Registration No. :

Total number of printed pages – 3

Second Semester Regular Examination – 2015

BASIC ELECTRICAL ENGINEERING

BRANCH (S) : AEIE, AERO, AUTO, BIOMED, BIOTECH, CIVIL, CSE, EC, EEE, EIE, ELECTRICAL, ETC, IT, MECH, MINING MM, PLASTIC, TEXTILE

QUESTION CODE : J 367

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1.   Answer the following questions :   2 × 10

(a)   Differentiate beween an ideal voltage source and practical voltage source.

(b)   Explain the significance of power factor.

(c)   What do you understand by retentivity ?

(d)   Write down the equation of a sinusoidal source voltage of 60 Hz frequency having a r.m.s value of 250 V.

(e)   What is the time constant of a RL circuit having R=10 Ω and L=10 H ?

(f)   Two impedances of value (2 +j6) Ω and (8 – j12) Ω are connected in series. What would be the resulting impedance in polar form ?

(g)   Describe Constant losses occurring in a DC machine.

(h)   A 3 phase, 50Hz, 415V, six pole induction motor runs at 960 rpm .What is the slip speed and slip ?

(i)   What is noise and write various sources of noise ?

(j)   What is a transducer ?

P.T.O.

2. (a) In an AC single phase circuit three impedances of value $5 < 30° \Omega$, $10 < 60° \Omega$ and $4 - j8 \Omega$ are connected in series with a 230 V, 50 Hz supply.

5

(i) Find the total combined impedance in Rectangular form ?

(ii) Magnitude of the current flowing in the circuit ?

(b) Using Super position theorem, find the voltage across 10Ω, resistor as shown in Fig (1).
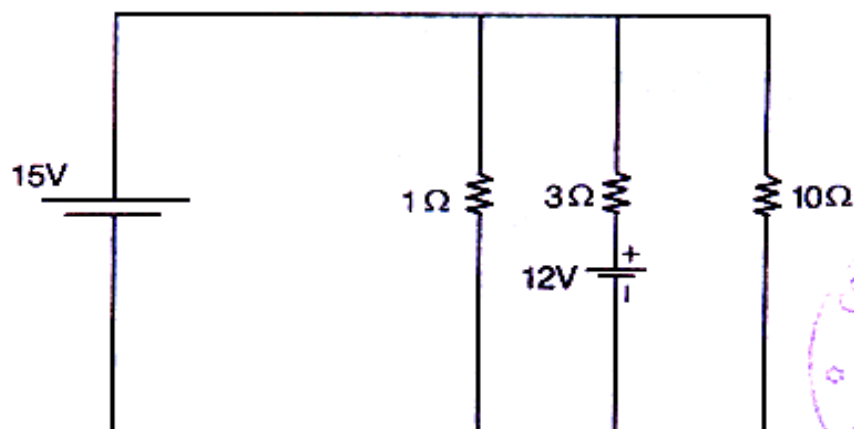
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Fig (1)

3. (a) An iron ring with a circular cross section of 4cm diameter and a mean circumference of 100 cm is wound with a coil of 500 turns. For an exciting current of 3 amp in the coil, the flux is found to be 2mWb. Calculate the relative permeability of iron. (Assume $\mu_0 = 4 \Pi \times 10^{-7}$ H/m)

5

(b) Explain the significance of B-H curve in magnetic materials. What are the various methods adopted in practice for reducing hysteresis and eddy current losses ?

5

4. (a) The potential drop V across a circuit is represented in rectangular form is $(40 + j25)$ Volts with reference to the circuit current. The power absorbed by the circuit is 160 Watts. Determine the

5

(i)   Magnitude of current.

(ii)   The complex impedance.

(iii) Power factor.

(b) State and Explain Maximum Power transfer Theorem by giving a suitable example.

5

5. (a) A resistance of 1 MΩ and a capacitor of 50 μF connected in series across a 200 V DC Supply. The fully charged capacitor is then disconnected from the supply .and discharged by connecting a 100Ω resistance across its terminal. Calculate the initial values of the charging current and the discharging current and also find the time constants. 5

(b) A 6 pole DC shunt generator the flux per pole is 8 mWb. There are 96 conductors lap connected .Find out the induced voltage if the armature rotates at a speed of 25 revolutions / second ? 5

6. (a) The primary of a single phase transformer is connected to a 220 V, 50Hz supply. If the peak flux in the core is 10mWb, what is the no of turns in the primary ? How many no.of turns required in the secondary to obtain a voltage of 110 V ? 5

(b) What do you understand by rotating magnetic field ? Also explain the operating principle of a three phase induction motor. 5

7. (a) What is a thermocouple ? How the temperature measurement can be done by it ? 5

(b) A balanced three phase star load has load impedance of $(8 + j6)$ ohm per phase and is supplied from a balanced three phase 440 V, 50 Hz supply. Determine the values of 5

(a) Line Voltages and phase voltages ?

(b) The Phase current and the line current ?

(c) Total power consumed ?

8. Answer any **two** of the following : 5×2

(a) Controlled Voltage Sources

(b) Principle of operation of DC Motor

(c) Measurement System.