FACULTY OF ENGINEERING AND TECHNOLOGY

BASIC ELECTRICAL ENGINEERING QUESTION BANK

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Module 1

1) With suitable diagrams explain the current division rule and voltage division (04 Marks)

2) state fleming's right hand rule. Mention its application. (04 Marks)

3) A resistance of 10 ohms is connected in series with the two resistances each of 15 ohms arranged in parallel. What resistances must be shunted across this parallel combination so that the total current will be 1.5A from 20v supply applied ? (06 Marks)

4) bring out clearly analogy between magnetic & electric circuit (06 Marks)

5) State & explain : i) faraday's law ii) fleming's left hand rule iii)fleming's right hand rule (12Marks)

6) The domestic power in a house comparises of loads as given in table. Calculate i) the total load & current taken from the supply of 230V ii) Total energy consumption permonth1HP=746W.(09Marks)

Sl. No	Item	Load	Hours used/day
1	8 Lamps	100W	10
2	3 Fans	80W	8
3	1 Refrigerator	½ HP	24
4	1 Heater	1000 W	1

7) Derive an expression for dynamically induced emf . (04Marks)

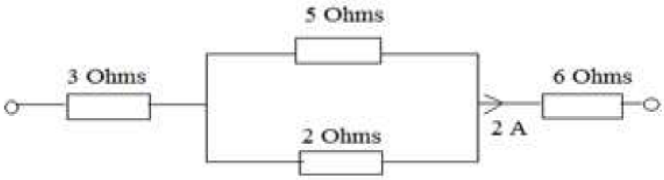
8) State and explain Ohm's law and mention its limitations. (06 Marks)

9) Two 12 V batteries with internal resistance of 0.5 ohms and 1 ohms respectively are joined in parallel and a resistance of 2 ohms is placed across the terminals. Find the current supplied by each battery.

(8 Marks)

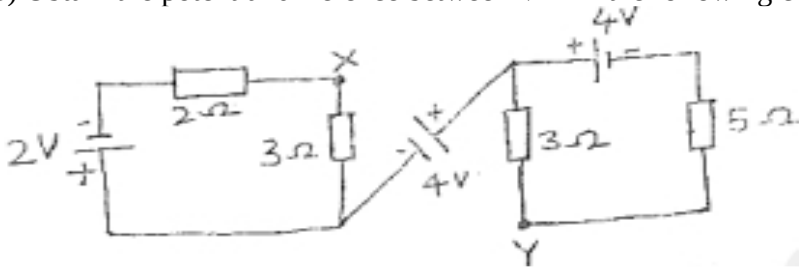
10) State and explain Kirchoff's laws. (06 Marks)

11) Calculate currents in each resistors, total power and power dissipated in each resistors for below
shown circuit diagram. (8 Marks)



12) A circuit of two parallel resistors having resistance of 20Ω and 30Ω respectively, connected in series with 15Ω resistor. If the current through 15Ω resistor is 3 A, find (i) Current in 20Ω and 30Ω resistors. (ii) Voltage across the whole circuit. iii) The total power and power consumed in all the resistors **(08 Marks)**

13) Obtain the potential difference between V_{XY} in the following circuit (06 Marks)



14) Explain statically and dynamically induced E.M.F with relevant diagrams. (08 Marks)

15) Define coefficient of coupling and find its relation with L_1, L_2 and M. (06 Marks)

Module 2

1) Obtain an expression for the voltage across a pure inductor if the current through it Is $i=I_m \sin\omega t$ (06 Marks)

2) A circuit consists of a Resistance of 10 Ω, an inductance of 16 mH and a capacitance of 150 μF connected in series. A supply of 100V at 50 Hz is given to the circuit. Find the current, Power factor, and power consumed by the circuit. **(08 Marks)**

3) In a three phase star connection find an expression for line and phase values of current and voltages in a three phase star connection. Also derive the equation for three phase power. **(06 Marks)**

4) With the help of circuit diagram and vector diagram show that two wattmeter's are sufficient to measure total power in a balanced three phase circuit. (08 Marks)

5) Mention the advantages of three phase system over single phase system. (06 Marks)

6) A three phase load of three equal impedances connected in delta across a balanced 400V supply, takes a line current of 10A at a power factor of 0.7 lagging. Calculate i) The phase current ii) The total power iii) The total reactive volt amperes. (06 Marks)

7) Show that current 'i' lags the applied voltage 'v' by 90^0 for a pure inductance A.C circuit and also power consumed is zero. (06 Marks)

8) Derive the voltage and current relations in a balanced 3 phase star connected load with suitable circuit and vector diagrams. (07 Marks)

9) A series RLC circuit with 100_, 25μF and 0.15H is connected across 415V,50Hz AC supply. Calculate i) impedance ii) current iii) power factor iv) voltage drop across inductor and capacitor. (07 Marks)

10) Show that two wattmeters measure three phase power with suitable circuit diagram and vector diagrams. (08 Marks)

11) A 318 μF capacitor is connected across a 230 volts, 50 Hz system. Determine i) capacitive reactance ii) RMS value of current iii) voltage and current expressions. (06 Marks)

12) Three arms of a 3 phase, delta connected load, each comprises of a coil having 25_ resistance and 0.15 inductance in series with a capacitor of 120μF across 415V, 50 Hz supply. Calculate i) line current ii) power factor iii) power consumed. (06 Marks)

