BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING) 00909

B.Tech. (Aerospace Engineering)

Term-End Examination

June, 2012

BME-021 : PRINCIPLES OF ELECTRICAL AND ELECTRONICS SCIENCE

Time : 3 hours *Maximum Marks : 70*

Note : *Answer **seven** questions. Question no. **1** is **compulsory**. Answer **any three** questions from section **A** and **three** from section **B**. Symbols and abbrevations have their usual meaning. Use of **Scientific** calculator is allowed.*

1. State ***True*** or ***False*** : **1x10=10**

(a) Insulator has resistance of the order of mega Ohms.

(b) Examples of semi conductor materials are mica and rubber.

(c) Reluctance of magnetic circuit is analogous to resistance of electric circuit.

(d) Energy stored in capacitor depends upon the current carried.

(e) Thevenin's theorem is not applicable to ac circuits.

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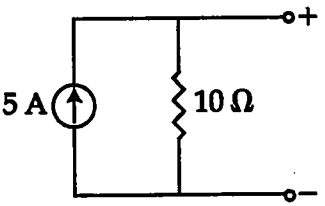
(f) The equivalent voltage source of the given current source is 50V.



(g) JFET and MOSFET belong to npn category.

(h) 555 timer is commonly used as Astable Multivibrator.

(i) The truth table of AND gate is

A	0	0	1	1
B	0	1	0	1
Y	1	1	1	0

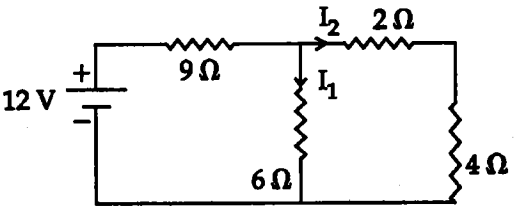
(j) RS 232 is a standard for serial binary data interconnection.

SECTION-A

Attempt *any three* questions from this section :

2. (a) State and explain Kirchoff's voltage law and Kirchoff's current law. 6

   (b) Find the current I_1 and I_2 in the circuit shown below : (use KVL and KCL) 4



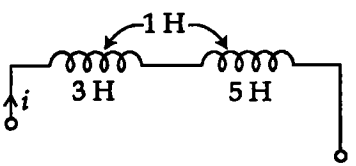
3. (a) With reference to energy band structure, explain conductor, insulator and semi-conductor. 5

   (b) The resistance of copper wire at 30°C is 30 Ω. Determine the resistance at 80°C. Given $\alpha_0 = 0.00427\ \Omega/\Omega/°C$. 5

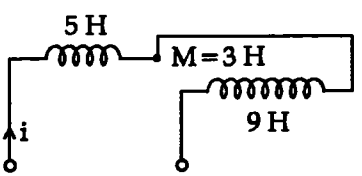
4. (a) Discuss the types of inductors used in electrical circuits. 6

   (b) Find the equivalent inductance of circuit shown below : 4

(i)



(ii)



5. (a) Explain the Hysteresis loop of a magnetic material. Discuss its importance. 4

(b) An electromagnet has an airgap of 5 mm, the flux density in the air gap being 1.255 tesla. Calculate the number of amp-turns required for the gap. $\mu_0 = 4\pi \times 10^{-7}$. 6

6. (a) Explain the principle of operation of three phase squirrel cage induction motor. 5

(b) A 50 KVA, 2200/110 V transformer has 1100 turns on primary side. Calculate the number of turns on secondary side, primary current and secondary current. 5

SECTION - B

Answer *any three* questions from this part :

7. (a) Explain the forward bias and reverse bias operation of pn junction diode. 5

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

8. (a) Explain operation of a basic inverter circuit. 5

   (b) Explain inverting integrator circuit using op-amp. 5

9. (a) Write the first sixteen binary numbers and their decimal values. 5

   (b) Explain the function and operation of Tri-state inverter circuit. 5

10. (a) Explain the operation of four-stage ripple counter using schematic diagram, waveform and state table. 6

    (b) Write a short note on RAM and ROM. 4

11. (a) Explain the terms : 6

    (i) Bus
    (ii) Flag
    (iii) Stack Pointer
    (iv) Program Counter.

    (b) Discuss the programmable peripheral interface 8255 for microprocessor applications. 4