

Code No: 182AC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

BASIC ELECTRICAL ENGINEERING

(Common to ECE, EIE, CSE(AI&ML), CSE(IOT), AI&DS, AI&ML)

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)**

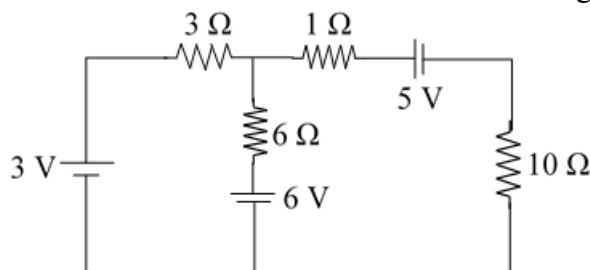
- Write the V-I relationships of R, L and C parameters. [1]
- State super position theorem. [1]
- Define reactive power and power factor. [1]
- Why resonance will occur in series R-L-C circuit, but not in R-L and R-C circuits? [1]
- What is the importance of regulation in a transformer? [1]
- Write few applications of auto transformer. [1]
- Define slip and what is minimum and maximum value of slip in any electrical machine. [1]
- Write any two differences between slip-ring and squirrel cage induction motors? [1]
- What is the difference between a wire and a cable? [1]
- What is the function of MCCB? [1]

PART - B**(50 Marks)**

- Explain different types of voltage and current sources with neat sketches.
- State and explain Thevenin and Norton Theorems. Show that these two theorems are dual to each other. [5+5]

OR

- A series R-C circuit is excited by DC voltage at $t=0$. Find current in the circuit in time domain for $t>0$.
- Find the voltage across 10Ω resistor in the circuit shown in Figure. [5+5]



4.a) What is meant by resonance in R-L-C series circuit. Derive the expression for resonance frequency in a R-L-C series circuit.

b) In a series R-L circuit $R= 5$ ohms and $L= 0.06H$ and the voltage across Resistor is $V_R(t)=15 \sin 200t$. Find the current and total voltage across the circuit. [5+5]

OR

5.a) Show that, in a balanced delta connected system, line current is equal to $\sqrt{3}$ time phase current and line voltage is equal to phase voltage.

b) Determine R.M.S and Average value of the sinusoidal waveform. [5+5]

6.a) Explain the operation of a single-phase transformer.

b) Calculate the efficiency at full load of a 100 kVA transformer for power factor of (i) unity (ii) 0.8. The copper loss is 1000 W at full load and the iron loss is 1000 W. [5+5]

OR

7.a) Explain different types of three-phase transformer connections with their relative merits and demerits.

b) The voltage per turn of a single-phase transformer is 1.2 V, when the primary winding is connected to a 230 V, 50 Hz AC supply, the secondary voltage to be 560V. Find

(i) primary and secondary turns (ii) Core area if the maximum flux density is 1.3 T. [5+5]

8.a) Explain the construction and principle of operation of an alternator.

b) A 3 phase, 6-pole, 50 Hz induction motor has a slip of 2% at no load and 4% at full load. Find (i) No load and Full load speed (ii) Frequency of rotor current on full load. [5+5]

OR

9.a) Explain about the slip-speed characteristics of induction motor.

b) Explain construction and working principle of a single-phase induction motor. [5+5]

10.a) Explain different types of wires and cables with diagrams.

b) A house has the following loads:

i) 10 lamps, 60 W each working for 8 hr/day.

ii) 1 oven of 450 W working for 1 hr/day

iii) 8 fans, 80 W each working for 2 hr/day.

iv) 1 heater of 1000 W working for 1 hr/day

v) 1 refrigerator of 250 W working for 12 hr/day

Calculate the monthly electricity bill if rate of charge per unit is Rs. 1.20/- plus Rs. 20/- as meter rent for the month of September. [5+5]

OR

11.a) With schematic diagrams, briefly explain about MCB.

b) What is earthing? Explain different earth methods. [5+5]

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