BME-021

BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

Term-End Examination

June, 2008

BME-021 : PRINCIPLES OF ELECTRICAL AND ELECTRONICS SCIENCES

Time : 3 hours *Maximum Marks : 70*

Note : *Answer seven questions in all. Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions from Section A and any* ***three*** *questions from Section B. All symbols and abbreviations used have their usual meanings.*

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

(i) Zener diode is used to regulate the load voltage.

(ii) The emitter of transistor is doped lightly.

(iii) Monostable multivibrator has more than one state.

(iv) $\overline{A + B} = \overline{A}\,\overline{B}$ is the DeMorgan's theorem.

(v) Active power in a 3 phase balanced circuit is $3 V_p I_p$.

(vi) Frequency of the emf produced in the armature of an alternator is directly proportional to the speed of the rotor.

(vii) The power factor of pure inductance is zero.

(viii) Accumulator of 8085 microprocessor unit is a part of the Arithmetic Logic Unit (ALU).

(ix) The voltage gain of an opamp can be changed easily by changing the ratio between values of the input and feedback resistors.

(x) Kirchhoff's laws are applicable to DC circuits only.

SECTION 'A'

*Answer any **three** of the following.*

2. (a) Distinguish between self-inductance and mutual inductance. 4

(b) A coil is wound uniformly with 400 turns over a steel ring of relative permeability 800, having a mean circumference of 40 mm and cross-sectional area of 50 mm^2. If a current of 25 A is passed through the coil, find (a) mmf, (b) reluctance of the ring, and (c) flux. 6

3. (a) Define apparent power and reactive power of an A.C. circuit. 4

(b) An inductive coil of resistance 32 Ω and reactance 15·7 Ω is connected in series with a capacitor of reactance 79·5 Ω. The circuit is connected across 500 V A.C. supply. Determine

(i) Current

(ii) Phase difference between voltage and current

(iii) Total power absorbed 6

4. (a) A three-phase, six pole induction motor is supplied from a 50 Hz, 400 V suply. Calculate the speed of the rotor when the slip is 3%. 4

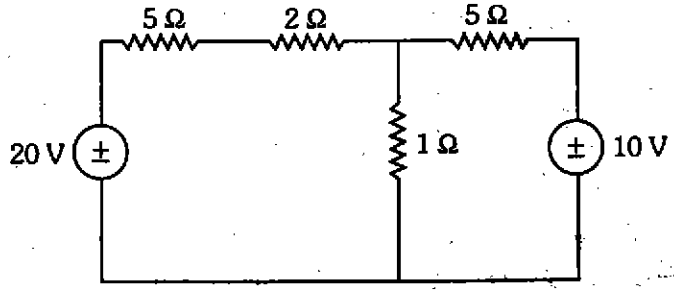
(b) Write the working principle of a three-phase induction motor. What are the main applications of single phase induction motors ? 6

5. (a) Explain series resonance in RLC series circuit. 4

(b) What are the most common materials used in the electrical and electronics devices ? Explain their properties and applications. 6

6. (a) State and explain Thevenin's theorem. 4

(b) Find the current passing through 2 Ω resistance by using Maxwell loop method. 6



SECTION 'B'

*Answer any **three** of the following.*

7. Draw the symbol, structure and equivalent circuit of SCR. List the applications of semiconductor diodes and transistors. *10*

8. What are the various registers in 8085 ? Name the 16 bit registers. Also give the name of 5 different addressing modes. *10*

9. Explain about Read Only Memory (ROM) and Random Access Memory (RAM) in detail. *10*

10. State and explain De Morgan's Theorem. Verify that $A + BC = (A + B)(A + C)$. *10*

11. What are the characteristics of ideal and practical operational amplifiers ? Draw the basic analog circuit for non-inverting amplifier. *10*