C16–EE–303

6239

BOARD DIPLOMA EXAMINATION, (C–16)
MARCH/APRIL—2018
DEEE—THIRD SEMESTER EXAMINATION

ELECTRICAL CIRCUITS

Time : 3 hours]   [*Total Marks* : 80

PART—A   10×3=30

Instructions : (1) Answer **all** questions.

           (2) Each question carries **three** marks.

           (3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. State the applications of potentiometer.

2. Define active and passive circuits with examples.

3. State the limitations of Ohm's law.

4. Explain ideal voltage source and ideal current source.

5. Using conjugate of current, determine the active power and reactive power using of the following voltage and current vectors :

$$V \quad (180 \quad j160), I \quad (\; 5 \quad j12).$$

6. Show mathematically, the power in a pure inductive a.c. circuit is equal to zero.

7. Define Q-Factor of a series circuit.

8. Define admittance, conductance and susceptance.

9. Derive the relation between line and phase voltages for a balanced star-connected system.

10. List the advantages of polyphase system over single-phase system.

PART—B   5×10=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Explain the method of measuring earth resistance using Earth Megger.

12. *(a)* Derive an equation for transformation of delta-connected resistance into star-connected.   6

(b) Find the equivalent delta of three resistances of 0·4 , 0·5 and 2 connected in star.   4

13. *(a)* Find the current through 2 resistor of the circuit shown below using superposition theorem.   5
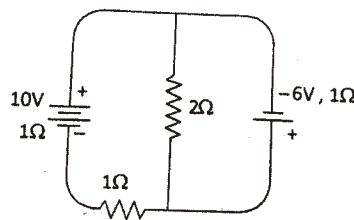
(b) Derive the r.m.s value of a sine wave alternating quantity.   5

14. A coil of resistance 40 and inductance 0·75 H forms part of series circuit for which the resonant frequency as 55 Hz if the supply is 250 V, 50 Hz. Find *(a)* line current, *(b)* power factor and *(c)* voltage across coil.   10

15. *(a)* A capacitor of $100\ \mu F$ is connected in series with resistor of $50\ \Omega$. The combination is connected across a 230 V, 50 Hz a.c. supply. Calculate the *(i)* impedance, *(ii)* current *(iii)* power factor and *(iv)* active power.   6

(b) A choke coil takes a current of 2·5 A when connected across 250 V, 50 Hz mains and consumes 400 watts. Find *(i)* resistance of the coil and *(ii)* inductance of the coil.   4

16. *(a)* Perform the following operation, where

$$A = (2 + j5), B = (30 - j60)$$

   (i) $A + B$

   (ii) $A - B$

   (iii) $A \times B$

   (iv) A / B 5

(b) In the measurement of power taken by 3-phase delta-connected squirrel-cage induction motor, two watt meters were used. The readings of them were found to be $-0·2\ kW$ and $7·0\ kW$ respectively. Calculate power and power factor of the motor.   5

17. Two impedances $z_1 = (5 + j10)\ \Omega$ and $z_2 = (10 - j15)\ \Omega$ are connected in parallel, if the total current supplied to the combination is 20 A, find *(a)* conductance, *(b)* susceptance, *(c)* voltage applied, *(d)* power factor and *(e)* power dissipated in each branch.   10

18. A star-connected alternator supplies a delta-connected load, the load impedance of each branch is $(6 + j8)\ \Omega$. The line voltage is 225 V. Determine *(a)* current in each phase of load *(b)* current in each phase of the alternator, *(c)* alternator phase voltage, *(d)* power drawn by the load and *(e)* load power factor.   10

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