13) Explain the generation of single phase A.C induced EMF with suitable diagrams. (06 Marks)

14) Define RMS value of alternating current ,show that its value is proportional to maximum value. (6 Marks)

Module 3

1) Derive the E.M.F equation of a transformer. (06 Marks)

2) The maximum efficiency at full load and Upf of a single phase, 25 KVA, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at i) 75% load, 0.9 pf ii) 50% load, 0.8 pf iii) 25% load, 0.6 pf. (08 Marks)

3) Explain the two way control of lamps with truth table and connection diagram (06 Marks)

4) What is earthing? Mention the objectives of earthing. Explain any one type of earthing with a neat diagram. (08 Marks)

5) Explain the various losses that occur in a transformer. (06 Marks)

6) A single phase, 20 KVA transformer has 1000 primary turns and 2500 secondary turns. The net cross sectional area of the core is 100cm^2. When the primary winding is connected to 550V, 50Hz supply, calculate (i) the maximum value of flux density in the core. (ii) The voltage induced in the secondary winding. iii) The primary and secondary full load currents. **(06 Marks)**

7) Explain the working principle of transformer and list the applications of transformer. (06 Marks)

8) A 40KVA, single phase transformer has core loss of 450 Watts and full load copper loss 850 Watts. If the power factor of the load is 0.8. Calculate i) Full load efficiency ii) Maximum efficiency at UPF iii) Load for maximum efficiency. (08 Marks)

9) Explain 2 way control and 3 way control of lamp with suitable circuit diagrams with truth table. (06 Marks)

10) Derive an EMF equation of transformer with usual notations. (06 Marks)

11) List different types of loss in transformer and explain each one in brief. (08 Marks)

12) Explain the term equipment earthing and explain any one type earthing with a neat diagram.(06 Marks)

Module 4

1)With a neat sketch explain the construction of various parts of a D.C Machine. **(08 Marks)**

2) A 200V, 4 pole lap wound DC Shunt motor has 800 armature conductors. The resistance of the armature winding is 0.5 Ω and that of the shunt field winding is 200 Ω. The motor takes 21A and the flux/pole is 30mwb. Find speed and gross torque developed in the motor. **(06 Marks)**

3) Derive the E.M.F equation of a D.C generator. (06 Marks)

4) Derive an equation for the torque developed in the armature of a D.C Motor. (06 Marks)

5) A 4 pole, 100V shunt generator with lap connected armature, having field and armature resistance of 50Ω and 0.1Ω respectively, supplies a load of 60 lamps each lamp rated 100V, 40W. Calculate the total armature current, the current per path and the generated E.M.F. Allow a contact drop of 1 volt per brush. (08 Marks)

6) List out applications of DC shunt and series motors. (06 Marks)

7) Explain the working principle of D.C motor with suitable diagrams. (06 Marks)

8) A 4 pole, DC shunt motor takes 22.5 A from a 250 V supply . The armature resistance is 0.5 Ohms and field resistance is 125 Ohms. The armature is wave wound with 300 conductors. If the flux pet pole is 0.02 Wb. Calculate i) Speed ii) Torque developed iii) Power developed. (08 Marks)

9) Discuss the following characteristics for i) series motor ii) shunt motor with relevant plots.
i) T_a v/s Ia ii) N v/s I_a (6 Marks)

10) Explain the function of following parts of D.C machine. (6 Marks)
i) Yoke ii) Field winding iii) Commutator iv) Pole shoe v) Pole core vi) Brush

11) A 4 pole, lap wound DC shunt generator delivers 200 A at terminal voltage of 250 Volts. It has a field and armature resistance of 50 Ohms and 0.05 Ohms respectively. Neglecting brush drop determine i) Armature current ii) Current per parallel path iii) EMF generated iv) Power developed. (8 Marks)

Module 5

1) A 6 pole, 3 phase, 50Hz alternator has 12 slots per pole and 4 conductors per slot. The winding is 5/6 full pitched. A flux of 25mwb is sinusoidally distributed in the air gap. Determine the line E.M.F if the alternator is star connected. **(06 Marks)**

2) Define slip of an induction motor and derive the relation between the supply frequency and the rotor current frequency. **(06 Marks)**

3)With neat sketch explain the construction of salient pole Alternator. **(08 Marks)**

4) A 3 phase, 50Hz induction motor has a slip of 1% at no load and 35 at full load. Determine (i) The synchronous speed (ii) No-load speed (iii) Full load speed (iv) frequency of rotor current at standstill (v) frequency of rotor current at full load. **(08 Marks)**

5) With a circuit diagram explain the working of a star-delta starter for a three phase induction motor. **(06 Marks)**

6) Derive the E.M.F equation of an Alternator. **(06 Marks)**

7) Explain the working principle of 3 phase synchronous generator. (6 Marks)

8) A 6 pole, 3 phase, 50 Hz, alternator has 12 slots per pole and 4 conductors per slot. A flux of 25mWb is sinusoidally distributed along the air gap. Determine the i) phase EMF ii) Line EMF . Assume coils are full pitched and winding factor as 0.96. (6 Marks)

9) Derive an EMF equation for 3 phase synchronous generator with suitable considerations. (6 Marks)

10) Describe the constructional features of 3 phase induction motor with suitable diagrams. (8 Marks)

11) An 8 pole 3 phase alternator runs at 750RPM and supplies power to 6 pole 3 phase induction motor which runs at 970 RPM. What is the slip of the induction motor? (6 Marks)