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BME-021

BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING) / B.Tech. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

01175

December, 2014

BME-021 : PRINCIPLES OF ELECTRICAL AND ELECTRONICS SCIENCES

Time : 3 hours *Maximum Marks : 70*

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

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

(a) In short circuit test, the iron losses are negligible.

(b) A three-phase induction motor has zero torque at synchronous speed.

(c) In delta connected systems, the reactive power is given by the relation,

$\sqrt{3}\, V_{Ph}\, I_{Ph} \cos \phi$

(d) The RLC series circuit is inductive at resonance.

(e) Sine wave has unity form factor.

(f) TRAP hardware interrupt has the highest priority.

(g) 80386 Microprocessor is code-named as P3.

(h) Universal motor is a constant speed motor.

(i) TRIAC can conduct in both directions.

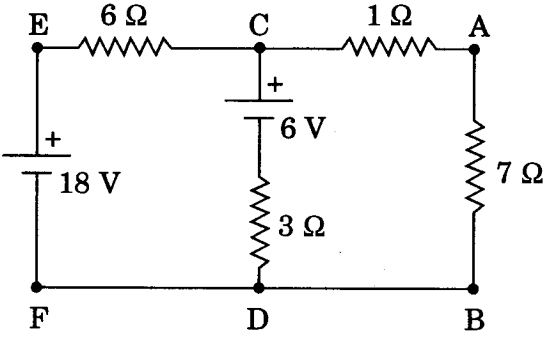
(j) AND gate is a universal gate.

SECTION A

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

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

(b) Using Thevenin's Theorem, calculate the potential difference across terminal A and B, as shown in Figure 1.

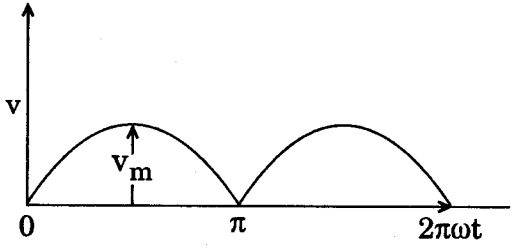


3. (a) For the output of full wave rectifier, determine *6*

(i) rms value

(ii) average value

(iii) form factor



(b) Explain series resonance. Why is series resonance called voltage resonance ? *4*

4. (a) What is coefficient of coupling ? Prove that $K = \frac{M}{\sqrt{L_1 L_2}}$, where K, M, L_1, L_2 have their usual meanings. *6*

(b) What is magnetic circuit ? Explain B-H curve as applied to magnetic material. *4*

5. (a) Why is single phase induction motor not self-starting ? Explain. *4*

(b) What is a transformer ? Explain its principle of working. *3*

(c) A three-phase 4-pole, 50 Hz induction motor is rotating at 1450 rpm. Find out synchronous speed and % slip of induction motor. *3*

6. (a) Prove that the energy stored in an inductor is given by $\frac{1}{2} LI^2$. *4*

(b) A coil of 100 turns is wound on torroidal magnetic core having reluctance of 10^4 At/Wb. When the coil current is 5 A, and is increasing at the rate of 200 A/sec, determine

(i) self-inductance of coil,

(ii) energy stored

(iii) self-induced emf in coil.

SECTION B

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

7. (a) Explain the data bus, address bus and control bus in a typical microprocessor architecture. Give a suitable diagram. Explain the architecture. *6*

(b) Explain the various registers of 8085. Name the 16-bit registers. Discuss the role of each register in mathematical operations. *4*

8. (a) Explain the operation of a Negative-Impedance Converter (NIC) using op-amp. *5*

(b) Draw the small signal equivalent circuit of BJT and MOSFET. *5*

9. (a) Draw the block diagram of IC 555 timer and explain its various modes of operation. *5*

(b) Explain the operation of a full wave diode bridge rectifier with diagrams. *5*

10. (a) What are shift registers ? What are the different types of shift registers ? Explain any two. *5*

(b) Draw the diode ROM matrix and a basic RAM cell. *5*

11. (a) Draw and explain the circuit diagram of DAC and ADC. *6*

(b) Describe and explain De Morgan's Theorems. *4*