11N507

B. Tech. I - Sem. (New Scheme) (Main) Exam., May - 2023
All Branch
1FY2 – 07 Basic Electrical Engineering
Common to all Branches

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All **ten** questions are compulsory.*

Part – B: *Analytical/Problem solving questions 5 × 4 marks = 20 marks. Candidates have to answer five questions out of seven.*

Part – C: *Descriptive/Analytical/Problem Solving questions 3 × 10 marks = 30 marks. Candidates have to answer three questions out of five.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A

Q.1 Derive expressions for average value and RMS value of a sinusoidally varying AC voltage.   [2]

Q.2 What do you understand by the terms power factor, active power and reactive power?   [2]

Q.3 What are the advantages of three phase system?   [2]

Q.4 What are the information obtained from open circuit and short circuit test in a single phase transformer? [2]

Q.5 A 100 kVA rated transformer has a full-load copper loss of 1.8 kW and an iron loss of 1 kW. Determine the transformer efficiency at full load and 0.8 power factor. [2]

Q.6 A 4-pole d. c. motor and a wave-wound armature with 800 conductors. The useful flux per pole is 20 mWb. Calculate the torque developed when a current of 40 A flows in each armature conductor. [2]

Q.7 The armature resistance of 200 V dc shunt motor is 0.4 Ω and not load current is 2 Amp. When loaded, the armature current is 50 Amp. The speed is 1200 rpm. Find out the no-load speed. [2]

Q.8 Draw the block diagram of AM Transmitter. [2]

Q.9 Define latching and holding currents as applicable to an SCR. [2]

Q.10 Explain the application of junction diode as rectifier by drawing a suitable circuit. [2]

PART – B

Q.1 Explain briefly the series resonance in single phase AC circuit. [4]

Q.2 A three phase balanced system supplies 110 V to a delta connected load whose phase impedances are equal to $(3.54 + j3.54)\Omega$. Determine the line currents and draw the phasor diagram. [4]

Q.3 A 230/110 V, 1-phase transformer takes an input of 350 VA at no load & at rated voltage. The core loss is 110 W. Find – [4]

(a) The iron loss component of no load current

(b) The magnetizing component of no load current

(c) No load power factor

Q.4 Draw and explain phasor diagram of an ideal transformer at no-load. [4]

Q.5 Explain electromagnetic spectrum in brief. [4]

Q.6 Draw output characteristics of CE configuration of BJT and explain different regions of its operation. [4]

Q.7 With the help of suitable block diagram, describe Amplitude modulation and demodulation techniques. [4]

PART – C

Q.1 State and explain superposition theorem. Use this theorem to find the value of the voltage V_a shown in Fig. 1. https://www.btubikaner.com [10]
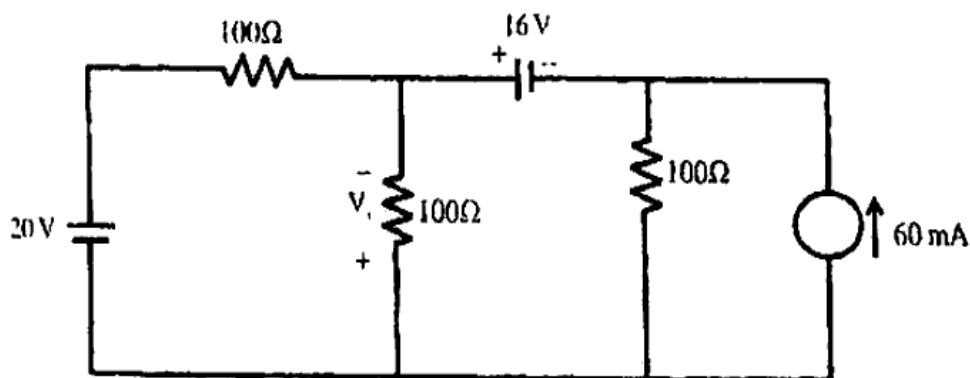

Figure – 1

Q.2 (a) Find the r.m.s value of the following current signal in a circuit.

$f(t) = 3 \sin \omega t + 4 \cos 2\omega t + 12 \sin 3\omega t + 5 \cos 3\omega t$ [5]

(b) A supply of 200 V, 50 Hz is connected with a 20Ω resistance in series with a choke coil (non - ideal). The reading of the voltmeter across the resistor is 100 V and across the coil is 140 V. Calculate power factor of the circuit. Also, determine the power consumed in the coil. [5]

Q.3 (a) Derive the expression of three phase power measured by two wattmeter method for a 3 phase balanced load. Draw the phasor diagram. [5]

(b) A 3 phase balanced Y connected load having resistance of 25Ω in each phase is connected to 400 V, 50 Hz, 3 phase supply. Find out - [5]

(i) Power consumed

(ii) Power consumed, if it is connected in Δ

(iii) If a resistance in one of the phases is open circuited/omitted, find out power consumed in each case.

Q.4 (a) The no-load current of a transformer is 15A at a power factor of 0.2 when connected to a 460 V, 50 Hz supply. The primary winding has 550 turns, calculate (i) the magnetizing component of no-load current, (ii) the iron loss, (iii) maximum value of flux in the core. [6]

(b) Explain the principle of operation of a DC motor with suitable diagram. [4]

Q.5 (a) Draw the basic block diagram of electronic communication system. State the function of transmitter. [5]

(b) Draw the block diagram of AM super heterodyne radio receiver and state the function of each block. [5]