

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

- State and explain Kirchoff's laws. (06 Marks)
 - 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
 - Estimate the mutual inductance between two coils, of the permeability of iron is 2000
 - 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)
 - 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 :
 - Total current
 - Total supply voltage
 - Total power dissipated in the circuit. (07 Marks)

OR

- State and explain :
 - Fleming's left hand rule
 - Faraday's second law. (06 Marks)
 - 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.

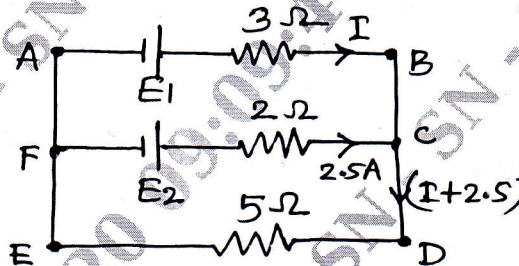


Fig. Q2(b)

(07 Marks)

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

Module-2

- Explain the function of following parts of DC machine
 - Yoke
 - Field coil
 - Pole core
 - Pole shoe
 - Commutator
 - Brush. (06 Marks)
 - Explain the construction and working principle of dynamometer type wattmeter. (07 Marks)
 - 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 :
 - Total armature current
 - Current per path
 - Generated EMF. (07 Marks)

OR

- Define the Back EMF of a DC motor and explain its significance. (06 Marks)
 - Explain the basic working principle of a single phase induction type energy meter with a neat diagram. (07 Marks)
 - 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 :
 - Speed
 - Gross torque. (07 Marks)

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 $318\mu\text{F}$ 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 $20\sqrt{60}\Omega$ 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)
