CBCS SCHEME

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17ELE15/25

First/Second Semester B.E. Degree Examination, Aug./Sept. 2020

Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. State and explain Kirchoff's laws. **(06 Marks)**

b. Two coils having 30 and 600 turns respectively are wound side by side on an iron circuit of section $100cm^2$ and mean length 150cm

i) Estimate the mutual inductance between two coils, of the permeability of iron is 2000

ii) A current in the first coil grows steadily from zero to 10A in 0.01sec. Find the emf induced in the other coil. **(07 Marks)**

c. An 8 ohms resistor is in series with a parallel combination of two resistors 12 ohms and 6 ohms. If the current in the 6Ω resistor is 4A. Determine :

i) Total current ii) Total supply voltage iii) Total power dissipated in the circuit. **(07 Marks)**

OR

2 a. State and explain : i) Flemings left had rule ii) Faraday's second law. **(06 Marks)**

b. In the circuit shown in Fig.Q2(b). Find E_1, E_2 and I, when the power dissipated in the 5Ω resistor is 125W.

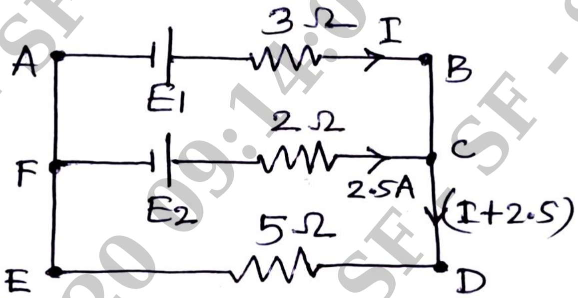

Fig.Q2(b) **(07 Marks)**

c. Derive an expression for energy stored in a magnetic field. **(07 Marks)**

Module-2

3 a. Explain the function of following parts of DC machine i) Yoke ii) Field coil iii) Pole core iv) Pole shoe v) Commutator vi) Brush. **(06 Marks)**

b. Explain the construction and working principle of dynamometer type wattmeter. **(07 Marks)**

c. A 4 pole, 100V DC shunt generator with lap connected armature having field and armature resistance of 50Ω and 0.1Ω respectively, supplies sixty 100V, 40W lamps. Calculate :

i) Total armature current ii) Current per path iii) Generated EMF. **(07 Marks)**

OR

4 a. Define the Back EMF of a DC motor and explain its significance. **(06 Marks)**

b. Explain the basic working principle of a single phase induction type energy meter with a neat diagram. **(07 Marks)**

c. A 4 pole DC shunt motor takes 12A from 220V supply. The armature and field resistances are respectively 0.5Ω and 100Ω. The armature is lap connected with 300 conductors. If the flux per pole is 20mwb. Calculate : i) Speed ii) Gross torque. **(07 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

5 a. Derive an expressions for : i) RMS value ii) Average value of sinusoidal AC current. **(06 Marks)**

b. Explain the 2 way control of lamp with a suitable circuit diagram and list its applications. **(07 Marks)**

c. A 318μF capacitor is connected across a 230 volts, 50Hz AC system. Determine :
i) Capacitive reactance ii) RMS value of current iii) Equations for voltage and current. **(07 Marks)**

OR

6 a. Obtain the voltage and current relations for R–L series AC circuit and show that power $P = VI\cos\phi$ watts. **(06 Marks)**

b. Explain the working of Residual Current Circuit Breaker (RCCB) with a suitable diagram. **(07 Marks)**

c. Two impedances $Z_1 = 2 + j3\Omega$ and $Z_2 = 2 - j4\Omega$ are connected in parallel, across a 100V, 50Hz AC supply calculate i) branch currents ii) total current of circuit. **(07 Marks)**

Module-4

7 a. Explain the generation of 3 phase AC system with suitable diagrams and waveforms. **(06 Marks)**

b. A 12 pole, 500RPM, star connected, 3 phase alternator has 48 slots with 15 conductors per slot. The flux per pole is 0.02wb and distributed sinusoidally. The winding factor is 0.97. Calculate : i) Frequency ii) Phase EMF iii) Line EMF. **(07 Marks)**

c. Show that two wattmeters are sufficient to measure three phase power and also estimation of power factor. **(07 Marks)**

OR

8 a. Explain the constructional features of salient pole type rotor with a neat diagram. **(06 Marks)**

b. Three coils each of impedance of $20\angle 60\Omega$ are connected in star to a 400V, 3phase, 50Hz AC supply. Find the readings on each of two wattmeters connected to measure the input power. **(07 Marks)**

c. Derive an EMF equation of a 3 phase alternator. **(07 Marks)**

Module-5

9 a. Explain different types of losses in transformer and their minimization techniques. **(06 Marks)**

b. Describe the working of STAR – DELTA starter for a 3 phase induction motor with suitable diagram. **(07 Marks)**

c. A 30 KVA single phase transformer has a core loss of 450w and full load copper loss of 850w. If the power factor of the load is 0.8. Calculate :
i) Full load efficiency
ii) Load for maximum efficiency
iii) Maximum efficiency at UPF. **(07 Marks)**

OR

10 a. Explain the basic working principle of a transformer and list the application of transformer. **(06 Marks)**

b. An 8 pole alternator runs at 750RPM and supplies power to a 4 pole induction motor, which runs at 1455RPM. What is the slip of the induction motor? **(07 Marks)**

c. Derive an EMF equation of a transformer with suitable notations. **(07 Marks)**

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