17331

15162

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : *(1)* ***All*** *questions are* ***compulsory****.*
(2) Answer ***each*** *next main question on a* ***new*** *page.*
(3) Figures to the ***right*** *indicate* ***full*** *marks.*

Marks

1. A) Attempt **any six** of the following : **12**

a) State potential difference and its unit.

b) If the two resistances of 24 Ω in series are connected in parallel with two resistances of 24 Ω . Find the equivalent resistance.

c) State reluctance. What is its unit ?

d) Draw impedance triangle and label it.

e) State any four applications of 3-phase circuit.

f) State the concept of balance load.

g) Define the voltage regulation of single phase transformer.

h) State the basic difference between fuse and MCB.

i) State the need of earthing in electrical systems.

B) Attempt **any two** of the following : **8**

a) State the following terms and write the formula.

i) Inductive reactance

ii) Capacitive reactance

State the relation of frequency for both the terms.

b) For the given circuit as shown in figure 1B(b) find the current flowing and the magnitude of p.f.

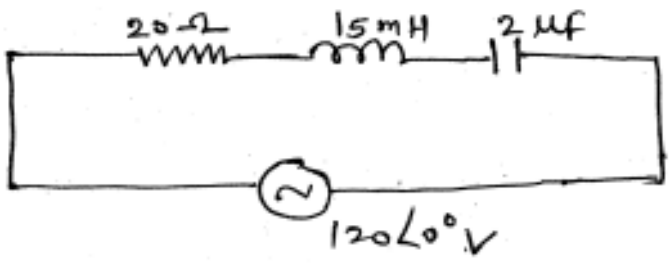

Fig. 1B (b)

c) Explain the working principle of shaded pole single phase induction motor.

P.T.O.

Marks

2. Attempt **any four** of the following : **16**

a) Applying mesh loop current method find current flowing through 12 Ω connected between terminals A and B (Refer fig. 2(a)).

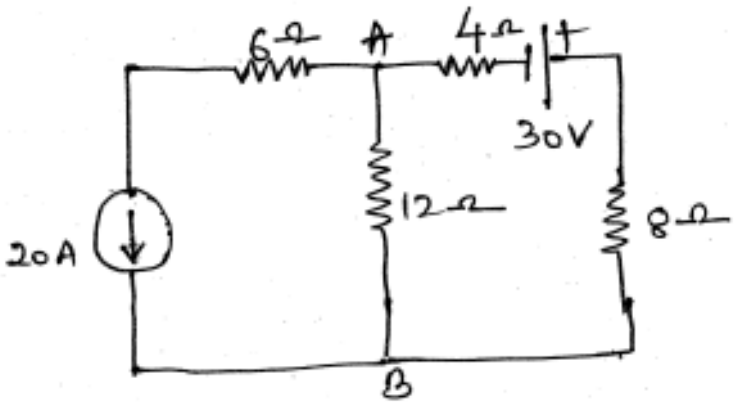

Fig. 2(a)

b) State Kirchoff's Laws, with sign convention concept. How KVL is different than mesh loop method ?

c) An alternating voltage is represented by

V = 114.8 sin (314t) volt.

find : i) r.m.s. value

ii) average value

iii) maximum value and

iv) frequency of voltage.

d) State the following terms :

i) phase

ii) phase difference

iii) in-phase quantity and

iv) out-of-phase quantity

e) Draw a phasor diagram and waveform for RC series circuit.

f) If R = 25 Ω , L = 10 mH and C = 50 μF , find active power, reactive power when they are connected in series across a a.c. source of $220\angle 0°$ volt.

Marks

3. Attempt **any four** of the following : **16**

a) For the circuit shown in fig 3(a) find the resistance between terminals A and B using star-delta conversion.

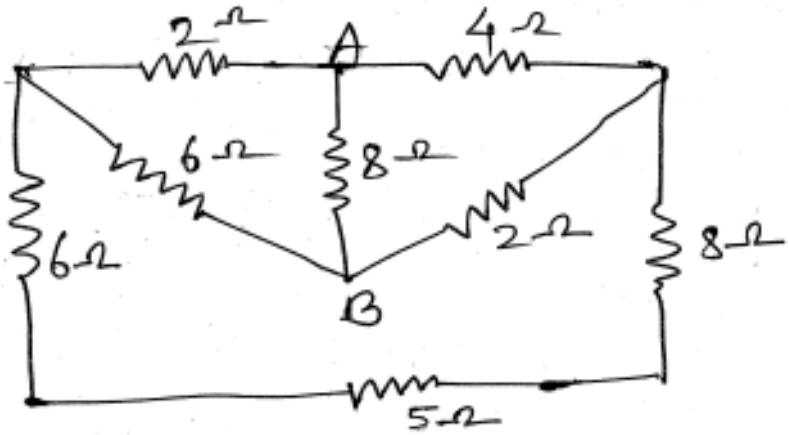

Fig. 3(a)

b) AC voltage of v = 110 sin (314t) is applied across a 39 mH inductor. Write the equation for current, draw phasor diagram.

