B.E - Bachelor of Engineering (CBCS Pattern) All Branches First Semester

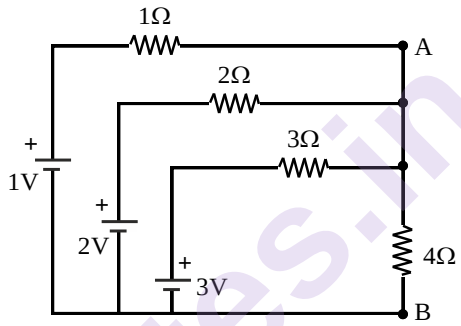
1BEAB04 - Basic Electrical Engineering

P. Pages : 3 **GUG/W/18/11468**

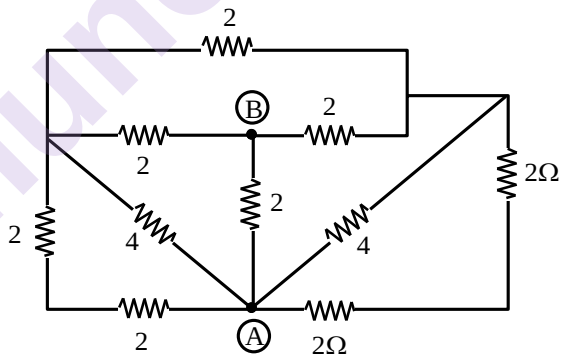
Time : Three Hours * 3 5 5 3 * Max. Marks : 80

Notes :
1. All questions carry equal marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams should be given wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.
6. Use of Drawing Instruments & non programmable calculator is permitted.
7. All questions are compulsory. However the students may avail internal choice.

1. a) Find V_{AB} by using Source Transformation. **8**



b) Determine the resistance between point A & B in the figure shown below. All values of resistor's are in ohms. **8**



OR

2. a) An RLC series ckt has a resistance R of 20Ω and a current which lags behind the applied voltage by 45º, if the voltage across the inductor is twice the voltage across the capacitor. What is the value of inductive reactance. **8**

b) A balanced star connected load of $(8+j6)\Omega$ is connected across three phase, 50Hz, 440V supply system. **8**

Calculate : -

i) Line current.
ii) Power absorbed.
iii) Reactive volt-ampere.
iv) Power factor.
v) Draw phasor diagram.

3. a) A 230V/115 Volt 1ϕ T/f is supplying a load of 5 amp at power factor 0.866 lagging. The no-load current is 0.2 amps at power factor 0.208 lagging. Calculate the primary current and primary power factor. **8**

b) i) Discuss leakage & fringing with neat sketches in case of magnetic ckt. **4**

ii) Discuss ohm's law in case of magnetic ckt. **4**

OR

4. a) Draw the phasor diagram of a 1ϕ Ideal T/f on NO LOAD condition. **4**

b) What will happen if we give the DC voltage at the input side of two winding 1ϕ T/f instead of AC supply? **4**

c) Two bars of same material with $\mu_r = 800,$ having equal mean length of 10cm but area of cross sections $2cm^2$ & $1cm^2$ are bent in the form of semicircle and joined to form a close ring. Calculate AT required to produce $1Wb/m^2$ flux density in the smaller ring. **8**

5. a) A 4 pole 220V shunt motor has 540 lap wound conductors. It takes 32 Amps from the supply mains & develops output power of 5.595kW. The field winding takes 1 Amp. The armature resistance is 0.09Ω and the flux per pole is 30mWb. **8**

Calculate

i) The speed.

ii) The torque developed in newton-meter.

b) Discuss the various characteristics of a DC shunt and series motors with electrical connection diagrams. Hence suggest their applications for different works. **4+4**

OR

6. a) A 4 pole, $3\phi,$ IM when supplied with 400V, 50Hz supply has a slip of 1% at No load & 3% at full load. Calculate No load speed, full load speed and rotor frequency at full load and at stand still. **8**

If per phase rotor resistance is 1Ω and standstill reactance per phase is $2\Omega,$ calculate ratio of starting torque to max. torque.

b) How does the rotor rotates in case of 1ϕ I.M.? Explain in detail. **5**

c) Compare squirrel cage I.M. & slip ring I.M. **3**

7. a) Define the term earthing. Explain with neat sketch plate earthing. List the factors influencing earth resistance. **2+4 +2**

b) A moving coil instrument has a resistance of 10Ω and gives full scale deflection when carrying a current of 50m Amp. Show how it can be adopted to measure :- **8**

i) Voltage upto 750 Volt & ii) Current upto 100 Amp.

OR

8. a) Explain the construction of induction type 1ϕ energy meter with its advantages & disadvantages. **8**

b) What do you mean by indicating recording & integrating instruments? **3**

c) What are the different types of torques required in indicating type instruments? Explain damping & its necessity. **5**

9. a) Derive all basic gates by using universal gates. **8**

b) Explain the operation of a Zener diode under forward & reverse biased conditions. **8**

OR

10. a) Draw & explain the complex volt-ampere characteristics of a P-N junction diode in both the directions. **8**

b) Write down the truth table with its symbol for the following gates. **6**

i) EX-NOR ii) EX-OR

iii) NAND iv) NOR

c) Convert the following binary number into hexadecimal number. **2**

$(1100101)_2 = (?)_H$

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