R22

Code No: 181AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year I Semester Examinations, January/February - 2024

BASIC ELECTRICAL ENGINEERING

(Common to CSE, IT, CSIT, CE(SE), CSE(CS), CSE(DS), CSD)

Time: 3 Hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a) Three capacitors of 4 μ F, 4 μ F and 8 μ F are connected in parallel. What is its equivalent capacitance? [1]

b) How Thevenin's voltage source and Thevenin's resistance are connected? [1]

c) Define the peak factor. [1]

d) What is the current and voltage relationship in a pure inductor? [1]

e) What is the main purpose of using core in a transformer? [1]

f) What is an autotransformer? [1]

g) What is the basis for classification of D.C. Generators? [1]

h) What is the equation of synchronous speed in a three-phase induction motor? [1]

i) What is the primary objective of providing the circuit breaker in power system? [1]

j) What are the types of circuit breakers are available in the market in the market for low voltage applications. [1]

PART - B

(50 Marks)

2.a) State and explain KVL and KCL.

b) Three resistors R_1, R_2 and R_3 are connected in series across a constant voltage V. Voltage across R_1 is 20V. Power consumed by R_2 is 25W and R_3 = 2 ohms. Find the voltage if the current is 5A. [5+5]

OR

3.a) State and explain the superposition theorem.

b) A 500 μF capacitor is charged to 20 V DC. It is suddenly connected to a resistance of 500 kΩ. Find (i) voltage across capacitor at t =0, (ii) current through capacitor at any time and (iii) voltage across capacitor at t = ∞. [5+5]

4.a) Define i) Instantaneous value, ii) Time period, iii) Frequency, iv) Cycle and v) Amplitude.

b) A sinusoidal voltage v = 50 Sin ωt is applied to a series RL circuit. The current in the Circuit is given by i = 25 Sin ($\omega t - 53^0$). Determine (i) apparent power, (ii) Average power and (iii) power factor. [5+5]

OR

5.a) Derive the relation between line and phase quantities of voltages and currents for a delta connected system.

b) A coil has a resistance of 20 ohms and inductance of 80 mH and is connected in series with a 100 pF capacitor. Determine the circuit impedance at resonance and also find the resonant frequency? [5+5]

6.a) Explain different losses in a single-phase transformer.

b) A 220/110V, 50Hz, 1.5kVA, has primary and secondary winding resistance of 1Ω and 2 Ω, and reactance of 3 Ω and 5 Ω respectively find the total equivalent resistance equivalent reactance and equivalent impedance referred by primary and secondary. [5+5]

OR

7.a) Explain the operation of auto transformer.

b) Describe the three-phase transformer connections. [5+5]

8.a) Explain the performance characteristics of dc shunt machine.

b) Discuss the construction and working of a three-phase induction motor. [5+5]

OR

9.a) Explain why single phase induction motor is not self-starting.

b) Describe the working principle of synchronous generator. [5+5]

10.a) Discuss the high rupturing capacity fuse with neat diagram. List out its merits and demerits.

b) Explain the ELCB and MCCB protection used in L.T switch gear. [5+5]

OR

11.a) What are the criterion considered for classified the wires and cables.

b) Describe the Nickel cadmium batteries. List out its merits and demerits. [5+5]

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