Printed Pages—4   EEE—101/EEE—201

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2302   Roll No. | 0 | 9 | 0 | 9 | 1 | 1 | 3 | 0 | 0 | 1 |

B.Tech.

(SEM II) EVEN SEMESTER THEORY EXAMINATION, 2009-2010

ELECTRICAL ENGINEERING

Time : 3 Hours   *Total Marks : 100*

Note : *Attempt all the questions.*

SECTION-A

1. Attempt **all** parts :   (20x1=20)
    (a) Among following which conductor has highest conductivity ?
        (i) Cu   (ii) Al   (iii) Ag   (iv) Mg
    (b) The mass of electron is _____ .
    (c) Pure inductive circuit :
        (i)   consumes some power on average
        (ii) does not consume power
        (iii) take power form the line during some part of the cycle and then returns
              back during other part of cycle
        (iv) none of these
    (d) Autotransformer can do the following :
        (i)   Step up Voltage   (ii) Step down Voltage
        (iii) both (i) and (ii)   (iv) none of these
    (e) Power factor of the following circuit will be zero :
        (i)   Resistive   (ii) Inductive
        (iii) Capacitive   (iv) both (ii) and (iii)
    (f) An ideal voltage source should have :
        (i)   large value of emf   (ii) small value of emf
        (iii) zero source resistance (iv) infinite source resistance
    (g) The power measurement in balanced 3-phase circuit can be done by :
        (i)   one wattmeter method only   (ii) two wattmeters method only
        (iii) three wattmeters method only (iv) any one of the above
    (h) At resonance power factor of series R-L-C circuit would be :
        (i)   0   (ii) 1   (iii) −1   (iv) 1.1
    (i) A transformer transforms :
        (i)   voltage   (ii) current
        (iii) voltage and current   (iv) frequency
    (j) A transformer can be connected to DC :
        (i)   Yes   (ii) No
    (k) Slip rings are made of aluminium :
        (i)   Yes   (ii) No

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(l)   The form factor sinusoidal alternating current is :

     (i)   1   (ii)   0   (iii)   1.11   (iv)   1.15

(m)   Three phase induction motor has a low efficiency :

     (i)   Yes   (ii)   No

(n)   Open circuit test is usually conducted on :

     (i)   slip ring motors   (ii)   wound rotor motor

     (iii) either of (i) and (ii)   (iv)   none of above

(o)   The torque developed in an induction motor is nearly proportional to :

     (i) $1/V$ (ii)   V   (iii) V^2 (iv)   none of these

(p)   What will happen if the back emf of DC motor vanishes ?

(q)   _____ Motor has self load properties.

(r)   _____ Motor will be preferred for elevators.

(s)   Synchronous motor can be used as power factor improving device :

     (i)   Yes   (ii)   No

(t)   Ceiling fan is :

     (i)   three phase IM   (ii)   single phase IM

     (iii) single phase synchronous motor (iv)   none of these

SECTION-B

2.   Attempt **any three** parts :   (3x10=30

(a)   State the following :

     (i)   Magnetic flux and its properties

     (ii)   Flux density

     (iii) Fleming's right hand rule

     (iv)   Fleming's left hand rule

     (v)   Len's law

(b)   Three voltages represented by the following equations,
$e_1 = 15\sin\omega t$, $e_2 = 5 \sin(\omega t + \pi/6)$, $e_3 = 10\cos\omega t$ together in an ac circuit. Represent these voltages by Phasor and calculate an expression for the resultant voltage. Check the result so obtained graphically.

(c)   A three phase, 50 Hz induction motor has a full load speed of 960 rpm. Calculate :

     (i)   slip

     (ii)   frequency of rotor induced emf

     (iii) Number of poles

     (iv)   Speed of rotor field with respect to rotor structure

     (v)   Speed of rotor field with respect to stator field.

(d)   List out main components of power supply system with a brief description. Also write the advantages of power factor improvement.

(e)   Show that the condition for resonance in a parallel R-L-C circuit is same as that in a series R-L-C circuit. State the application of Series as well as Parallel resonance.

SECTION–C

3.   Attempt **any two** parts :   (2x5=10)

(a)   State the Superposition and Norton's Theorem.

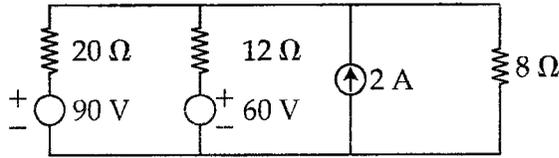(b)   Using Superposition theorem find the current in 20 Ω resistor of the circuit shown in figure 1.

Figure 1

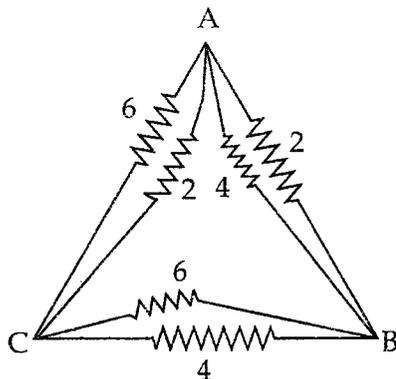(c)   In the given circuit shown in figure-2, find the resistance between the points B and C.

Figure 2

4.   Attempt **any two** parts :   (2x5=10)

(a)   A 140 V DC shunt motor has an armature resistance of 0.2 ohm and a field resistance 70 ohm. The full load line current is 40 A and the full load speed is 1800 rpm. If the brush contact drop is 3 V, find the speed of the motor at half load.

(b)   Sketch and explain the speed–load characteristics of following dc motor :

(i)   Series motor

(ii)   Shunt motor

(iii)   Cumulatively compounded motor

(iv)   Differentially compound motor

(c)   Discuss the principle of operation and deduce the emf equation for synchronous motor.

EEE –101/EEE –201   3   [Turn Over

5. Attempt **any two** parts :   (2x5=10)

 (a) Draw and explain the no-load and full-load phasor diagram for a single phase transformer.

 (b) A transformer has a primary winding of 600 turns and a secondary winding of 150 turns. When the load current on the secondary is 60 A at 0.8 power factor lagging, the primary current is 20 A at 0.707 power factor lagging. Determine the no-load current of the transformer and its phase with respect to the voltage.

 (c) Explain why the hysteresis and eddy current losses occur in the transformer. How does change in frequency affect the operation of given transformer ?

6. Attempt **any two** parts :   (2x5=10)

 (a) Power measurement by two wattmeter explain the significance of (i) equal wattmeters readings (ii) zero reading on one wattmeters using suitable phasor diagram.

 (b) Two impedances $Z_1 = (10 + j15)$ ohms and $Z_2 = (6 - j8)$ ohms are connected in parallel. The total current supplied is 15A. What is the power taken by each impedance ?

 (c) Show that the power intake by a three-phase circuit can be measured by two-wattmeters connected properly in a circuit.

7. Attempt **any two** parts :   (2x5=10)

 (a) Explain why moving Iron type of instrument is suitable both on DC and AC. Also differentiate between moving iron type instrument and moving coil permanent magnet instrument.

 (b) A moving-coil milli-ammeter having a resistance of 8 Ω gives full scale deflection when a current of 5 mA is passed through it. Explain how this instrument can be used for measurement of (i) current up to 2 A (ii) voltages up to 8 V.

 (c) Give the construction and working of dynamometer watt meter.

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