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**C16-EE-303****6239****BOARD DIPLOMA EXAMINATION, (C-16)****OCTOBER/NOVEMBER—2023****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. State any three applications of potentiometer.
2. State Kirchhoff's laws.
3. Define the terms (a) branch, (b) junction and (c) loop of a circuit.
4. State Norton's theorem.
5. Convert the following into polar to rectangular and rectangular to polar :  
(a)  $3-j4$  and (b)  $120 \angle -60^\circ$
6. Write the equations for instantaneous values for current and voltage in pure inductive circuits.
7. Define Q-factor of series circuits.
8. State any three conditions for resonance in parallel circuit.
9. List any three advantages of 3-phase system over single phase system.
10. What is the effect of power factor in the measurement of 3-phase power by using 2-wattmeter method when (a) Pf is unity and (b) Pf is zero? Write the expressions for polyphase emfs and represent them by phasor diagram.

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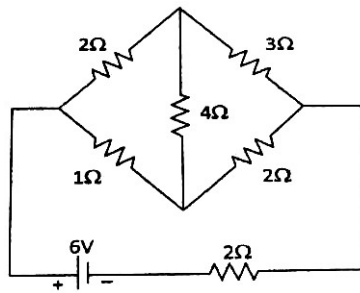
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### PART—B

10×5=50

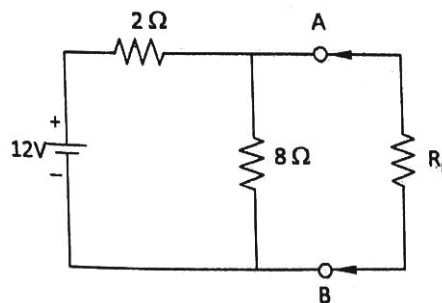
- Instructions :** (1) Answer *any five* questions.  
(2) Each question carries **ten** marks.  
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

- 11.** (a) Write the comparison between series-type ohmmeter and shunt-type ohmmeter in any three aspects. 3  
(b) Explain construction and working of megger with a neat sketch. 7
- 12.** Solve the bridge given in figure shown below for the current through 4Ω resistor using Kirchoff's laws. 10



- 13.** (a) Show that in 3-phase delta connected system, the line current is  $\sqrt{3}$  time the phase current. 5  
(b) Find the Thevenin's equivalent of terminals A and B for the circuit given below : 5

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- 14.** The equation of an instantaneous current is  $i = 42.42 \sin 628t$ . Determine its (a) r.m.s value, (b) average value, (c) frequency, (d) form factor and (e) peak factor. 10
- 15.** A coil having a resistance of  $6\Omega$  and an inductance of  $0.03\text{H}$  is connected across  $50\text{ V}$ ,  $60\text{ Hz}$  supply. Find (a) current, (b) phase angle, (c) power factor, (d) volt-ampere and (e) power consumption. 10
- 16.** (a) Prove that resonant frequency  $F_r = \frac{1}{2\pi\sqrt{LC}}$ . 5  
 (b) What is the reactance of a  $50\text{ Hz}$ , AC circuit containing an inductor of  $5\text{H}$  and a capacitor of  $10\text{ microfarad}$  connected in series. 5
- 17.** A circuit consists of three branches connected in parallel across a  $100\text{ V}$ ,  $50\text{ Hz}$  supply.  
 1st branch : a resistor of  $200\Omega$   
 2nd branch : a  $50\Omega$  resistor in series with a  $30\text{ microfarad}$  capacitor  
 3rd branch : an inductor of  $100\Omega$  resistance and  $0.5\text{H}$  inductance  
 Calculate branch currents and total current in magnitude and phase. 10
- 18.** Three coils each with a resistance of  $45\Omega$  and inductance of  $0.2\text{H}$  are connected to a  $415\text{ V}$ ,  $50\text{ Hz}$ , 3-phase supply in delta connection. Calculate (a) current in each coil and (b) total power absorbed. 10

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