18027(M)

B. Tech 2nd Semester Examination

Fundamentals of Electronics Engineering (CBS)

EC-101

Time : 3 Hours   Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt total five questions. Select one question from each section A, B, C & D. Section E is Compulsory.

SECTION - A

1. (i)   What is LED? Discuss its advantages, disadvantages and applications.   (6)

    (ii) Explain the working of half wave rectifier. Sketch all the relevant waveform and circuit diagram. Derive an expression for PIV, rectifier efficiency and ripple factor.   (6)

2. (i)   Explain N-type and P-type semiconductors. Describe their structure with the help of a schematic diagram. If they are uniformly doped, how do they behave under the influence of an external electric field?   (6)

    (ii) In a centre tap full wave rectifier, the load resistance R_L=1kΩ. Each diode has forward-bias dynamic resistance r_d of 10 Ω. The voltage across half the secondary winding is 220sin314t. Find (a) peak value of current, (b) the dc or average value of current, (c) the rms value of current, (d) the ripple factor, and (e) the rectification efficiency.   (6)

SECTION - B

3. (i)   What are the various mode of operation of transistors? Explain the current relation in CE configuration with the help of circuit diagram and also derive how β is related to α?   (6)

    (ii) Draw the circuit of JFET. Explain the working and V-I characteristics of JFET.   (6)

4. (i)   What is need of biasing? Explain voltage divider biasing circuit in detail.   (6)

    (ii) Describe the operation of MOSFET, in (a) enhancement mode, and in (b) depletion mode.   (6)

SECTION - C

5. (i)   For each of the following op-amp applications, sketch the circuit diagram, describe the operation and derive the relevant expressions: (a) Voltage follower; (b) Summing amplifier (c) Differential amplifier.   (6)

    (ii) With a neat circuit diagram, explain the working of an RC phase shift oscillator. Give the expression for its frequency of oscillations.   (6)

6. (i)   Draw the circuit diagram of op-amp in inverting and non-inverting configuration. Derive an expression of voltage gain in each case.   (6)

    (ii) Draw and explain the working of Hartley Oscillator. Give the expression for its frequency of oscillations.   (6)

SECTION - D

7. (i)   Sketch the CRO with electric focusing and deflection system and write its uses.   (6)

[P.T.O.]

(ii) Perform the following conversions:

(a) $(11011.101)_2 \quad = (?)_{10}$

(b) $(3A)_{16} \qquad\quad = (?)_{10}$

(c) $(34.45)_{10} \qquad = (?)_8$ (6)

8. (i)   How do you measure unknown voltage and current using CRO? Explain briefly.   (6)

(ii) Explain briefly NOT, NAND and OR gate using truth table and also explain why we called NAND gate as universal gate.   (6)

SECTION - E

9. (i)   Define load line and operating point.   (3)

(ii) Describe voltage regulator using zener diode.   (3)

(iii) In N-type semiconductor a large number of electrons are present still it remains electrically neutral, why?   (3)

(iv) What is the basic concept of operational amplifier?   (1)

(v)   Describe the mechanism of zener breakdown.   (2)