

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

CLASS: BTECH
BRANCH: CEP&P/BT/CHEM.ENGG/CIVIL/MECH/PROD

SEMESTER: I
SESSION: MO/2018

SUBJECT: EE101 BASICS OF ELECTRICAL ENGINEERING

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.

- Q1. (a) Define (i) active and passive elements (ii) linear and nonlinear elements [2]
 Q1. (b) Use Node voltage method to find the current through and voltage across each resistor for the circuit shown in Fig. 1. [3]
- Q2. (a) Explain with the aid of B-H curve the meaning of following terms: [2]
 Remanence, Coercivity.
- Q2. (b) An iron ring has a mean length of 1.0m and a cross sectional area of 10cm². It has a radial air gap of 2mm. a flux of 1.0 mWb is required in the air gap. The leakage factor is 1.2 and iron is such that when flux density is 1.2 Wb/m², the relative permeability is 400. Calculate the number of ampere turns required. [3]
- Q3. (a) Draw the phasor diagram of the following voltages: [2]
 $v_1 = 100\sin 100t$
 $v_2 = 120\sin(100t - \pi/3)$
 $v_3 = 150\sin(100t + \pi/3)$
 $v_4 = 200\cos 100t$
 Also find the resultant voltage and its rms value.
- Q3. (b) A periodic waveform is shown in Fig. 2. Calculate the (i) frequency of waveform (ii) wave equation for $0 < t < 100$ msec (iii) RMS value (iv) Average value (v) Form factor. [3]
- Q4. (a) Define power factor and explain power triangle. [2]
 Q4. (b) An inductive coil takes 10A and dissipates 1000W when connected to a supply at 250V, 25Hz. Calculate (i) impedance (ii) effective resistance (iii) reactance (iv) inductance (v) power factor (vi) power angle of lag. [3]
- Q5. (a) Explain resonance in a series circuit. Also show how the current, inductive reactance, capacitive reactance and impedance varies with respect to frequency. [2]
 Q5. (b) In a series parallel circuit, the two parallel branches A and B are in series with C. the impedances are $Z_A = 10 + j8$, $Z_B = 9 - j6$ and $Z_C = 3 + j2$ and the voltage across C is $100 + j0$ V. Calculate the current I_A and I_B and the phase angle between them. Also draw the phasor diagram. [3]

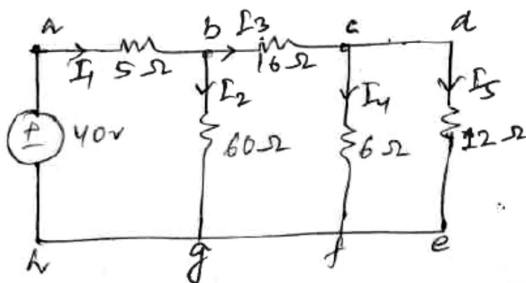


Fig-1.

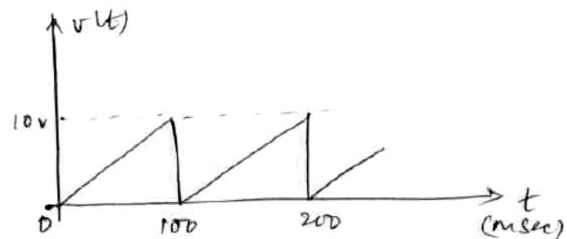


Fig-2