



First/Second Semester B.E. Degree Examination, Dec.2023/Jan.2024  
**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 Ohms' law: What are its limitations? (07 Marks)  
b. Define RMS value, derive an expression for RMS value of a sinusoidal AC voltage. (08 Marks)  
c. Two 10 ohms resistors are connected in parallel, which is connected in series with 25 ohms resistance across 90V supply. Find the voltage across 25ohms resistor and the total power consumed by the circuit. (05 Marks)

OR

- 2 a. Explain clearly, how alternating voltage is generated. (06 Marks)  
b. Two storage batteries A and B are connected in parallel to supply a load of 0.30 ohms. The open circuit emf of A is 11.7 volts and that of B is 12.3 volts. The internal resistances are 0.06 ohms and 0.05 ohms respectively. Find the current supported to the load. (08 Marks)  
c. State and explain KCL and KVL. (06 Marks)

### Module-2

- 3 a. Derive an expression and show that current lags voltage by an angle " $\phi$ " for an a.c circuit containing two elements in series. (07 Marks)  
b. What are the advantages of the three phase system when compared with single phase a.c system? (04 Marks)  
c. A series circuit with  $R = 10$  ohms,  $L = 50$ m Henry and  $C = 100\mu$  Farady's is supplied with 200V 50Hz. Find : i) Impedance ii) Current iii) Power iv) Power factor. (09 Marks)

OR

- 4 a. Establish the relationship between phase and line values of voltage and currents in a 3-phase delta connected circuit. (08 Marks)  
b. Derive an expression and show that the average power consumed by a pure capacitor is zero. (08 Marks)  
c. Two wattmeter connected in a balanced system indicates 4.5kW and 0.5kW, the latter wattmeter reading is obtained after reversing its current coil. What is the total power and power factor of the circuit? (04 Marks)

### Module-3

- 5 a. Derive emf equation of transformer. (07 Marks)  
b. With a neat circuit diagram, explain how a single lamp can be controlled from 3 switches. (07 Marks)  
c. The required no load ratio is a single phase, 50Hz core type transformer is 6000/250V. Find the number of turns per limb on the high and low voltage sides if the flux is to be about 0.06wb. (06 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.

OR

- 6 a. What is the necessity of earthing? With neat sketch, explain plate earthing. (08 Marks)  
 b. In a 25KVA, 2000/200V, single phase transformer the iron and full load copper losses are 350 and 400W respectively. Calculate the efficiency at unity power factor on full load and half load. (08 Marks)  
 c. What are the losses that occurs is a transformer how they are minimized? (04 Marks)

**Module-4**

- 7 a. Draw the schematic representation of DC shunt generator, and obtain the relationship between induced emf and terminal voltage. (06 Marks)  
 b. Derive an expression for armature torque in a d.c motor. (06 Marks)  
 c. A 110V, d.c shunt generator delivers an armature current of 52amps, its armature resistance is 0.2 ohms, the generator rotates at a speed of 1800 rpm has 6 poles lap connected and has 360 conductors. Calculate the generated emf and flux per pole. (08 Marks)

OR

- 8 a. Draw the explain the main parts of dc generator. (06 Marks)  
 b. Draw the characteristics of dc server meter and explain. (06 Marks)  
 c. A 230V dc shunt motor takes a no-load current of 2amp, and runs at 1100 rpm. It the full-load current is 40Amps, find the speed at full load. Assume flux remains constant and armature resistance is 0.25 ohms. Neglect field current. (08 Marks)

**Module-5**

- 9 a. What is the necessity of starter in an indication meter? Explain star – delta starter with a neat figure. (08 Marks)  
 b. Derive the expression for frequency of generated voltage is an alternator. (04 Marks)  
 c. A 3 phase, 50Hz, 16 pole alternator has star connection with 144 slots having 10 conductors/slot. The flux/pole is 24.8m wb. The coils are full pitched. Find :  
 i) Speed and ii) the line emf, take winding factor as 0.96. (08 Marks)

OR

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- 10 a. With a neat figure, explain the constructional details of an alternator. (08 Marks)  
 b. Explain the concept of rotating magnetic field of an induction motor. (08 Marks)  
 c. A 3 phase, 6 pole, 60Hz inductor motor has frequency of rotor current at full load of 1.8Hz. Find the synchronous speed and slip of full – load. (04 Marks)

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