c) State the concept of lagging and leading quantity. State its nature for capacitive circuit only.

d) Draw a neat circuit for measurement of power using of dynamometer type wattmeter on R-L series circuit. Label the current coil and potential coil.

e) State any four comparison between R-L series and R-C series circuit.

f) For a balanced 440 V, 50 Hz, star connected system, three equal coils of resistance 12 ohm and inductance 15 mH are connected per phase. Calculate line current and power absorbed by the circuit.

4. Attempt **any four** of the following : **16**

a) State the differences between statically and dynamically induced emf for each type. State one example.

b) State form factor and peak factor. State the relation between :
   i) rms and max value
   ii) max and average value

c) A circuit takes a current of 12 A at a voltage of 220 V and its p.f. is 0.8 leading. Draw power triangle and find active, reactive and apparent power.

d) Draw all series resonance curve and state the relation of all elements with frequency.

e) A 3-phase 440 V, 50Hz, supply is connected to a balanced 3-phase delta connected load of impedance (6 – j8) Ω/phase. Calculate :
   i) phase current
   ii) line current
   iii) power factor and
   iv) total reactive power

f) How single-phase I.M. is made self starting ?

Marks

5. Attempt **any four** of the following : **16**

a) Refer figure 5(a) and find (i) max value of current (ii) form factor (iii) peak factor and (iv) frequency.

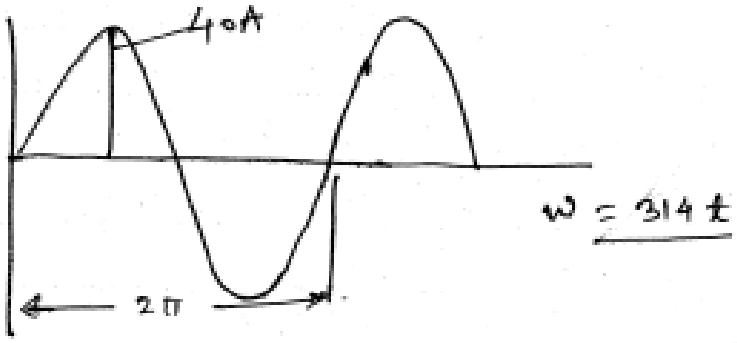

Fig. 5(a)

b) State following laws with their applications.
   i) Faradays Laws (both) of electromagnetism
   ii) Lenz's Law

c) Refer figure 5(c) and find the current flowing through (1) branch using node voltage method.

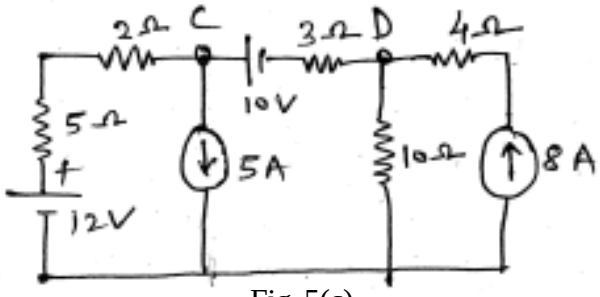

Fig. 5(c)

d) For a delta connected balanced system prove $I_L = \sqrt{3}\, I_{Ph}$ where I_L = line current and I_{Ph} = phase current.

e) Compare single phase two winding transformer with single phase autotransformer.

f) Explain construction of single phase transformer. State the losses occurred in transformer.

6. Attempt **any four** of the following : **16**

a) Draw phasor diagram for both star and delta connected balanced load.

b) State the term :
   i) voltage ratio
   ii) current ratio
   iii) transformation ratio and
   iv) EMF ratio related to single phase transformer.

c) Justify the name "Universal motor". State its applications.

d) State the comparison between resistance split phase and capacitor start single phase I.M.

e) Draw a neat sketch of pipe earthing with label. State any 2 drawbacks of it.

f) State minimum 4 precautions against electric shock.