

THIRD SEMESTER DIPLOMA EXAMINATION IN ELECTRICAL AND ELECTRONICS ENGINEERING — OCTOBER, 2016

FUNDAMENTALS OF AC SYSTEM

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. Define Maximum value of an alternating current.
2. Express Impedance in RLC series circuit.
3. State phase sequence of three phase system.
4. Describe leading power factor.
5. Equation for finding single phase AC power. (5×2=10)

PART — B

(Maximum marks : 30)

II Answer *any five* questions from the following. Each question carries 6 marks.

1. List the advantages of AC system over DC system.
2. Derive the equation for instantaneous value of alternating voltage.
3. Explain AC through Pure capacitor with relevant vector diagram.
4. Analyse AC through RL series circuit with relevant vector diagram.
5. Distinguish between star and delta connections.
6. A balanced star connected load of impedance $(6+j8)$ ohms per phase is connected to a 3 phase, 400v, 50Hz supply. Find the line current and power consumed by each phase.
7. Explain the need for power factor improvement. (5×6=30)

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) Two alternating quantities are represented as $A=4+j3$, $B=5+j6$.
Find $A+B$ and $A-B$ in
- | | | |
|----------------------|-----------------|---|
| (i) Rectangular form | (ii) Polar form | 8 |
|----------------------|-----------------|---|
- (b) Derive the equation for alternating voltage and current. 7

OR

- IV (a) An alternating current is given by $141.4\sin 314t$. Find :
- | | | |
|-------------------|---|---|
| (i) maximum value | (ii) frequency | 8 |
| (iii) Time period | (iv) instantaneous value when t is 3msec. | |
- (b) Define the following :
- | | | | |
|---------------|-------------------|-------------------|---|
| (i) RMS value | (ii) crest factor | (iii) form factor | 7 |
|---------------|-------------------|-------------------|---|

UNIT — II

- V (a) Explain alternating current through RC series circuit with relevant vector diagram. 8
- (b) A capacitor C is in series with 75 ohm resistor and a 12 H coil across a 220v, 60Hz Supply. Determine the value of C at resonance condition. 7

OR

- VI (a) A coil has an Inductance of 0.75 H and resistance of 2.5 ohm are connected in series with 230v, 50Hz AC supply. Calculate :
- | | | |
|-------------------|-------------------------------|---|
| (i) Impedance | (ii) current through inductor | 8 |
| (iii) Phase angle | (iv) Power factor | |
- (b) Explain alternating current through RLC parallel circuit with relevant vector diagram. 7

UNIT — III

- VII (a) Explain generation of poly phase alternating voltages. 8
- (b) 3 coils each having a resistance of 20 ohm and an inductive reactance of 15 ohm are connected in star to 400v, 3 phase, 50 Hz supply. Calculate :
- | | | | |
|------------------|-------------------|-------------|---|
| (i) Line current | (ii) Power factor | (iii) Power | 7 |
|------------------|-------------------|-------------|---|

OR

- | | Marks |
|---|-------|
| VIII (a) Differentiate the balanced Star/Delta and Delta/Star conversions. | 8 |
| (b) A balanced star connected load of impedance $(6+j8)$ ohm per phase is connected to a 3 phase, 400V, 50 Hz supply. Find the line current and power absorbed by each phase. | 7 |

UNIT — IV

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|--|---|
| IX (a) Explain two wattmeter method for power measurement in 3phase balanced load. | 8 |
| (b) List and explain various power factor improving equipment. | 7 |

OR

- | | |
|--|-------------------|
| X (a) The power input to a 2000v, 50 Hz, 3 phase motor running in full load at an efficiency of 90% is measured by two watt meters which indicate 300 Kw and 100 Kw respectively. Find | |
| (i) Input power | (ii) Power factor |
| (iii) Line current | (iv) Output Power |
| (b) Differentiate between balanced load and unbalanced load. | 8 |
| | 7 |
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