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**Question Paper Code: E3109**

B.E./B.Tech. DEGREE EXAMINATION, JUNE 2010

Second Semester

Mechanical Engineering

GE2151 — BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Regulation 2008)

(Common to Aeronautical Engineering, Automobile Engineering, Civil Engineering, Marine Engineering, Production Engineering, Biotechnology, Chemical Engineering, Petroleum Engineering, Plastic Technology, Polymer Technology, Textile Technology and Textile Technology (Fashion Technology))

Time : Three hours

Maximum : 100 Marks

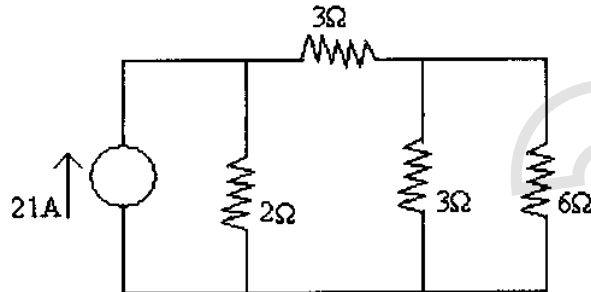
Answer ALL Questions

PART A — (10 × 2 = 20 Marks)

1. Find the effective value of the cosine wave  $V_m \cos(\omega t + \Phi)$ .
2. It is required to convert a 5mA meter with  $20\Omega$  internal resistor into 5A ammeter. Calculate the value of shunt resistance required and multiply factor of the shunt.
3. What is the greatest advantage of DC MOTORS?
4. What is leakage flux?
5. What is junction capacitance?
6. For a certain transistor  $I_C = 5.505\text{mA}$ ,  $I_B = 50\mu\text{A}$ ,  $I_{CO} = 5\mu\text{A}$ , determine the value of  $\beta$  &  $I_E$ .
7. Prove that  $A + \overline{AB} = A + B$ .
8. Why divide-by-n counter called so?
9. Mention the need of modulating the information signals.
10. Define Total internal reflection.

PART B — (5 × 16 = 80 Marks)

11. (a) Describe Kirchoffs laws. For the circuit shown in the figure below. Determine the current through  $6\Omega$  resistor and the power supplied by the current source. (16)



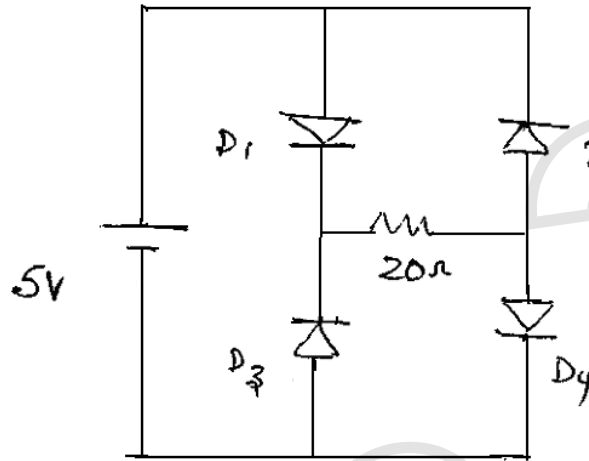
Or

- (b) Explain the principle and operation of PMMC instruments. How ammeter and voltmeter can be constructed using PMMC instruments? (16)
12. (a) (i) A 220-V d.c. series motor runs at 700rev/min when operating at its full-load current of 20A. The motor resistance is  $0.5\Omega$  and the magnetic circuit may be assumed unsaturated. What will be the speed if :
- (1) the load torque is increased by 44%?
  - (2) the motor current is 10 A? (8)
- (ii) Explain the operation and principle of a DC motor. (8)

Or

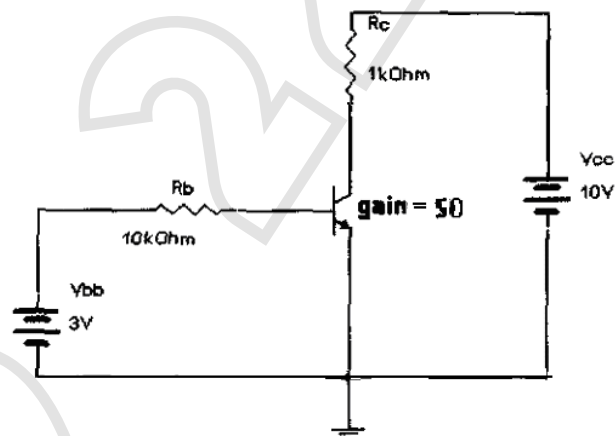
- (b) (i) Determine the actual output power of an induction motor using the following data.
- No. of poles = 2  
Frequency = 50 Hz  
Rated voltage = 415 V  
Name plate full speed = 2980 rpm  
Measured speed at 423 V = 2990 rpm  
Name plate rated power = 22 kW. (8)
- (ii) Explain the construction and operation of single phase alternators. (8)

13. (a) (i) Explain the  $V - I$  characteristics of a diode. (12)
- (ii) Find the current through the  $20\ \Omega$  resistor shown below. Each silicon diode has a barrier potential of  $0.7\ \text{V}$  and a dynamic resistance of  $2\ \Omega$ . (4)



Or

- (b) (i) Explain the input and output characteristics of transistors in CB configuration. (10)
- (ii) Determine whether or not the transistor in circuit below is in saturation. Assume  $V_{CE(sat)} = 0.2\ \text{V}$ . (6)



14. (a) (i) Represent the given function with THREE AND gates and ONE OR gate.  
 $\bar{A}BC + A\bar{B}C + ABC\bar{C} + ABC$ . (10)
- (ii) Explain the operation of half adder with a neat diagram. (6)

Or

- (b) (i) Explain the operation of 4 bit synchronous UP counter with a neat diagram. (12)
- (ii) Express the function XOR gate using NAND gates. (4)
15. (a) (i) A 10MHz sinusoidal carrier wave of amplitude 10mV is modulated by a 5KHz sinusoidal audio signal wave of amplitude 6mV. Find the frequency components of the resultant modulated wave and their amplitudes. (4)
- (ii) Explain with suitable diagram Diode detector for AM signals. (12)

Or

- (b) Discuss the usage of satellite for long distance communication with a neat block diagram of basic satellite transponder. (16)