Code : 031201

B.Tech 2nd Semester Examination, 2017

Basic Electrical Engineering

Time : 3 hours   Full Marks : 70

Instructions :

(i)   There are **Nine** Questions in this Paper.

(ii)   Attempt **Five** questions in all.

(iii)   **Question No. 1 is Compulsory.**

(iv)   The marks are indicated in the right-hand margin.

1. Choose the correct answer (any seven).   2×7=14

(i) Correct form of ohm's law is

    (a) I = VR

    (b) V ∝ I

    (c) V = IR

    (d) Both (a) and (c)

(ii) While finding Thevenin's equivalent a circuit between two terminals V_{th} is equal to

    (a) Short-Circuit terminal voltage

    (b) open-Circuit terminal voltage

    (c) net voltage available in the terminals

    (d) emf of the battery nearest to the terminals

P.T.O.

(iii) A 3-phase load is balanced if all the three phase have the same

    (a) impedance

    (b) power factor

    (c) impedance and power factor

    (d) None of the above

(iv) Which of the following theorems is applicable for both linear and non-linear circuit?

    (a) Superposition theorem

    (b) Thevenin's theorem

    (c) Norton's theorem

    (d) None of the above

(v) The magnetic field required to reduce the residual magnetization to zero is called

    (a) Retentivity

    (b) Coercivity

    (c) Hysteresis

    (d) Saturation magnetization

(vi) A Certain waveform has a form factor of 1·2 and a peak of 1·5. If the maximum value is 100, find the r.m.s. value and the average value

    (a) 66.6, 55.5

    (b) 44.4, 22.2

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(c) 66.6. 22.2

(d) 44.4, 55.5

(vii) Three delta-connected resistors absorb 60 kW when connected to a 3-phase line. If the resistors are connected in star, the power absorbed is

(a) 60 kW

(b) 20 kW

(c) 40 kW

(d) 180 kW

(viii) PMMC instruments can be used for
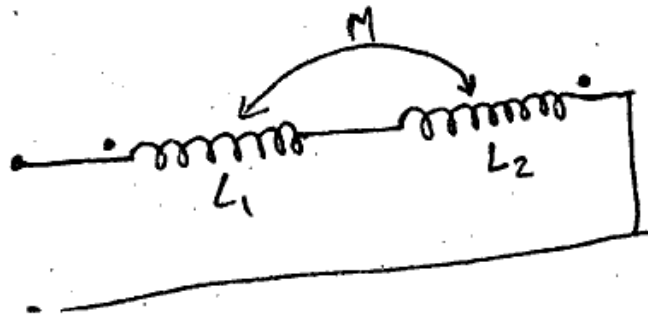
(a) a.c work only

(b) d.c work only

(c) neither a.c nor d.c. work

(d) both a.c and d.c work

(ix) The equivalent inductance measured between the terminal 1 and 2 for the circuit shown in the figure is

(a) $L_1 + L_2 + M$

(b) $L_1 + L_2 - M$

(c) $L_1 + L_2 + 2M$

(d) $L_1 + L_2 - 2M$

(x) The lack of which force causes the points to oscillate?

(a) Controlling force

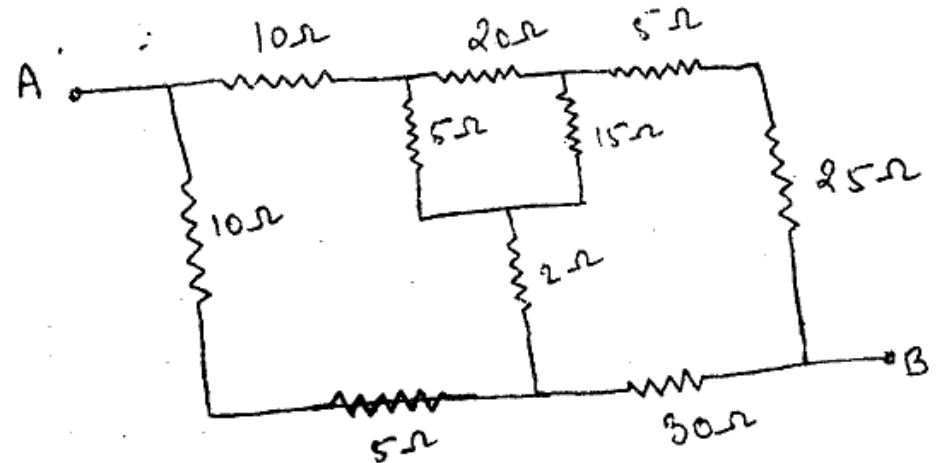(b) deflecting force

(c) Damping force

(d) None of the above

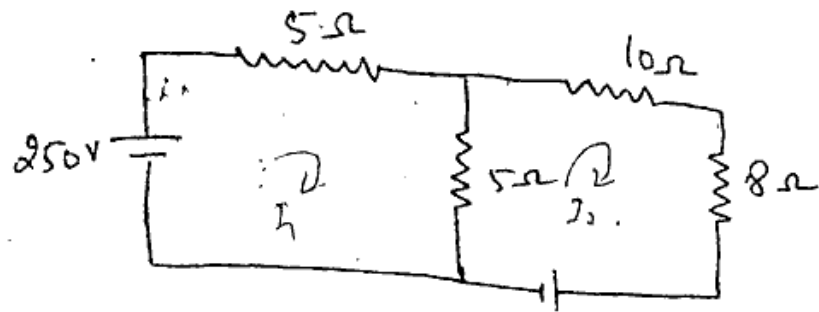2. (a) What do you mean by active and passive elements? Explain Kirchhoff's law.

6

(b) Find an equivalent resistance between A and B in the network of figure.

8

3. (a) State and explain Norton's theorem. 7
   (b) Find the current through the 8 Ω resistor? By Thevenin's Theorem. 7

4. Three coils each having a resistance of 20 Ω and reactance's of 15 Ω are connected in (a) star and (b) delta, across a three-phase, 400 V, 50 Hz supply. Calculate in each case, the readings on two watt meters connected to measure the power input. 14

5. Explain in brief different types of controlling torque in an indicating instruments. 14

6. (a) Define the following: 7
   (i) Waveform
   (ii) Rms value
   (iii) Average value
   (iv) Phase Voltage
   (v) Phase Current
   (vi) Line Voltage
   (vii) Line Current
   (b) A balanced delta-connected load of impedance (8-j6) ohms per phase is connected to a three-phase. 230V. 50 H Supply. Calculate (a) Power factor (b) Line current and (c) reactive power. 7

7. A magnetic core, in the form of a closed ring, has a mean length of 20 cm and a cross-section of 1 cm². The relative permeability of iron is 2400. What direct current will be needed in a coil of 2000 turns uniformly wound round the ring to create a flux of 0.2 m Wb in the iron? 14

8. (a) Define quality factor. How will you correlate bandwidth, resonant frequency and quality factor. 7

   (b) A steel ring has its mean diameter of 35 cm and a cross-sectional area of 24 cm². There is an air gap of length of 12 mm. The effective cross-sectional area of the air gap is extenders to 12 cm² by using short pole pieces of negligible reluctance. Determine the current necessary in 300 turns of wire wound on the ring to produce a flux density of 0.25 Wb/m² in the gap. The relative permeability of steel is 700. 7

9. Write short notes on any two of the following: 7×2=14

   (a) Thevenin's theorem

   (b) Deflecting Torque

   (c) Eddy and hysteresis losses.

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