



Semester: July 2024– November 2024

Maximum Marks: 50

Examination: End-Semester Examination

Duration: 2 Hrs.

Programme code: 06

Class: FY

Semester: I (SVU 2023)

Programme: B.Tech

Institute/School/Department: K. J. Somaiya School
of Engineering

Name of the department:

COMP/ETRX/EXTC/IT/MECH/RAI/AID
S/CCE/EXCP

Course Code: 216U06C106

Name of the Course: Elements of Electrical and
Electronics Engineering

Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any two	
i)	A capacitor has a capacitance of 30 microfarads which is connected across a 230V, 50Hz supply. Find (i) capacitive reactance, (ii) rms value of current, (iii) power, (iv) power factor, and (v) equations for voltage and current.	05
ii)	Find an equivalent resistance between terminals A and B.	05
iii)	Differentiate between core type and shell type transformer.	05
Q.2	Attempt any one	10
i)	Find the current through the 10Ω resistor of the network shown in figure below using loop analysis:	
ii)	Find the value of current flowing through the 2Ω resistor connected between the terminals A and B using Thevenin's theorem.	
Q.3	Attempt any one	10
i)	The input power of a three-phase motor was measured by the two wattmeter method. The readings of two wattmeters are 5.2kW and -1.7kW and the line	



	voltage is 415V. Calculate the total power, power factor and line current.	
ii)	The voltage and current are given by $\bar{V} = 150\angle 30^\circ$ V and $\bar{I} = 2\angle -15^\circ$ A. If the circuit works on a 50Hz supply, determine <u>impedance</u> , <u>resistance</u> , <u>reactance</u> , <u>power factor</u> and <u>power loss</u> considering the circuit as a simple series circuit.	
Q.4	Attempt the following 1) Write a short note on different losses in transformer. Explain the different parameters on which these losses are dependant in brief.(5M) 2) Explain the construction of DC motor with a neat circuit diagram.(5M)	10
Q.5	Attempt the following 1) Explain the single phase full wave bridge rectifier with a neat circuit diagram and waveform of input and output.(5M) 2) Explain output characteristics of BJT in common emitter (CE) configuration with a neat circuit diagram and waveforms.(5M)	10

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Name of the College: K. J. Somaiya School of Engineering	Name of the department: COMP / ETRX / EXTC / FT / MECH / RA / AIDS / CCE / EXCP / CSBS	
Course Code: 216U06C103	Name of the Course: Engineering Chemistry	

Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary 4) Ca=40, H=1, Mg=24, C=12, O=16, N=14, S=32, Na=23, K=39, Cl=35.5

Que. No.		Max. Marks
Q.1	Attempt any Two	
i)	What are MEMS? Discuss the common materials used as Substrate in MEMS fabrication?	05
ii)	What are the fundamental modes of vibrations in IR spectroscopy? Explain with suitable example.	05
iii)	Explain the construction, working of Nickel-Cadmium battery? State its limitations.	05
Q.2	Attempt any One	10
i)	2.9 g of coal was heated in Kjeldahl's flask and NH_3 gas evolved was absorbed in 0.5 N HCl. The blank titration reading is 36 mL. After absorption the excess acid required 17.5 mL of 0.5 N KOH for exact neutralization. 2.9 g of coal sample in quantitative analysis gave 0.38 g BaSO_4 . Calculate % of N and S in coal sample. Discuss the proximate analysis method in detail. State the significance of % moisture and % volatile matter in the coal.	
ii)	How, bioethanol can be manufactured using fermentation method? State its applications. Calculate % Hydrogen and GCV, if a sample of coal contains, C = 79%, O = 13%, S = 0.5%, N = 0.2%, Ash = Remaining. If NCV of coal is 7453 Kcal / Kg.	
Q.3	Attempt any One	10
i)	State the roles and responsibilities of citizens in E-waste management? Discuss the advantages of computational chemistry.	
ii)	Classify the bio-ceramics giving suitable examples. Discuss in detail, advantages of bio-ceramics as biomaterials?	
Q.4	Attempt the following	10
	Treatment of 100000 litres of hard water through ion exchange resin column required 300 litres of 0.1 N HCl for the regeneration of cationic resin column and 300 litres of 0.1 N NaOH for the regeneration of anionic resin column. Calculate the hardness of water sample treated. State any five reactions of lime-soda with the impurities in hard water. Also give the corresponding requirement of lime and soda for the same.	
Q.5	Attempt the following	10
	Discuss chemical shift in NMR spectroscopy and state any five factors affecting the chemical shift. An aqueous solution of concentration 0.001 M absorbs 10 % of the incident radiation and the path length of the cell is 1 cm. Calculate the concentration of the same substance when it absorbs 90 % of the incident radiation in the cell having same path length.	

