53 (EE 201) BEEN

2017

BASIC ELECTRICAL ENGG.

Paper : EE 201

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* State the following : 5×2=10

   (i) Circuit

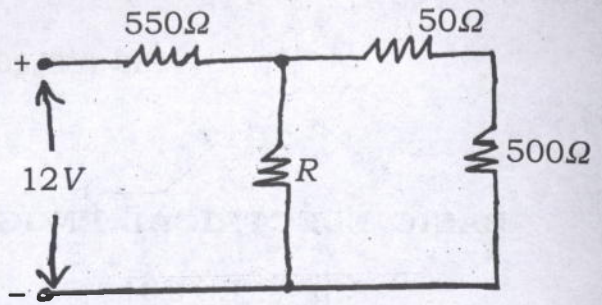
   (ii) Parameters

   (iii) Linear circuit

   (iv) Branch

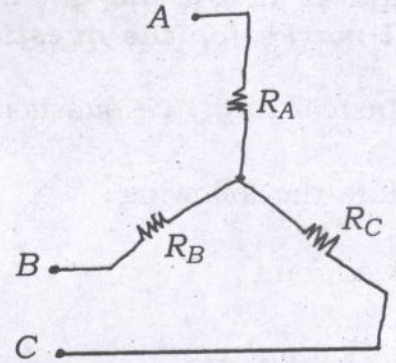
   (v) Loop.

(b)



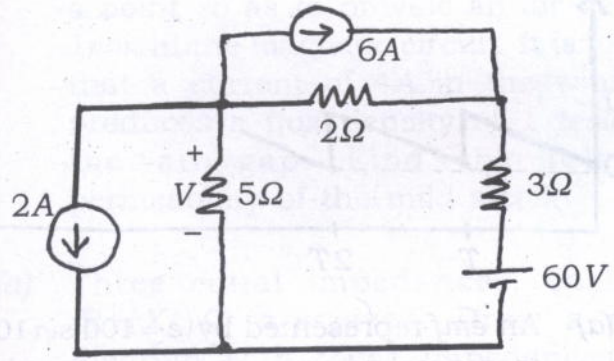
What is the value of unknown resistor R in the above circuit if the voltage drop across the 500Ω resistor is 2·5 *volts*? 10

2. (a)



Consider the Star network shown in the above figure. The resistance between terminals A and B with C open is 6Ω, between terminals B and C with A open is 11Ω, and between terminals C and A with B open is 9Ω. Calculate the values of R_A, R_B and R_C. 10

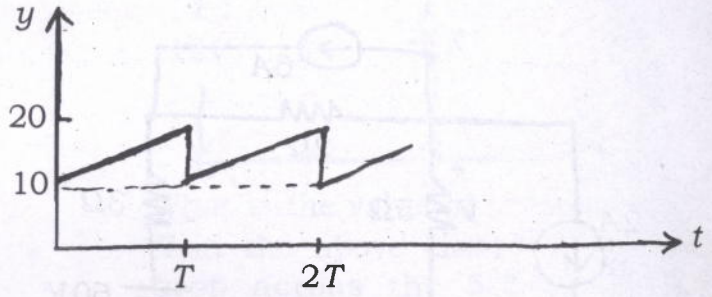
(b) Apply Superposition theorem to the given circuit for finding the voltage drop V across the 5Ω resistor. 10



3. (a) A sinusoidal alternating current of frequency 60*Hz* has a maximum value of 120*A*. Write down the equation for its instantaneous value. Reckoning time from the instant the current is zero and is becoming positive, find

(a) the instantaneous value after $\frac{1}{360}$ second and (b) the time taken to reach 96*A* for the first time. 10

(b) Determine the r.m.s. and average value of the waveform shown in the following figure : 10



4. (a) An *emf* represented by $e = 100 \sin 100\pi t$ is impressed across a circuit consisting of 40Ω resistor in series with a $40\mu F$ capacitor and a $0{\cdot}25H$ inductor. Determine *(i)* the r.m.s. value of the current *(ii)* the power supplied *(iii)* the power factor. 10

(b) An impedance of $(10+15j)\Omega$ is connected in parallel with an impedance of $(6-8j)\Omega$. Calculate the total active power. 10

5. (a) Write briefly about the following :

(i) Lenz's law

(ii) Mutual inductance. 5+5=10

(b) A mild steel ring of $30cm$ mean circumference has a cross sectional area of $6cm^2$ and has a winding of 500 turns on it. The ring is cut through at a point so as to provide an air gap of $1mm$ in the magnetic circuit. It is found that a current of $4A$ in the winding produces a flux density of 1 *tesla* in the air gap. Find the relative permeability of the mild steel. 10

6. (a) Three equal impedances, each of $(R+jX_L)\Omega$ are given. Draw a neat diagram with these impedances for *(i)* Star-connected load *(ii)* Delta connected load. Clearly show the line and phase voltages and line and phase currents for each case. 5+5=10

(b) Given a balanced 3-phase system with Star-connected load for which line voltage is $230V$ and impedance of each phase is $(6+8j)\Omega$. Find the line currents and power absorbed by each phase. 10

7. (a) Write briefly the following : 5+5=10

(i) Plate earthing

(ii) Conduit wiring.

(b) How will you use a PMMC instrument which gives a full scale deflection at $50mV$ p.d. and $10mA$ current as —

(i) Ammeter $0-10A$ range

(ii) Voltmeter $0-250V$ range.

Draw the circuit diagrams for each case and clearly show the necessary steps. 5+5=10
