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First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019 Basic Electrical Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Deduce an expression for stored energy in a magnetic field. (04 Marks)
 b. Find current in the battery, the current in each branch and pd across AB in the network shown in Fig.Q1(b). (06 Marks)

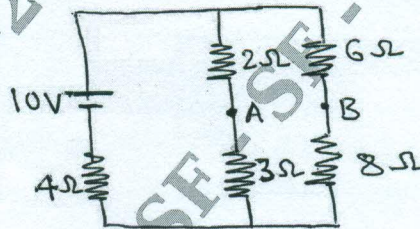


Fig.Q1(b)

- c. A coil of 1000 turns is wound on a silicon steel ring of relative permeability 1200. The ring has a mean diameter of 10cm and cross-sectional area of 12 sq.cm. When a current of 4 amperes flows through the coil. Find :
- Flux in the core
 - Inductance of the coil
 - The e.m.f included in the coil if the flux falls to zero in 15 milli seconds
 - Now if another similar coil is placed such that 70% magnetic coupling exists between the coils. Find the mutual inductance. (06 Marks)

OR

- 2 a. State Fleming's right hand rule. Mention its application. (04 Marks)
 b. A resistance of 10Ω is connected in series with the two resistances each of 15Ω arranged in parallel. What resistance must be shunted across this parallel combination so that the total current taken will be 1.5A from 20V supply applied? (06 Marks)
 c. Coils A and B in magnetic circuit have 600 and 500 turns respectively. A current of 8A in coil A produces a flux of 0.04 Wb. If coefficient of coupling is 0.2, Calculate :
- Self inductance of coil A with B open circuited
 - Flux linking with coil B
 - The average e.m.f induced in coil B when the flux with it changes from zero to full value in 0.02 second
 - Mutual inductance. (06 Marks)

Module-2

- 3 a. With a neat sketch explain the construction of a DC machine. (06 Marks)
 b. State the application of DC shunt motor and DC series motor. (04 Marks)
 c. A 4 pole, 220V, Lap connected, DC shunt motor has 36 slots. Each slot containing 16 conductors. It draws a current of 40A from the supply. The field resistance and armature resistance are 110Ω, 0.1Ω respectively. The motor develops an output power of 6KW. The flux for pole is 40 MWb. Calculate :
- The speed
 - The torque developed by the armature
 - The shaft torque. (06 Marks)



OR

- 4 a. Explain different characteristics of a DC series motor. (05 Marks)
b. With the help of neat diagram, explain the construction and principle of operation of single phase energy meter. (06 Marks)
c. An 8 pole, Lap-connected armature has 40 slots with 12 conductors per slot, generates a voltage of 500V. Determine the speed at which it is running if the flux per pole is 50 MWb. (05 Marks)

Module-3

- 5 a. With a neat circuit diagram and a switching table, explain three way control of lamp. (04 Marks)
b. Derive an expression for RMS value of an alternating quantity. (06 Marks)
c. Two impedances of $Z_1 = 10 + j15\Omega$ and $Z_2 = 6 - j8\Omega$ are connected in parallel. If the supply current is 20A. What is the power dissipated in each branch? (06 Marks)

OR

- 6 a. Show that the average power consumed by pure inductor is zero. (05 Marks)
b. Explain the plate earthing along with a neat diagram. (06 Marks)
c. An alternating current of frequency of 60Hz has a maximum value of 12A
i) Write down the equations for its instantaneous value
ii) Find the value of current after $\frac{1}{360}$ seconds.
iii) Find the time taken to reach 9.6 Amps for the first time. (06 Marks)

Module-4

- 7 a. Obtain the relationship between line and phase values of current in a three phase balanced delta connected system. (05 Marks)
b. Discuss the different types of rotor used in alternator. (07 Marks)
c. A 3 phase star connected system has 4Ω resistance in series with an inductance of 10mH per phase is applied voltage is 415V with frequency of 50 Hz. Find the power drawn by the circuit. (04 Marks)

OR

- 8 a. Derive e.m.f equation of an alternator. (05 Marks)
b. Three coils each of impedance $20\angle 60^\circ$ are connected in star to a 3 phase, 400V, 50Hz supply. Find the reading on each of the two wattmeters connected to measure the power input. (05 Marks)
c. A 3-phase, 6-pole, star connected alternator revolves at 1000rpm. The stator has 90 slots and 8 conductors per slot. The flux per pole is 0.05 Wb. Calculate voltage generated if $k_w = 0.96$. (06 Marks)

Module-5

- 9 a. Explain the principle of operation of a 3-phase induction motor. (05 Marks)
b. With a neat sketch explain the constructional details of core and shell type transformer. (06 Marks)
c. A 100 KVA, 6000/400V, 50Hz, single phase transformer has 100 turns in the secondary. Find : i) Full load primary current and secondary current ii) number of turns in the primary coil iii) maximum flux in the core. (05 Marks)

OR

- 10 a. A 6 pole induction motor is supplied by a 10 pole alternator which is driven at 600rpm. If the motor is running at 970 rpm, determine the percentage slip. (05 Marks)
b. Derive the expression for frequency of rotor currents. (04 Marks)
c. A 600 KVA transformer has an efficiency of 92% at full load, unity pf. and at half load, 0.9 pf. Determine its efficiency at 75% of full load and 0.9pf. (07 Marks)