02.12.2024(M)

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Maximum Marks: 50

 Programme code: 06

Programme: BTech

 Institute/School/Department: K. J. Somaiya School
 of Engineering

Examination: End-Semester Examination

Duration: 2 Hrs.

Class:

FYBTech

Semester: I (SVU 2023)

Name of the department:

 COMP/EXTC/IT/MECH/RAI/AIDS/CCE/
 EXCP/VLSI/CCE/CSBS

Course Code: 216U06C101

Name of the Course: Applied Mathematics I

Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary

Que. No.	Question Statement	Max. Marks
Q.1	Attempt the following.	10
i)	If $u = f(x^2 - y^2, y^2 - z^2, z^2 - x^2)$, prove that $\frac{1}{x} \frac{\partial u}{\partial x} + \frac{1}{y} \frac{\partial u}{\partial y} + \frac{1}{z} \frac{\partial u}{\partial z} = 0$.	5
ii)	Solve $x^7 + 1 = 0$.	5
Q.2	Attempt any ONE from the following.	10
i)	Solve $(D^2 - 4D + 4)y = e^{2x} + x^2 + 5 + \cos 2x$	
ii)	Investigate for what values of a and b the following linear equations $x + 2y + 3z = 4$, $x + 3y + 4z = 5$, $x + 3y + az = b$, have (i) a unique solution, (ii) An infinite number of solutions. Find these solutions.	
Q.3	Attempt any TWO from the following.	10
i)	Solve $(3xy^2 - y^3)dx - (2x^2y - xy^2)dy = 0$	5
ii)	Separate into real and imaginary parts \sqrt{i} .	5
iii)	Prove that $A = \begin{bmatrix} \cos \alpha & 0 & \sin \alpha \\ 0 & 1 & 0 \\ -\sin \alpha & 0 & \cos \alpha \end{bmatrix}$ is orthogonal and hence find A^{-1}	5
Q.4	Attempt any TWO from the following.	10
i)	Solve $(D^2 + 1)y = \operatorname{cosec} x \cot x$ using variation of parameters.	5
ii)	If $x + i y = \tan\left(\frac{\pi}{6} + i \alpha\right)$, prove that $x^2 + y^2 + \frac{2x}{\sqrt{3}} = 1$.	5
iii)	If $x = e^u \cos v$, $y = e^u \sin v$, Find Jacobian $\frac{\partial(u,v)}{\partial(x,y)}$.	5
Q.5	Attempt any ONE from the following.	10
i)	If $u = \frac{x^2 + xy}{y\sqrt{x}} + \sin^{-1}\left(\frac{y^3 - x^2 y}{x^2 - y^2}\right)$ then find $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} + x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$	
ii)	Find the stationary values of $x^3 + xy^2 - 12x^2 - 2y^2 + 21x + 10$.	

