

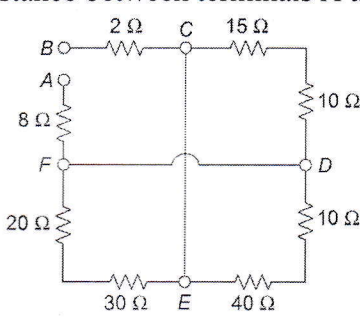
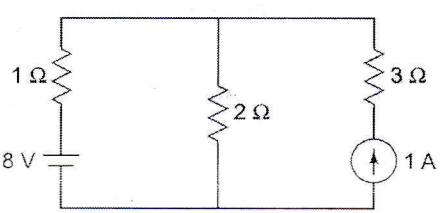
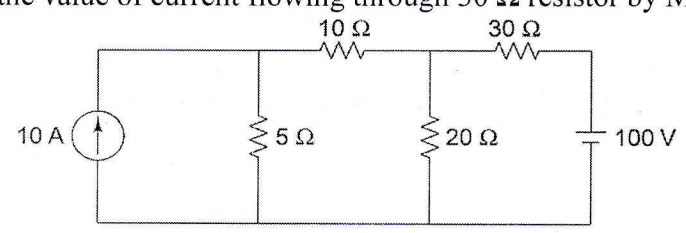
K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

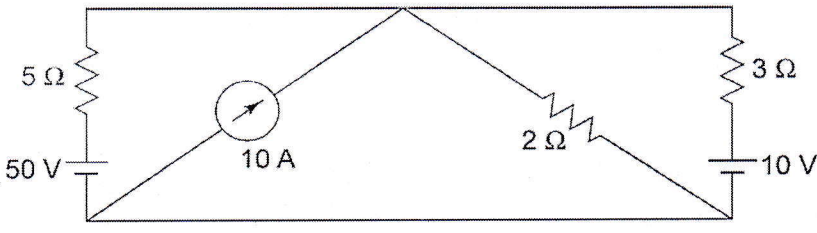
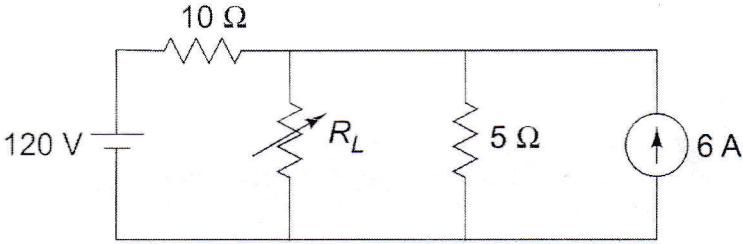
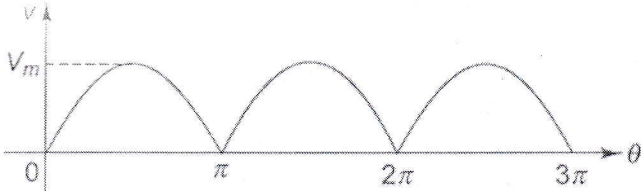
Apsil 2026 ~~Nov-Dec-2025~~
 (B.Tech.) Program: All Branches
Supplementary Examination: FY Semester: I
 Course code: BSC105 Course Name: Basic of Electrical Engineering
 Date of Exam: ~~21/01/2026~~ Duration: 2.30 Hours Max. Marks: 60

15/04/2026

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 value of current flowing through the 2 Ω resistor by Superposition theorem. 	5	CO1	App
c)	Find the value of current flowing through 30 Ω resistor by Mesh Analysis. 	5	CO1	App
Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Find the value of current flowing through the 5 Ω resistor by source transformation.	5	CO1	App

				
b)	<p>Find the value of resistance R_L for maximum power transfer and calculate the maximum power.</p> 	5	CO1	App
c)	<p>State and explain Thevenin's Theorem with an example including V_{th}, R_{th} and equivalent circuit diagram.</p>	5	CO1	App
Q.3 a)	<p>Solve any two questions out of three. (5 marks each)</p>	10		
i)	<p>Find the average value and rms value of the waveform shown in Fig.</p> 	5	CO2	App
ii)	<p>The instantaneous voltages across each of the four coils connected in series are given by $V_1 = 20 \sin \omega t$, $V_2 = 50 \cos \omega t$, $V_3 = 40 \sin (\omega t + \pi/6)$, $V_4 = 10 \sin (\omega t - \pi/3)$. Determine the resultant voltage.</p>	5	CO2	App
iii)	<p>An alternating current is given by $i = 14.14 \sin 377 t$. Find (i) rms value of the current, (ii) frequency, (iii) instantaneous value of the current when $t = 3 \text{ ms}$, and (iv) time taken by the current to reach 10 A for first time after passing through zero.</p>	5	CO2	App
Q.3 b)	<p>Solve any two questions out of three. (5 marks each)</p>	10		
i)	<p>Compare R-L-C series and parallel resonance circuits.</p>	5	CO2	App
ii)	<p>An R-L-C series circuit with a resistance of 20Ω, inductance of 0.4 H and a capacitance of $60 \mu\text{F}$ is supplied with a 200 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</p>	5	CO2	App

iii)	Prove that the magnetic field obtained with a three phase AC supply has constant magnitude and rotating nature.	5	CO6	U
Q.4 a)	Solve any two questions out of three. (5 marks each)	10		
i)	Three equal impedances, each of $(9 + j12)$ 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)	Derive the relation between line and phase quantities for three phase star connected load with phasor diagram.	5	CO3	App
iii)	Explain the construction and working of permanent magnet stepper motor. State its advantages and disadvantages with application.	5	CO5	U
Q.4 b)	Solve any two questions out of three. (5 marks each)	10		
i)	A 30 kVA, 2400/120 V, 50 Hz, transformer has a high-voltage winding resistance of 0.1Ω and a leakage reactance of 0.22Ω . The low-voltage winding resistance is 0.035Ω and the leakage reactance is 0.012Ω . Calculate for the transformer: (i) Equivalent resistance as referred to both primary and secondary (ii) Equivalent reactance as referred to both primary and secondary (iii) Copper loss at full load.	5	CO4	App
ii)	What is the transformation ratio and derive EMF equation for the transformer.	5	CO4	App
iii)	A 5 kVA, 250/500 V, 50 Hz, single-phase transformer gives the following test results: No-load test (meters on primary side) 250 V, 0.75 A, 60 W Short Circuit test (meters on secondary side) 9 V, 6 A, 21.6 W Calculate the equivalent circuit constants and insert these on the equivalent circuit diagram.	5	CO4	App
