Roll No.																

Ajay Kumar Garg Engineering College, Ghaziabad

Department of Electrical & Electronics Engineering

Pre-University Test

Course: B.Tech
Session: 2024-25
Subject: Fundamentals of Electrical Engg.
Max Marks: 70

Semester: II
Section: S11 to S20
Sub. Code: BEE-201
Time: 3Hrs.

OBE Remarks:

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CO No.	1	1	2	3	3	4	5	1	2	2	3	3	4	4	5	5	1
Bloom's Level	L-1	L-1	L-2	L-2	L-1	L-2	L-3	L-3	L-2	L-3	L-2	L-2	L-1	L-2	L-2	L-2	L-3
Weightage CO4: 16															Weightage CO5: 16		

Note : Answer **all** the sections.

Section-A

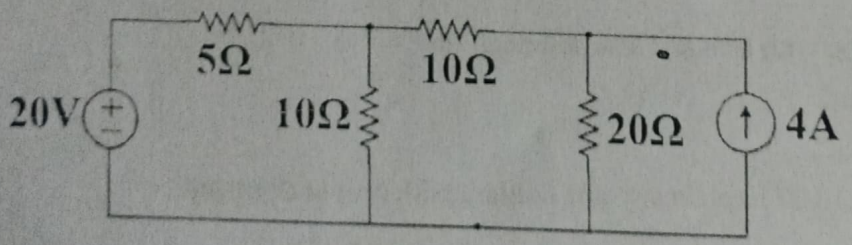
A. Attempt **all** the parts. **(7x2 =14)**

1. Define bilateral and unilateral element with example.
2. Differentiate between ideal voltage source and practical voltage source.
3. In a series RLC circuit, R =2Ω, L = 2mH, C = 10μF. Find the resonant frequency and Q-factor.
4. What is the condition for positive voltage regulation in a transformer?
5. Draw the phasor diagram of practical transformer at no load condition.
6. Define the function of commutator in DC machine.
7. What is Switch fuse unit(SFU)?

Section-B

B. Attempt **Any three.** **(3x7 = 21)**

8. Calculate the current across 20Ω resistor using nodal analysis in the following circuit:



9. Derive mathematically dynamic impedance (ZD) offered by RLC parallel circuit under resonance. Also, draw its phasor diagram.

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10. Derive the relation between line and phase values in a 3-ϕ, delta connected circuit.
A balanced star-connected load of (3+j4) Ω/phase is connected to a 3-ϕ, 400 V supply. Calculate the line current, power factor, active and reactive power drawn from the supply.

11. What is the purpose of an equivalent circuit of a transformer? Obtain the approximate equivalent circuit of a transformer as referred to the primary with all necessary parameters.

12. Derive the condition for maximum efficiency in single phase transformer.
A transformer is rated at 100KVA, at full load its copper loss is 1400 W and iron losses are 940 W, Calculate (i) efficiency at full load unity p.f (ii) efficiency at half load unity p.f (iii) the load KVA at which maximum efficiency will occur (iv) maximum efficiency at unity p.f.

Section-C

C. Attempt **all** the parts. **(5x7 = 35)**

13. Attempt any one.

a) Derive the expression of torque for DC motor. A 6 pole lap wound DC shunt motor has 500 conductors in the armature. The resistance of the armature path is 0.05 Ω. The resistance of the shunt field is 25 Ω. Find the speed of the motor when it takes 120 A from DC mains of 100 V. Flux per pole is 0.02 Wb.

b) Why 1-ϕ induction motor is not self-starting? What are the methods of starting? Explain any one of them

14. Attempt any one.

a) Explain the slip torque characteristics of the three-phase induction motor.
The voltage applied to the stator of a three phase, 4 pole induction motor has frequency of 50 Hz. The frequency of the emf induced in the rotor is 15.5 Hz. Determine the slip and speed at which motor is running.

b) Explain the working principle of three phase synchronous motor with suitable diagram.

15. Attempt any one.

a) Explain the following with neat and labelled diagram:
(i) ELCB
(ii) MCB

b) Why earthing is required? Explain any one method with proper diagram.

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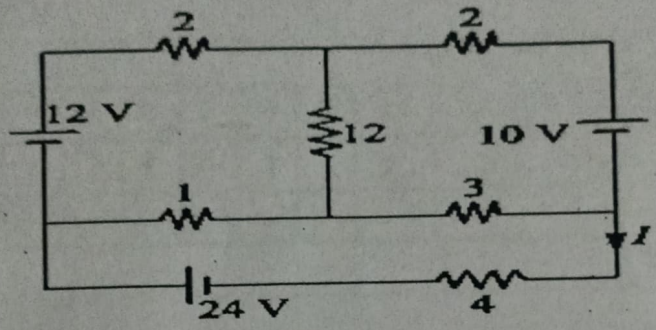
16. Attempt any one.

a) Name and explain the various cables and wires used in electrical system based on insulation.

b) Classify and explain various types of batteries with their advantages and applications.

17. Attempt any one.

a) Determine the current in 4 ohm branch in the circuit shown below, using mesh analysis.



b) Three impedances of (70.7 + j 70.7) Ohm, (120 + j 160) Ohm and (120 + j 90) Ohm are connected in parallel across a 250 V supply. Determine **(i)** admittance of the circuit **(ii)** supply current and **(iii)** circuit power factor.

Faculty Sign

HoD Sign