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[5151]-106

F.E. EXAMINATION, 2017

BASIC ELECTRICAL ENGINEERING

(2015 PATTERN)

Time : Two Hours

Maximum Marks : 50

N.B. :— (i) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6,

Q. 7 or Q. 8.

(ii) Neat diagrams must be drawn wherever necessary.

(iii) Figures to right indicate full marks.

(iv) Use of Non-programmable Scientific Calculators is allowed.

(v) Assume suitable data, if necessary

1. (a) State the factors on which resistance of the conductor depends.

What is the effect of increase in temperature on resistance of copper conductor, silicon and nichrome ? [6]

(b) An iron ring has magnetic circuit of cross-section 10 cm^2 and radial air gap of 1 mm cut in it. The ring is uniformly wound with 1000 turns and current of 2A produces a flux of 1 mWb in the air gap. Calculate the reluctance of magnetic path. [6]

P.T.O.

Or

2. (a) Obtain the expression for coefficient of coupling between two magnetically coupled coils. [6]
- (b) An electric motor runs at 600 rpm and produces a torque of 210 N-m. The motor efficiency is 88%. Find motor input power and current drawn when motor is fed at 400 V DC supply. [6]
3. (a) A direct loading test is to be conducted on 1-phase 230/110 V, 2 KVA transformer to determine efficiency and voltage regulation. Draw the neat connection diagram and write down the ranges of the meters used with reasons. [6]
- (b) Obtain the equation for current, when AC voltage $v = V_m \sin \omega t$ is applied across pure inductance. Draw the circuit diagram, wave form and phasor diagram. [6]

Or

4. (a) Sketch curves for charging of capacitor for voltage and current. Write their expressions. Also show the time constant and initial charging current. [6]
- (b) A 10 KVA, 3300/220 V 1-phase 50 Hz transformer has emf per turn equal to 10. Calculate : [6]
- (i) Turns on primary side
 - (ii) Turns on secondary side
 - (iii) Maximum flux in the core
 - (iv) Primary and secondary full load current.

5. (a) Obtain the expression for power, when voltage $v = V_m \sin \omega t$ is applied across R-C series circuit. [6]
- (b) The resistance of 5Ω is connected across 200 V, 50 Hz 1-phase a.c. supply. The voltage across the resistance is 50 V. Calculate : [7]
- (i) voltage across inductance
- (ii) value of inductance
- (iii) power and
- (iv) power factor

Or

6. (a) What is series resonance ? Obtain the expression for resonant frequency. [6]
- (b) Obtain the relation between phase values and line values of voltage and current in case of balanced delta connected 3-ph inductive load. Assume phase sequence RYB. Draw the necessary phasor diagram. [7]
7. (a) State and explain Kirchhoffs laws. [6]
- (b) Find equivalent resistance between A and B for the circuit shown in Fig. 7(b). [7]

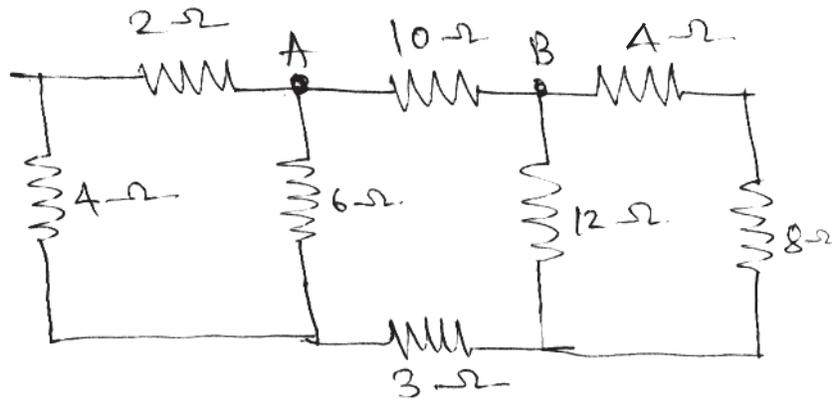


Fig. 7(b)

Or

8. (a) State and explain Superposition theorem. [6]
- (b) Find current flowing through AB using Kirchhoff's laws for the circuit shown in Fig. 8(b) [7]

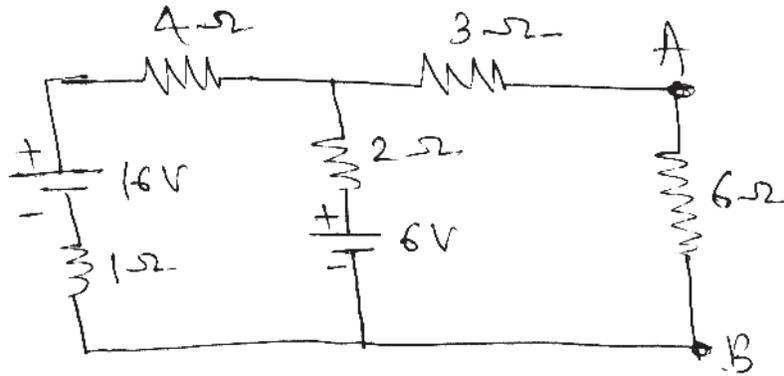


Fig. 8(b)