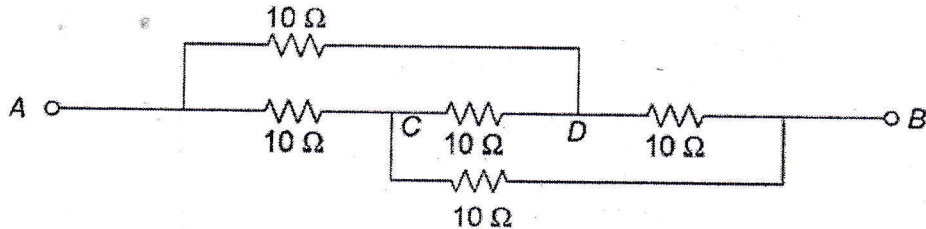
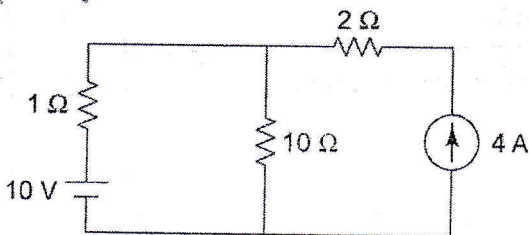
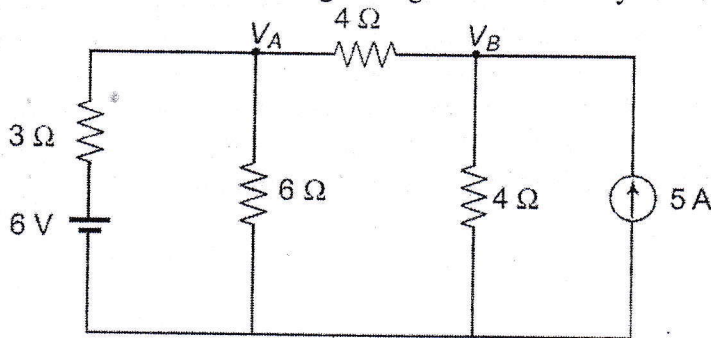


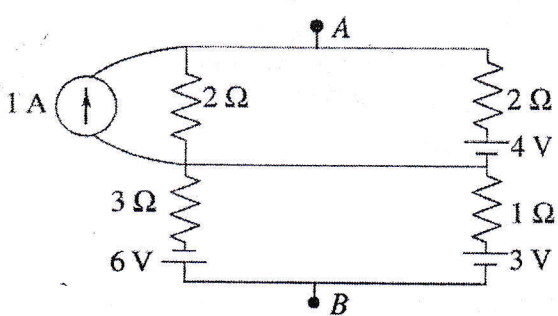
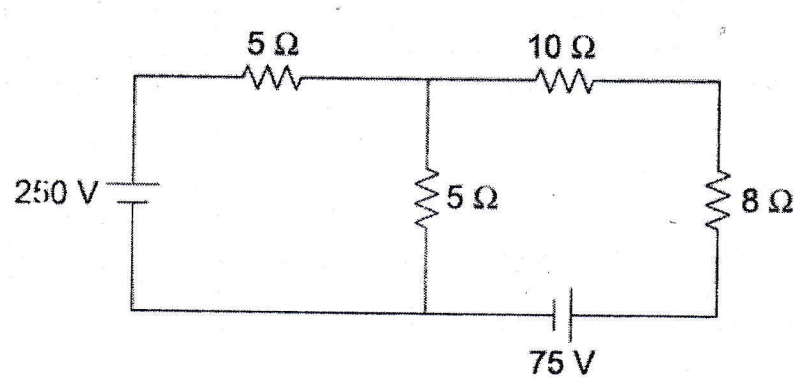
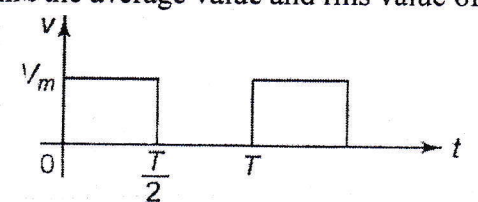
K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Nov – Dec 2025		
(B.Tech.) Program: All Branches		
Examination: FY	Semester: I	
Course code: BSC105	Course Name: Basic of Electrical Engineering	
Date of Exam: 21/01/2026	Duration: 2.30 Hours	Max. Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any two questions out of three: (05 marks each)	10		
a)	Find the equivalent resistance between terminals A and B. 	5	CO1	App
b)	Find the current flowing through the 10 Ω resistor by Superposition theorem. 	5	CO1	App
c)	Find the value of current flowing through 4 Ω resistor by Nodal Analysis. 	5	CO1	App

Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Reduce network shown into a single source and a single resistor between terminals A and B. 	5	CO1	App
b)	Find the value of current flowing through the $8\ \Omega$ resistor by Thvenin's theorem. 	5	CO1	App
c)	State and Explain Superposition theorem with example.			
Q.3 a)	Solve any two questions out of three. (5 marks each)	10		
i)	Find the average value and rms value of the waveform shown in Fig. 	5	CO2	App
ii)	Find the resultant voltage and its equation for the given voltages. $V_1 = 20 \sin \omega t$, $V_2 = 40 \cos(\omega t + \pi/6)$, $V_3 = 30 \sin(\omega t - \pi/4)$,	5	CO2	App
iii)	An alternating voltage is given by $v = 141.4 \sin 314t$. Find (i) frequency, (ii) rms value, (iii) average value, and (iv) instantaneous value of voltage, when t is 3 ms.	5	CO2	App

Q.3 b)	Solve any two questions out of three. (5 marks each)	10		
i)	Compare R-L and R-C circuits.	5	CO2	App
ii)	An R-L-C series circuit with a resistance of $10\ \Omega$, inductance of 0.2 H and a capacitance of $40\ \mu\text{F}$ is supplied with a 100 V supply at variable frequency. Find the following w.r.t. the series resonant circuit: (i) frequency at which resonance takes place (ii) current (iii) power (iv) voltage across R-L-C at that time (v) quality factor	5	CO2	App
iii)	With the help of neat labeled diagram, explain briefly the construction of a three phase induction motor.	5	CO6	U
Q.4 a)	Solve any two questions out of three. (5 marks each)	10		
i)	Three equal impedances, each of $(8 + j10)\text{ ohms}$, are connected in star. This is further connected to a 440 V , 50 Hz , three-phase supply. Calculate (i) phase voltage, (ii) phase angle, (iii) phase current, (iv) line current, (v) active power, and (vi) reactive power.	5	CO3	U
ii)	Explain the construction and working of permanent magnet stepper motor. State its advantages and disadvantages with application..	5	CO3	App
iii)	Derive the relation between line and phase quantities for three phase star connected load with phasor diagram	5	CO5	U
Q.4 b)	Solve any two questions out of three. (5 marks each)	10		
i)	An 80 kVA , $3200/400\text{ V}$, 50 Hz single-phase transformer has 111 turns on the secondary winding. Calculate (i) number of turns on primary winding, (ii) secondary current, and (iii) cross-sectional area of the core, if the maximum flux density is 1.2 Teslas .	5	CO4	App
ii)	Explain working principle of transformer with neat circuit diagram.	5	CO4	App
iii)	A 100 kVA , single-phase transformer has iron loss of 600 W and a copper loss of 1.5 kW at full-load current. Calculate the efficiency at (i) full load and 0.8 lagging pf, and (ii) half load and unity pf.	5	CO4	App
