

CBCS Scheme

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14ELE15/25

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017 Basic Electrical Engineering

Time: 3 hrs.

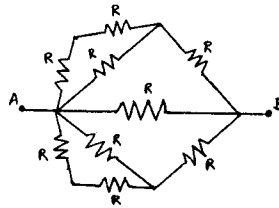
Max. Marks: 100

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

Module-1

- 1 a. Calculate effective resistance between points A and B for the combination of resistances given in fig.Q1(a). (05 Marks)

Fig.Q1(a)



- b. Bring out clearly analogy between Magnetic and Electric circuits. (06 Marks)
 c. State and explain : i) Faraday's laws ii) Fleming's left hand rule iii) Fleming's right hand rule. (09 Marks)

OR

- 2 a. The domestic power in a house comprises of loads as given in table. Calculate i) The total load and current taken from the supply of 230V ii) Total energy consumption per month
 1HP = 746W. (08 Marks)

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

- b. An air cored Solenoid consists of 1500 turns of wire wound on a length of 60cm. A search coil of 500 turns, enclosing a mean area of 20cm² is placed centrally in the solenoid. Find
 i) the mutual inductance of the arrangement ii) the emf induced in the search coil, when the current in the solenoid is changing uniformly at the rate of 250A/sec. (06 Marks)
 c. Derive an expression for dynamically induced e.m.f. (06 Marks)

Module-2

- 3 a. With neat sketch, explain the constructional features of a D.C machine. (08 Marks)
 b. Explain with neat sketch, the construction, working and theory of operation of Dynamometer type Wattmeter. (08 Marks)
 c. A four pole D.C. motor has its armature lap wound with 1040 conductors and runs at 1000 rpm, when taking an armature current of 50A from a 250V D.C supply. The resistance of the armature is 0.2Ω. Calculate the useful flux per pole of the motor. (04 Marks)

OR

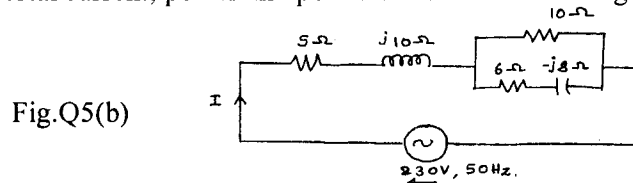
- 4 a. Explain types of D.C. motors and characteristics of D.C. shunt motor. (08 Marks)
 b. Derive the e.m.f. equation of a D.C. generator. (06 Marks)
 c. List out applications of D.C. motor and explain why starter is required for a D.C. motor. (06 Marks)

Module-3

- 5 a. Define i) Real power ii) Reactive power iii) Apparent power iv) Power factor
 v) Form factor. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any scribbles, identification, appeal to evaluator and/or signatures written on Page - 50 will be treated as malpractice.

- b. Find the total current, power and power factor of the circuit given in fig. Q5(b). (07 Marks)



- c. Write a note on : i) Two way control of lamp ii) M.C.B. (08 Marks)

OR

- 6 a. With a neat diagram, explain service mains, meter board and distribution board of a domestic wiring system. (08 Marks)
 b. Derive an equation for the power consumed by an R-C series circuit. Draw the waveforms of voltage, current and power. (08 Marks)
 c. An alternating current i is given by $i = 141.4 \sin 314t$. Find i) The maximum value ii) Frequency iii) Time period and iv) the instantaneous value when t is 3m.s. (04 Marks)

Module-4

- 7 a. Show that two Wattmeters are sufficient to measure three phase power and also derive expression for power factor. (08 Marks)
 b. Write the differences between salient pole type and non salient pole type rotor of a synchronous generator. (04 Marks)
 c. Each phase of a delta connected load comprises a resistor of 50Ω and capacitor of $50 \mu\text{f}$ in series. Calculate i) line and phase currents ii) total power when load is connected to a 440V, 3 phase, 50Hz supply. (08 Marks)

OR

- 8 a. A 4 pole, 3 phase, 50Hz star connected alternator has an induced line voltage of 3300V. Determine the flux per pole assuming $K_p = 1$ and $K_d = 0.96$. The armature has 9 slots per pole and 8 conductors per slot. (06 Marks)
 b. The input power to a 1.6KV, 50Hz, 3 phase motor is measured by using two wattmeter method. The motor is running on full load with an efficiency of 86%. The readings of the two wattmeters are 255KW and 85KW. Determine i) The input power ii) The power factor iii) The line current and iv) The output power. (08 Marks)
 c. Derive the emf. equation of an alternator. (06 Marks)

Module-5

- 9 a. Define Efficiency and voltage regulation of a transformer and give their equations. (06 Marks)
 b. Explain the working of Star – Delta starter, with neat sketch for a 3 phase induction motor. (06 Marks)
 c. A single phase 25 KVA, 1000/2000V, 50Hz transformer has a maximum efficiency of 98% at full load u.p.f. Determine its efficiency at i) $3/4^{\text{th}}$ full load u.p.f ii) $1/2$ full load 0.8 p.f iii) 1.25 full load 0.9 p.f. (08 Marks)

OR

- 10 a. Prove that the stator magnetic field has a constant magnitude and rotates at synchronous speed in an induction motor. (08 Marks)
 b. Derive the e.m.f equation of a transformer. (06 Marks)
 c. A 3 phase induction motor is wound for 4 pole and is supplied from 50Hz system. Calculate i) Synchronous speed ii) The speed of the motor when slip is 4% iii) The rotor current frequency when motor runs at 1440 rpm. (06 Marks)
