21718

**3 Hours / 70 Marks**   Seat No. ☐☐☐☐☐☐☐☐

Instructions :   (1)   All Questions are *compulsory.*

(2)   Answer each next main Question on a new page.

(3)   Illustrate your answers with neat sketches wherever necessary.

(4)   Figures to the right indicate full marks.

(5)   Assume suitable data, if necessary.

(6)   Use of Non-programmable Electronic Pocket Calculator is permissible.

(7)   Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1.   **Attempt any FIVE of the following :**   **10**

(a)   Name the components of following symbols :

(i)   A ——▷|—— K

(ii)   A ——▷|—— K
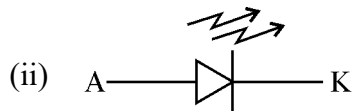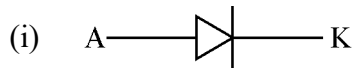
(b)   Define the term 'Ripple factor' for rectifier.

(c)   State relation between emitter current (I_E), Base current (I_B) and collector current (I_C) of BJT.

(d)   Write three terminal voltage regulator IC for obtaining :

(i)   + 5V

(ii)   −12V

    (e)   'Germanium diode knee voltage is lower than silicon diode knee voltage.' Justify.

    (f)   Define the term 'Load Regulation'.

    (g)   Draw symbol and write truth table of EX-OR gate.

2.   **Attempt any THREE of the following :**   **12**

    (a)   State working principle of photo diode. List out its three applications.

    (b)   Sketch circuit diagram and input, output waveform of Half wave rectifier. State its efficiency.

    (c)   Compare BJT common base configuration with common collector configuration on the basis of

        (i)   Current gain

        (ii)   Voltage gain

        (iii) Input impedance

        (iv) Output impedance

    (d)   Sketch block diagram of D.C. regulated power supply. State functions of each block.

3.   **Attempt any THREE of the following :**   **12**

    (a)   Explain with circuit diagram operation of zener diode as a voltage regulator.

    (b)   State type of feedback used for oscillator circuit. Explain Barkhausen criteria.

    (c)   State condition for both junction to operate BJT in cut off state, Active state and saturation state.

(d) Name the type of rectifier for each of following feature :

    (i)   Highest rectifier efficiency

    (ii)   Highest form factor

    (iii) Two diode rectifier circuit

    (iv) $PIV = 2V_m$

4. **Attempt any THREE of the following :**   12

(a) Sketch circuit diagram of Hartely oscillator. State expression for frequency of oscillation.

(b) Sketch circuit diagram of bridge rectifier with LC filter. State function of each component.

(c) In a common base configuration, the emitter current is 1 mA. If the emitter circuit is open, the collector current is 50 μA. Find total collector current. Assume α (Alpha) = 0.92.

(d) Sketch and label V-I characteristics of P-N junction diode. Write steps to calculate dynamic forward bias resistance.

(e) Explain operation of series inductor filter and find out its ripple factor.

5. **Attempt any TWO of the following :**   12

(a) A transistor is connected in common emitter (CE) configuration with collector supply V_{CC} of 8V. Voltage drop across resistance RC connected in series with collector is 0.5 V. The value of RC is 800 Ω. If alpha (α) equal to 0.96, calculate :

    (i)   Collector-emitter voltage

    (ii)   Collector current

    (iii) Base current

(b) Sketch pin configuration of IC 723. State functions of each pin. Sketch circuit diagram for obtaining 6V output d.c. regulated voltage using IC 723.

(c) Implement the fundamental logic gates 'OR gate', 'AND gate', 'NOT gate' using only NAND gates.

6. **Attempt any TWO of the following :** 12

(a) Sketch circuit diagram of RC phase shift oscillator. If value of capacitor $C = C_1 = C_2 = C_3 = 5$ pF and frequency of oscillation is 800 Hz, calculate value of resistor R, ($R = R_1 = R_2 = R_3$).

(b) For common emitter configuration sketch input characteristics for two different values of V_{CE} and output characteristics for two different values of I_B. Write formula for input resistance and output resistance.

(c) Perform following number system conversion :

   (i) $(589)_{10} = ($ $)_2$

   (ii) $(101101)_2 = ($ $)_{16}$

   (iii) $(413)_8 = ($ $)_2$

   (iv) $(5AF)_{16} = ($ $)_{10}$

   (v) $(AC8)_{16} = ($ $)_2$

   (vi) $(106)_8 = ($ $)_{10}$

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