

Code No: 181AM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year I Semester Examinations, March/April - 2023

FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to BT, PCE)

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) Explain Kirchhoff's voltage law. [1]
- b) State ohms law. [1]
- c) Define alternating quantity. [1]
- d) Write the formula for inductive reactance  $X_L$  and capacitive reactance  $X_C$ . [1]
- e) Define slip of an induction motor. [1]
- f) Explain the difference in principle of DC Generator and DC Motor. [1]
- g) Define peak inverse voltage of diode. [1]
- h) What is meant by Transformer utilization factor? [1]
- i) Mention the names of terminals of BJT. [1]
- j) Define current gain ( $\alpha$ ) of a transistor. [1]

**PART-B****(50 Marks)**

- 2.a) Determine the current in branch A-B by using KVL (figure 1).

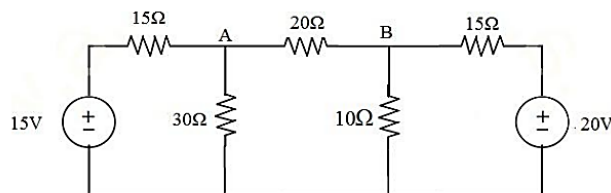


Figure 1

- b) Obtain the Equivalent Resistance when two resistors  $R_1$  and  $R_2$  are connected in Series and Parallel respectively.
- c) Calculate the voltage drop across each resistors, also determine the current supplied from the battery (figure 2). [5+2+3]

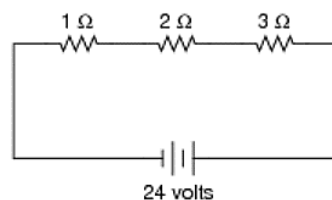


Figure 2

OR

- 3.a) Explain about Energy Sources.  
b) Find the equivalent resistance for the circuit shown below figure 3, all the resistors have same value of resistance R.

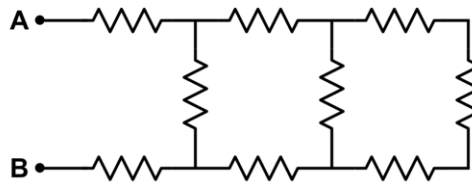


Figure 3

- c) Determine the mesh currents for the circuit shown below figure 4. [3+3+4]

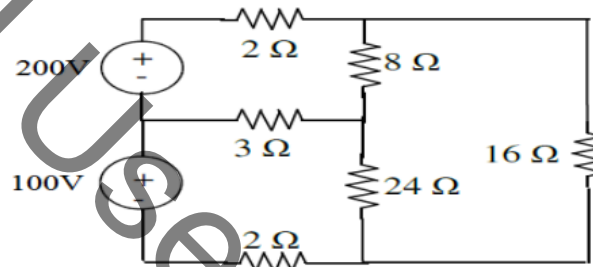


Figure 4

- 4.a) The impedances of series circuit are  $Z_1 = (6+j8)$  ohms and  $Z_2 = (8-j6)$  ohms. If the applied voltage is 120V, find total impedance, current and power factor.  
b) Derive an expression for the current and impedance for a series RC circuit excited by a Sinusoidally alternating voltage. Draw the phasor diagram.  
c) An alternating current is expressed as  $I = 14.14 \sin 314t$ . Determine  
(i) Maximum current (ii) RMS current (iii) Frequency [4+3+3]

OR

- 5.a) A resistor of 50Ω and inductance of 100mH are connected in series across 200V, 50Hz supply. Determine the following  
(i) Impedance (ii) current flowing through the circuit. Also draw the phasor diagram.  
b) Derive an expression for Form Factor of sine wave form. [6+4]  
6.a) Explain about the working principle of a D.C generator  
b) Draw the constructional diagram of a single –phase transformer.  
c) Explain working principle of an Alternator. [4+3+3]

OR

- 7.a) Classify types of D.C motors. Draw their schematic diagrams.  
b) What is the significance of back emf of motors?  
c) Write the applications of three phase induction motors. [4+3+3]  
8.a) Explain the working of Bridge rectifier. Give the expressions for RMS current, PIV, ripple factor.  
b) Explain the operation of forward biased and reverse biased PN junction Diode. [5+5]

OR

- 9.a) With suitable diagrams, Obtain expressions for  $V_{DC}$ ,  $I_{DC}$ ,  $V_{rms}$  and  $I_{rms}$  of center-tapped full wave rectifier.  
b) Explain about the effect of temperature on diode characteristics. [6+4]

10.a) Among CE, CB and CC configurations which is most popular? Why?

b) Explain the constructional details of a transistor.

c) If  $\beta$  of a transistor is 98,  $I_c = 4.5\text{mA}$ , then calculate base current.

[3+4+3]

**OR**

11.a) Explain working principle of NPN Transistor.

b) If  $\alpha$  of a transistor is 0.9, calculate  $\beta$ .

c) Derive the relationship between  $\alpha$  &  $\beta$  of transistor.

[5+2+3]

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Used papers 2023