BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)
B.Tech. (Aerospace Engineering)

Term-End Examination

December, 2013

BME-021 : PRINCIPLES OF ELECTRICAL AND ELECTRONICS SCIENCE

Time : 3 hours *Maximum Marks : 70*

Note : *Answer **seven** questions in all. **Three** questions from **section - A**, **three** questions from **section-B** and the **compulsory** question number **1**.*

1. State whether the following assertions are **true or false** : **10x1=10**

(a) Pure semiconductors behave like an insulator at low resistance.

(b) If 2 capacitors of 5F are in parallel, the net capacitance is 10F.

(c) A constant current source has infinite internal resistance.

(d) Total resistance of a parallel circuit is double of the smallest branch resistance.

(e) During series resonance, current in the circuit is minimum.

(f) A modem is a device which allows 2 computers to communicate over standard phone lines.

(g) In a zener diode, a large current change produces a very small change in the diode voltage in the breakdown region.

(h) An astable multivibrator using op-amp comparator is used to generate symmetrical square wave signal.

(i) In 3 - phase star connection $V_L = Vph$ and $I_L = \sqrt{3}\ Iph$.

(j) The number of address lines in 8085 microprocessor determines the number of memory locations that the CPU can address.

SECTION-A

Answer **any three** questions from this section.

2. (a) State and explain Thevenin's Theorem with suitable example. **5**

(b) Find out the value of resistance 'R' in the figure 1. **5**

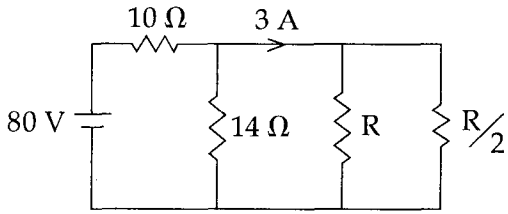

Fig. 1

3. (a) Define and explain in brief rms value and average value for any alternating quantity. 5

(b) Find the rms, average values and form factor for the full wave rectified sine wave shown in the figure 2. 5

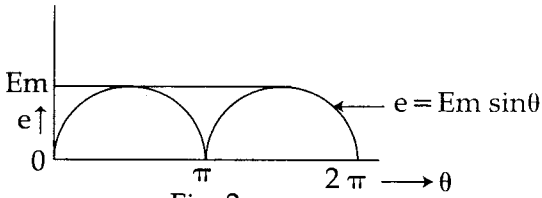

Fig. 2

4. (a) Explain what you understand by co-efficient of coupling. Derive the expression for it. 5

(b) An iron ring having a cross sectional area of 5 cm × 4 cm and a mean diameter of 18 cm has a coil of 270 turns uniformly wound over it. A current of 1.27A flows through the coil which produces a flux of 1.13 mWb in the ring. Find the reluctance of the circuit and the relative permeability of iron. 5

5. (a) Explain the principle of operation of a 3 - phase Induction motor. 6

(b) A 3 phase, 4 pole induction motor is supplied from a 50Hz, 400V supply. The motor runs at a speed of 1450 rpm. Calculate, 4

(i) Synchronous speed.

(ii) % slip of the motor.

(iii) If the slip is 4%, calculate the rotor speed.

6. (a) Explain resonance in parallel a.c circuits. Hence derive the formula of the frequency at which the circuit resonates. 6

(b) An inductive coil having a resistance of 17Ω and inductance of 0.5H is connected in parallel with a capacitor of 120 μF. Find the frequency at which the circuit becomes purely resistive. Also find the current under this condition. Supply voltage is 230V. 4

SECTION-B

Answer **any three** questions from this section.

7. (a) Explain the I-V characteristics of a P-N junction diode. 5

(b) Discuss in brief the operation of JFET. 5

8. Explain in detail the architecture of 8085 microprocessor. 10

9. (a) Explain the use of 555 timer IC as an astable multivibrator. 5

(b) Discuss the working of an SR type flip-flop. 5

10. (a) Discuss working of a Digital to Analog Convertor (DAC). 5

(b) Which arithmetic operators are used in a microprocessor. Explain with examples. 5

11. (a) Discuss use of a BJT as a common emitter amplifier. 5

(b) What are the basic functions of MODEM ? 5