09.12.2024 (m)

Set C



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Name of the College:

K. J. Somaiya School of Engineering

Class: FY

Semester: I (SVU 2023)

Name of the department: All

Course Code: 216U06C105

Name of the Course: Engineering Drawing

Instructions:

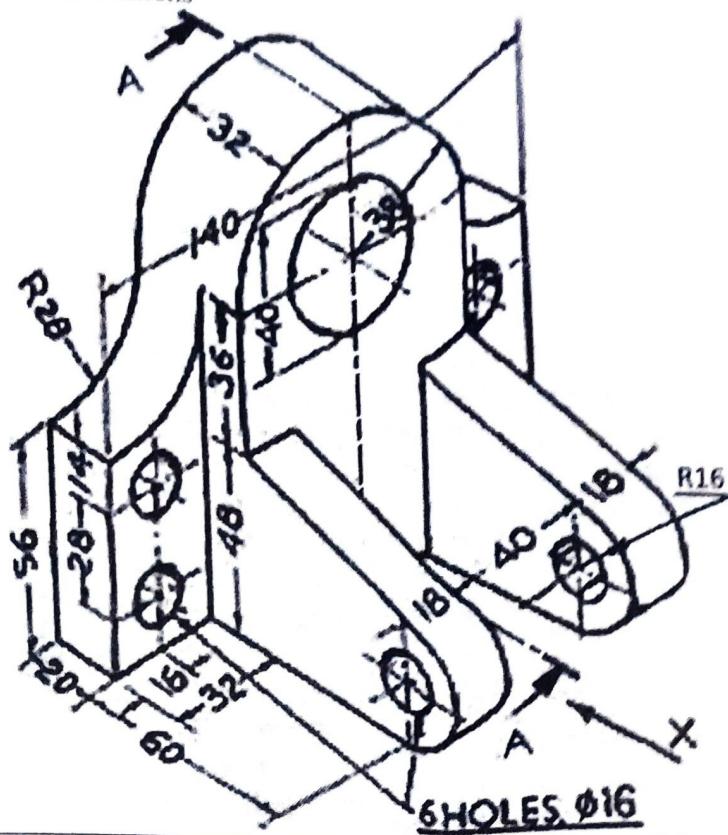
- All Questions are Compulsory.
- Figures to the right indicate full marks.
- Illustrate your answers using figures, sketches, diagrams etc.
- Assume suitable dimensions if necessary and state it clearly.
- Avoid using colours and layers in your drawings to avoid problems during printing.
- Line type, line thickness, text size, text font, content of title block, proper dimensions etc. at appropriate place carries weightage during assessment.
- Arrange your drawings properly and on minimum number of pages.
- All the students are requested to save the drawings regularly. In case of any hardware or software problems, extra time will not be allotted to any student for unsaved work.
- Any kind of electronic gadgets capable of memory storage such as pen drive, mobile etc. are not permitted.

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any ONE	10
i)	A line PQ 70 mm long has its end P 30 mm above HP and 15 mm in front of VP. The line is inclined at 40° to HP and 35° to VP. Draw the projections of line and determine inclinations of FV and TV.	
ii)	A pentagonal plate of 40 mm side has one of its base edges in HP. The corner opposite to this edge is 35 mm above HP. Draw the projections and find the inclination of surface with HP.	
Q.2	Attempt any ONE	10
i)	A Hexagonal Prism having an edge of base 30 mm and axis height 70 mm rests on one of its base edges on VP. The axis of the prism makes an angle of 35° to VP. Draw the projection of the solid.	
ii)	A Cone of 50 mm diameter and axis length 70 mm has one of its generators in HP. Draw the projections of cone.	
Q.3	Attempt any ONE	10
i)	A triangular prism of 35 mm edges of base and 60 mm height is resting on HP on its base with one of the base edge perpendicular to the VP. It is cut by an AIP in such a way that it bisects the axis and is inclined at 55° to the HP. Draw FV and sectional TV. Also develop lateral surface of retained prism.	
ii)	A cylinder of 50 mm diameter and axis 70 mm long stands with its circular base on HP. A section plane perpendicular to VP and inclined at 50° to HP intersects the axis a height of 30 mm from top plane on the axis. Draw FV and sectional TV. Also draw the development of lateral surface of retained cylinder.	

Q.4 Attempt the following

Draw sectional LHSV along A-A and FV
 Insert important dimensions

16



Q.5 Attempt the following

Draw an isometric view of given object with respect to origin 'O'

16

