

B.Tech.

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00314

Term-End Examination

June, 2014

**OIEE-001 : BASICS OF ELECTRICAL
ENGINEERING**

Time : 2 hours

Maximum Marks : 70

Note : *There are eight questions. Attempt any **five** questions including question no. 1 which is **compulsory**. All questions carry equal marks. Use of scientific calculator is allowed.*

1. This question contains objective type questions.

Select the most appropriate option.

7×2=14

(a) If 10 mA current flows through a 2.5 kΩ resistance, then the power dissipated in it would be

- (i) 25 W
- (ii) 25 mW
- (iii) 250 W
- (iv) 250 mW

- (b) The value of resistance 'R' shown in given Figure 1 is

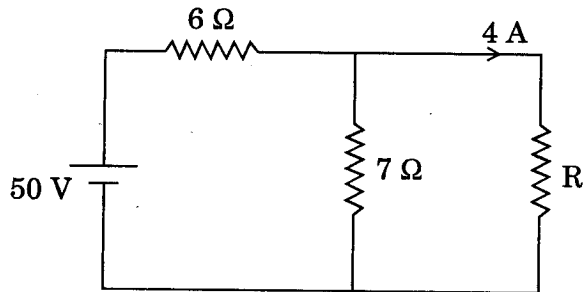


Figure 1

- (i) 3.5Ω
(ii) 4.5Ω
(iii) 1Ω
(iv) 2.5Ω
- (c) Maximum power factor in a.c. circuit can be
- (i) 1.414
(ii) 1
(iii) 0.707
(iv) 0.663
- (d) In a series RLC circuit, the current will be maximum when
- (i) $X_L > X_C$
(ii) $X_L < X_C$
(iii) $X_L = X_C$
(iv) None of the above

- (e) The form factor of sinusoidal alternating current is
- 1
 - 0
 - 1.11
 - 1.21
- (f) In a $\Delta - \Delta$ system, a phase voltage of 100 V produces a line voltage of
- 58 V
 - 71 V
 - 100 V
 - 173 V
- (g) An RC circuit has $R = 2 \Omega$ and $C = 4 \text{ F}$. The time constant is
- 0.125 sec
 - 2 sec
 - 0.5 sec
 - 8 sec

2. (a) Find the equivalent resistance R_{ab} in the circuit of Figure 2.

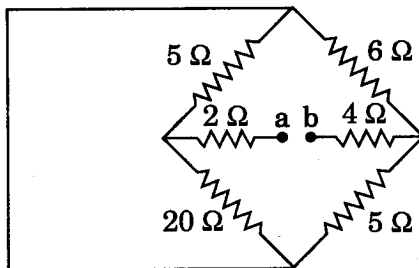


Figure 2

- (b) State and explain Thevenin's theorem and write its limitations and applications. $2 \times 7 = 14$
3. (a) What is the difference between primary cell and secondary cell ?
- (b) Explain the construction, working and applications of silver oxide cell. $2 \times 7 = 14$
4. (a) Derive an expression for the force experienced by current carrying conductor placed in a uniform magnetic field.
- (b) An iron ring of 60 cm mean circumference has a cross-sectional area of 8 cm^2 and there is an air gap of 5 mm width cut in ring. The ring is wound with a coil of 1000 turns carrying a current 2.5 A. Find the flux in air gap. The relative permeability of the iron is 750. $2 \times 7 = 14$
5. (a) Explain the self-inductance and mutual inductance.
- (b) Two coils having 100 and 50 turns respectively are wound on a core with $\mu = 4000 \mu_0$, effective core length 60 cm and core area 9 cm^2 .
- Find the mutual inductance between the coils, taking coefficient of coupling as one.
- $2 \times 7 = 14$

6. (a) Define the form factor and peak factor and obtain the value for a half-rectified sine wave and full-rectified sine wave.
- (b) Evaluate these complex numbers :
- (i) $[40 \angle 50^\circ + 20 \angle -30^\circ]^{1/2}$
- (ii) $\frac{10 \angle -30^\circ + (3 - 4j)}{(2 + 4j)(3 - 5j)^*}$ $2 \times 7 = 14$
7. (a) A balanced star connected load of $(8 + j6) \Omega$ per phase is connected to a three-phase 400 V supply. Find the line current, power factor and three-phase power.
- (b) Derive the relation between phase and line currents and voltages for a three-phase balanced delta connected system. $2 \times 7 = 14$
8. Write short notes on any *four* of the following :
- $4 \times 3 \frac{1}{2} = 14$
- (a) Kirchhoff's current law and Kirchhoff's voltage law
- (b) Nickel Cadmium cell
- (c) Faraday's laws of electromagnetic induction
- (d) Lenz's law
- (e) Hysteresis loop
- (f) Poly-phase system