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Question Paper Code : 57022

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Second Semester

Civil Engineering

GE 6252 — BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to all Branches except Electronics and Communication Engineering, Medical Electronics Engineering, Biomedical Engineering, Computer Science and Engineering, Information Technology, Computer and Communication Engineering, Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering and Pharmaceutical Technology)

(Regulation 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   State Ohm's law and its limitations.

2.   Define the principle of moving iron instrument for attraction type.

3.   Calculate the e.m.f generated by a 4-pole, wave-wound armature having 45 slots with 18 conductors per slot when driven at 1200 r.p.m. and the flux per pole is 0.016 Wb.

4.   List out the types of single phase induction motors.

5.   Define the two breakdown conditions in Zener diode.

6.   Find the values of I_C, I_B and β. Transistor values are $\alpha = 0.95, I_E = 1$ mA.

7.   Define the logic operation of AND gate with Boolean equation.
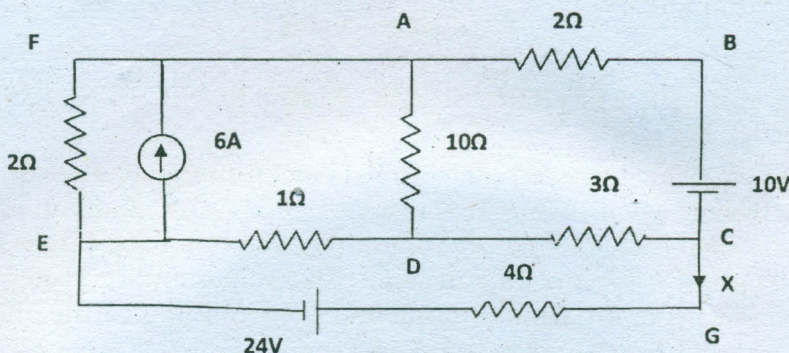
8. Prove the following Boolean identity.

$$A + \overline{A}B = A + B.$$

9. Compare analog and digital signals.

10. What are the advantages of Optical Fibre Communication?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the current, power in the 4 Ω resistance of the circuit shown below. (10)

(ii) RL series circuits having a resistance of 6 Ω and an inductance of 0.03H is connected across a 100 V, 50 Hz Supply. Calculate the phase angle between the current and the voltage, power factor. (6)

Or

(b) (i) A 15 volt moving-iron voltmeter has a resistance of 500 Ω and an inductance of 0.12 H. Assuming that this instrument reads correctly on DC. What will be its reading on AC at 15 volts when the frequency

   • 25 Hz and

   • 100 Hz. (6)

(ii) Explain the principle and operation of dynamometer type Watt meter and derive deflecting torque. Write advantages and disadvantages. (10)

12. (a) (i) With neat sketches, explain the working principle and the construction of DC motor. Also derive the Torque and speed equation. (12)

(ii) A d.c shunt generator supplies a load of 7.5KW at 200 V. Calculate the induced e.m.f if armature resistance is 0.6 Ω and field resistance is 80 Ω. (4)

Or

(b) (i) At starting the windings of a 230 V, 50 Hz, split-phase induction motor, main winding : $R = 4\Omega$, $X_L = 7.5\Omega$ and then starting winding $R = 7.5\Omega$, $X_L = 4\Omega$. Find

      (1)   Current I_M in the main winding

      (2)   Current I_S in the starting winding

      (3)   Phase angle between I_S and I_M

      (4)   Line current

      (5)   Power factor of the motor.   (10)

(ii) Explain the principle and working of single phase transformer.   (6)

13. (a) (i) Describe the working of PN junction diode in forward and reverse bias condition.   (10)

    (ii) Explain the operation of NPN and PNP transistor.   (6)

Or

(b) (i) Let $V_{BB} = 10V$, $R_B = 1M$, $\beta = 100$, $V_{CC} = 15$, $R_L = 10\Omega$ in the transistor circuit, find

      (1) I_B

      (2) I_C

      (3) I_E

      (4) V_{CE}, Neglect V_{BE}.   (8)

    (ii) Explain the working of Zener diode and its applications.   (8)

14. (a) (i) Draw the logic symbol of OR, AND, NOT gate and explain its logic operation.   (8)

    (ii) Draw a half adder using logic gates. Explain with truth table with expression of sum and carry.   (8)

Or

(b) (i) Explain the operation and draw the following flip-flops,

      (1)   RS flip-flops using NOR gate

      (2)   D flip-flops using NAND gate

      (3)   JK flip-flops. $(3 \times 4 = 12)$

    (ii) Explain the operation of synchronous counters.   (4)

15. (a) (i) Describe the principle of modulation and its needs. Short note on amplitude modulation and frequency modulation. (12)

    (ii) Give some advantages of FM over AM. (4)

Or

    (b) (i) With help of block diagram describe the working of a satellite (earth station transmitter) communication and its short note on earth station receiver. (12)

    (ii) Explain the operation of monochrome TV transmitter. (4)

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