-align: center;"><b>OR</b></p> <p>c) Elaborate on the process of caustic embrittlement.</p> <p>d) A sample of water contains hardness of 208ppm <math>\text{CaCO}_3</math> equivalents. Find the hardness in "French, "Clarke, meq/L.</p> <p>How many grams of <math>\text{FeSO}_4</math> dissolved per litre gives 200ppm of hardness?</p>	10
Q2	<p><b>Attempt any Two</b></p> <p>a) A water sample has been found to contain- <math>\text{MgCl}_2 = 17\text{mg/L}</math>; <math>\text{CaCO}_3 = 7\text{mg/L}</math>; <math>\text{Ca}(\text{HCO}_3)_2 = 30\text{mg/L}</math>; <math>\text{CaSO}_4 = 15\text{mg/L}</math>. Calculate all types of hardness.</p> <p>b) Distinguish between BOD and COD.</p> <p>c) Draw a neat labelled diagram for softening of water by zeolite method. An exhausted zeolite softener was regenerated by passing 120 Lit of <math>\text{NaCl}</math> solution containing 60 gm/Lit <math>\text{NaCl}</math>. How many litres of water can be softened by this zeolite if the hardness of water is 420ppm.</p>	10
Q3	<p><b>Attempt any Two</b></p> <p>a) Explain tacticity of Polymer giving examples. Give formula for Reduced viscosity and Inherent viscosity.</p> <p>b) Give classification of nanomaterials with examples. Write a short note of Fullerenes.</p> <p>c) In a polymer, there are 50 molecules of molecular weight 100, 100 molecules of molecular weight 200 and 200 molecules with molecular weight 300. Find <math>M_n</math>, <math>M_w</math> and PDI.</p>	10

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Programme code: 05	Class: FY	Semester: I (SVU R-2023_24-07-2023)	<b>SET C</b>
Programme: B.Tech			Name of the department: COMP/ETP/CE/MECH AIDS
Name of the Constituent College: K. J. Somaiya College of Engineering			
Course Code: 216U06C105	Name of the Course: Engineering Drawing		

Question No.		Max. Marks
Q1	<p>A line CD 85mm long has its front view inclined at an angle of <math>50^\circ</math> to XY. The point C is 10mm in front VP and 30mm above HP. The length of the front view is 65mm. Draw the top view of the line and measure its length. Also find the inclinations of the line CD to HP and VP.</p> <p>OR</p> <p>A line RS, measuring 100mm long has one of its ends 60mm in front of VP and 50mm above HP. The other end is 25mm in front of VP and above HP. The top view of the line is 85mm long. Draw the projections.</p>	8
Q2	A plate having shape of an isosceles triangle has base 50 mm long and altitude 70 mm. It is so placed that in the front view it is seen as an equilateral triangle of 50 mm sides. Draw its projections.	8
Q3	<p>Figure shows a pictorial view of an Object. (Use First angle Projection method)</p> <p>Draw :</p> <ul style="list-style-type: none"> <li>i) Front View;</li> <li>ii) Top View.</li> <li>iii) Insert important dimensions.</li> </ul> 	14

Ex 1  
Ex 2  
Ex 3  
Ex 4  
Ex 5