| BME-021 |

B. Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING) / B.Tech. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

June, 2015

00303

BME-021 : PRINCIPLES OF ELECTRICAL AND ELECTRONICS SCIENCE

Time : 3 hours   *Maximum Marks : 70*

*Note : Answer any **seven** questions in all — three questions from Section A, three questions from Section B. Question one is **compulsory**.*

1. State whether the following assertions are *True* or *False*.   *10 ×1=10*

    (a) Leakage flux exists only in primary circuit of a transformer.

    (b) Speed control of a 3-phase induction motor by stator voltage control is possible, if load torque increases with speed.

    (c) In a 3-phase delta connection, line current is equal to $\sqrt{3}$ times the phase current.

(d) Average value of a sinusoidal ac is slightly greater than its rms value.

(e) At series resonance, the current is maximum.

(f) In pure inductive circuit, actual power is infinite.

(g) Thevenin's theorem is true for both ac and dc circuits.

(h) Op-Amp 741 can be used as a microprocessor.

(i) NAND gate can be used as an amplifier.

(j) Diode is a three terminal device.

SECTION A

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

2. (a) State and explain Thevenin's theorem with a suitable example.   4

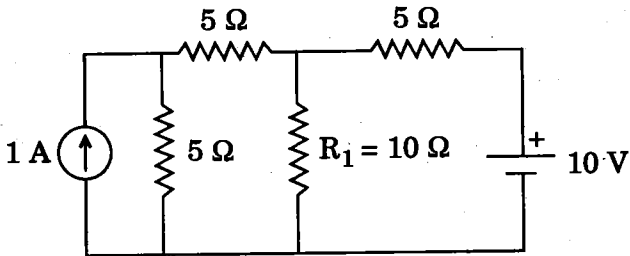   (b) Find the current in R_1 of the network shown in Figure 1.   6

Figure 1

3. (a) For the output waveform of a half-wave rectifier shown in Figure 2, determine (i) rms value, (ii) average value, (iii) form factor.   6
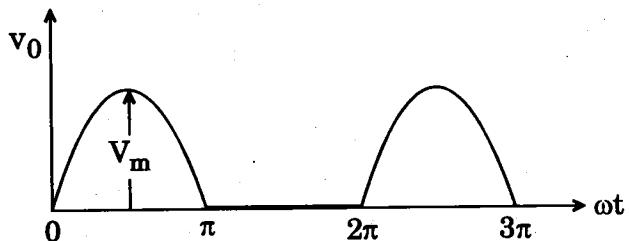

Figure 2

     (b) Draw and explain resonance curve in series RLC circuit.   4

4. (a)   Derive the relationship between flux, reluctance and magnetic field intensity of a typical magnetic circuit.   *4*

(b)   A cast steel magnetic structure made of a bar of cross-section 4 cm^2 is shown in Figure 3. Find the current that the 500 turn magnetizing coil on the left limb should carry so that a flux of 2 mWb is produced in the right limb. Iron has μ as 600.   *6*
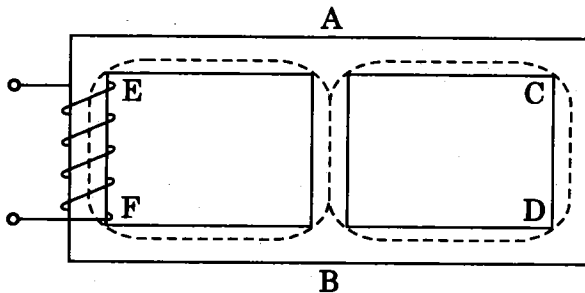

Figure 3

5. (a)   Name any three methods of starting a three phase squirrel cage induction motor. Briefly explain any one method.   *4*

(b)   What is servo motor ? How does a dc servo motor differ from a conventional dc motor ?   *3*

(c)   A 3-ϕ. 50 Hz, 6-pole induction motor rotates at a speed of 950 rpm. Calculate % slip and frequency of rotor induced emf.   *3*

6. (a)   Explain the concept of power in ac circuits. Draw power triangle and explain it.   *4*

(b)   If a coil of 150 turns is linked with a flux of 0·01 Wb when carrying a current of 10 amp, calculate the inductance of the coil.   *6*

SECTION B

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

7. (a) Give the architecture of 8085 microprocessor. Explain the different buses and registers. *5*

    (b) Explain stack pointer, program counter and flags in 8085. *5*

8. (a) Draw and explain the electronic circuit of a common emitter amplifier using BJT. *5*

    (b) Explain the working of an inverting integrator using op-amp. *5*

9. (a) Describe a typical S-R flip-flop. Explain its working principle. *5*

    (b) Draw and explain a 3-element shift register using D flip-flop. *5*

10. (a) Explain the use of 555 timer as astable multivibrator. *5*

    (b) Draw and explain a 6-bit binary weighted DAC. *5*

11. (a) Draw the switch configuration, truth table and symbol of a tri-state inverter. *5*

    (b) Explain the following instructions : *5*

        (i)   LDAX

        (ii) SUI

        (iii) CMA