

# Model Question Paper-I/II with effect from 2021 (CBCS Scheme)

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## First Semester \_\_BE\_\_ Degree Examination Subject Title: Basic Electrical Engineering

TIME: 03 Hours

Max. Marks: 100

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.  
02.  
03.

Module -1			Marks
Q.01	a	With respect to DC circuit, state and explain Kirchhoff's law.	6
	b	A sinusoidally varying alternating voltage is given by, $v(t) = V_m \sin \omega t$ , obtain its RMS value of voltage in terms of maximum value.	8
	c	A resistance R is connected in series with a parallel circuit comprising two resistances of $12 \Omega$ and $8\Omega$ respectively. The total power dissipated in the circuit is 70 W when the applied voltage is 20V. Calculate R.	6
OR			
Q.02	8	A load resistance $R_L \Omega$ is connected across the source $V_S$ with internal resistance $R_{int}$ in series with source; obtain the condition that the power transferred to load from source is maximum.	6
	6	A pure inductor excited by sinusoidally varying AC voltage, show that the average power consumed by inductor is zero.	8
	c	Two resistors are connected in parallel and a voltage of 200V is applied to the terminals. The total current taken is 2.5 A, and the power dissipated in one of the resistor is 1500 W. What is the resistance of each element?	6
Module-2			
Q.03	a	With the help of phasor diagram, show that the current drawn by the R-L series circuit, lags the applied voltage by an angle $\phi$ with respect to voltage.	8
	b	A voltage of 125 V at 60 Hz is applied across a non-inductive resistor connected in series with a capacitor. The current is 2.2 A. The power loss in the resistor is 96.8 W, and that in the capacitor is negligible. Calculate the resistance and the capacitance.	6
	c	A three single phase balanced load connected in three phase three wires star form, with the help of phasor diagram, obtain the relationship between line and phase quantities of voltage and current.	6
OR			
Q.04	a	With the help of phasor diagram, show that the current drawn by the R-C series circuit, leads the applied voltage by an angle $\phi$ with respect to voltage.	8
	b	Two circuits, the impedances of which are given by $Z_1 = 10 + j15 \Omega$ and $Z_2 = 6 - j8 \Omega$ , are connected in parallel. If the total current supplied is 15 A, what is the power taken by each branch.	6
	c	Three phase power consumed by the balanced load is given by $P = \sqrt{3} V_L I_L \cos(\phi)$ watts, then show that two wattmeter sufficient to measure three phase power P.	6
Module-3			
Q.05	a	With a neat diagram, explain the constructional details of DC generator.	8
	b	A shunt generator delivers 50 KW at 250 V and 400 rpm. The armature and shunt field resistances are $0.02 \Omega$ and $50 \Omega$ respectively. Calculate the speed of the machine running as a shunt motor and taking 50 KW input at 250 V. Allow 1 V brush for contact drop.	6
	c	For the single phase transformer, obtain an expression for EMF induced in either primary side or secondary side.	6
OR			

Q. 06	a	A dc motor running with a speed of N rpm, obtain an expression for EMF induced in the armature winding.	8
	b	A 4-pole, 500V, shunt motor has 720 wave-connected conductors on its armature. The full-load armature current is 60 A, and the flux per pole 0.03 Webers. The armature resistance is 0.2 $\Omega$ , and the contact drop is 1 V per brush. Calculate the full load speed of the motor.	6
	c	To operate the transformer in maximum efficiency always, derive at what condition, this can be achieved.	6
<b>Module-4</b>			
Q. 07	a	With the help of neat diagram, explain the constructional details of three phase induction motor.	6
	b	A three phase 400 V, 50 Hz supply is given to three induction motor with 4 pole running and runs at 1440 rpm. Determine the speed of the rotor and frequency of the rotor current.	6
	c	With the help of diagram, explain the construction details of salient and non-salient generator.	8
OR			
Q. 08	a	An alternator running at N rpm, induces an emf in the armature conductors of the machine and obtain an expression of induced emf.	6
	b	A 3-phase 16-pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 webers, sine-distributed, and the speed is 375 rpm. Find the frequency, and the phase and line voltages.	6
	c	When a three phase supply given is given to the three phase induction motor, explain how a rotating magnetic field produces in the airgap of the machine.	8
<b>Module-5</b>			
Q. 09	a	With the help of block diagram, discuss low voltage distribution system (400 V and 230 V) for domestic, commercial, and small-scale industry.	6
	b	List out the power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Find the total power consumed.	6
	c	Why earthing is need in a building service. With neat diagram explain the pipe earthing.	8
OR			
Q. 10	a	In a domestic consumers end, discuss how two-part electricity tariff imposed to calculate electricity bills.	6
	b	Discuss how electricity bill is calculated based on "unit" which is consumption of electrical energy for domestic consumers.	6
	c	With a neat circuit diagram, explain the operation of MCB and RCCB	8

Table showing the Bloom's Taxonomy Level, Course Outcome and Program Outcome

Question	Bloom's Taxonomy Level attached	Course Outcome	Program Outcome	
Q.1	(a)	L2	CO1	PO1
	(b)	L2	CO1	PO2
	(c)	L1 L2	CO1	PO2
Q.2	(a)	L2	CO1	PO1
	(b)	L2	CO1	PO2
	(c)	L1 L2	CO1	PO2
Q.3	(a)	L2	CO1	PO2
	(b)	L1 L2	CO1	PO2
	(c)	L2	CO1	PO2
Q.4	(a)	L2	CO1	PO2
	(b)	L1	CO1	PO2

		L2	C01	
	(c)	L2	C01	P02
<b>Q.5</b>	(a)	L2	C02	P02
	(b)	L1	C02	P02
		L2		
(c)	L2	C02	P02	
<b>Q.6</b>	(a)	L2	C02	P02
	(b)	L1	C02	P02
		L2		
(c)	L2	C02	P02	
<b>Q.7</b>	(a)	L2	C02	P02
	(b)	L1	C02	P02
		L2		
(c)	L2	C02	P02	
<b>Q.8</b>	(a)	L2	C02	P02
	(b)	L1	C02	P02
		L2		
(c)	L2	C02	P02	
<b>Q.9</b>	(a)	L2	C03	P01
	(b)	L2	C04	P02
	(c)	L2	C04	P01
<b>Q.10</b>	(a)	L2	C03	P02
	(b)	L2	C04	P02
	(c)	L2	C04	P02
<b>Lower order thinking skills</b>				
<b>Bloom's Taxonomy Levels</b>	Remembering (knowledge): <i>L</i> <sub>1</sub>		Understanding Comprehension): <i>L</i> <sub>2</sub>	Applying (Application): <i>L</i> <sub>3</sub>
	<b>Higher order thinking skills</b>			
	Analyzing (Analysis): <i>L</i> <sub>4</sub>	Valuating (Evaluation): <i>L</i> <sub>5</sub>	Creating (Synthesis): <i>L</i> <sub>6</sub>	
				