

01171

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

Term-End Examination

December, 2012

BME-021 : PRINCIPLES OF ELECTRICAL AND
ELECTRONICS SCIENCE

Time : 3 hours

Maximum Marks : 70

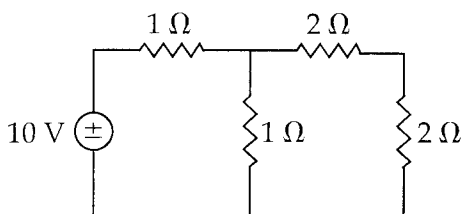
Note : Answer any five questions. Use of calculator is allowed.

1. (a) Give basic definitions of conductors, insulators and semiconductors. Explain their nature using energy band theory. 6
- (b) A ring is composed of three sections. The cross - section area is 0.001 m^2 for each section. The mean length of each section are $l_a = 0.3 \text{ m}$, $l_b = 0.2 \text{ m}$, $l_c = 0.1 \text{ m}$. An air gap length of 0.1 mm is cut in the ring. Relative permeabilities for section a, b, c are 5000, 1000 and 10,000 respectively. Flux in the air gap is $7.5 \times 10^{-4} \text{ Wb}$ and the coil has 100 turns. Find (a) total mmf and (b) exciting current. 6

(c) Explain the difference between electrical and electronic circuits. 2

2. (a) Explain Thevenin's theorem. Where is it used generally? 6

(b) Find current I_1 and I_2 in the given circuit by applying KVL. 6



(c) What is meant by electrical power? Give different form of expression for electrical power. 2

3. (a) Trace the waveforms for voltage, current and power for an pure inductive and a pure capacitive circuit. 6

(b) Write comparison between star and delta connected systems. 6

(c) Describe in few words the difference between p - type and n - type semi-conductors. 2

4. (a) Two three phase induction motors when connected across a 400 V, 50Hz supply are running at 1440 and 940 rpm respectively. Determine the slip and no. of poles of each motor. 6
- (b) Explain working principle of a transformer. List the main parts of a transformer. 6
- (c) Draw the small signal equivalent circuit of a : (a) BJT (b) MOSFET 2
5. (a) How to create Zener effects in a diode ? Mention a possible application of Zener diodes. 6
- (b) Explain how a BJT and MOSFET can be used as a switch ? 6
- (c) Draw logic symbol of NAND gate and give its truth table. 2
6. (a) Explain the characteristics of ideal and practical operational amplifiers. 6
- (b) Explain working of a full - wave bridge rectifier circuit with suitable waveforms. 6
- (c) Give circuit schematic of a 2 input summing circuit using an op amp and show how the inputs V_1 and V_2 are summed to obtain output V_0 ? 2

7. (a) What is De Morgan's second theorem ? 6
Show that $A(\bar{B} + 1) + AB = A$.
- (b) What is the difference between volatile and non - volatile memory ? 6
- (c) What is the full form of MODEM ? 2
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