* 3241 *

C09–EE–303

3241

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2018

DEEE—THIRD SEMESTER EXAMINATION

ELECTRICAL CIRCUITS

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

PART—A 3×10=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. Define *(a)* circuit, and *(b)* network.

2. State Kirchhoff's laws.

3. Define *(a)* cycle, and *(b)* frequency.

4. Define average value.

5. Derive the formula for r.m.s. value of sinusoidal current in analytical method.

6. Derive the relation between voltage and current in a pure capacitive circuit.

7. Write any three differences between series and parallel resonant circuits.

8. The current through a pure inductor is 2·5 ampere when the voltage applied is $50\sin(314t)$ V. Find inductance and power consumption.

9. Derive the relation between line voltage and phase voltage in a 3-phase, star-connected system.

10. A balanced star-connected load of (8 $j6$) per phase is connected to a 3-phase, 230-V supply. Find the line current.

PART—B

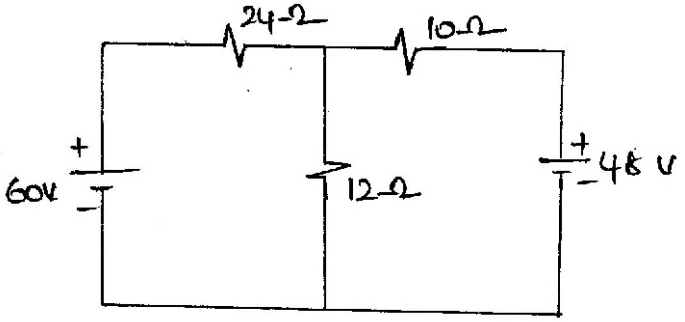
10×5=50

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

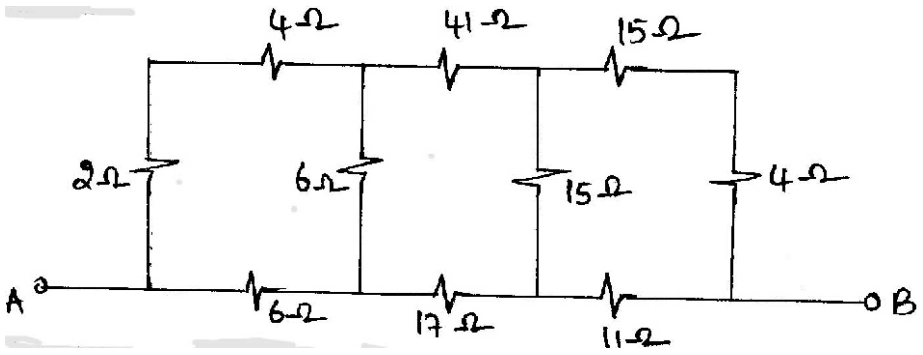
(2) Each question carries **ten** marks.

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

11. Use superposition theorem to find the current in each branch of the network shown in the figure below :



12. Find the resistance between the terminals *A* and *B* of the circuit shown in the figure below using star-delta transformation :



13. *(a)* Explain ideal voltage source and ideal current source. 5

(b) Find the resonant frequency of *R-L-C* series circuit having resistance of 10 ohm, inductance of 10 mH and capacitance of 05 F. 5

14. *(a)* Convert the following from polar to rectangular or from rectangular to polar : 5

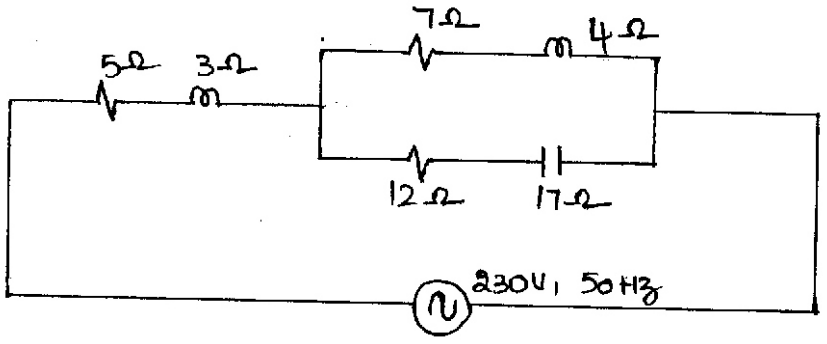
(i) 100 30

(ii) 40 *j*30

(b) The equation of an alternating voltage is v 200 sin (318t). Determine its *(i)* maximum value, *(ii)* r.m.s. value, *(iii)* frequency, *(iv)* form factor, and *(v)* peak factor. 5

15. For the network shown in the figure below, determine the *(a)* total impedance and admittance, *(b)* total current, *(c)* current in each branch, and *(d)* power factor of the whole network.

2½×4=10



16. An *R-L* circuit takes a current of 3 ampere at a power factor of 0·6 lag when connected to a 115-V, 50-Hz supply. Another *R-C* circuit takes a current of 5 ampere at a power factor of 0·707 lead when connected to the same supply. If the two circuits are connected in series across a 230-V, 50-Hz supply, calculate *(a)* current, *(b)* power consumed, and *(c)* power factor.

17. An inductive coil consisting of resistance and inductance is in parallel with a circuit consisting of resistance in series with a capacitor. Find the condition that the entire circuit should act like a non-inductive resistance. Find also the value of the frequency at that condition.

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

★ ★ ★