22213

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

15 minutes extra for each hour

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) State the typical knee voltage values for Si and Ge diodes.

b) State the need of rectifiers. List the types of rectifiers.

c) Draw a symbol of PNP and NPN transistors.

d) State the output voltage of IC 7824 and IC 7906.

e) Suggest the suitable diode type for voltage regulator circuit.

f) Define the terms

   i)   Line Regulation

   ii) Load Regulation

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

P.T.O.

2.　　**Attempt any <u>THREE</u> of the following:**　　　　**12**

　　a)　Describe the V-I characteristics of a P-N junction diode with proper sketch and define

　　　　i)　　Break over voltage

　　　　ii)　　Reverse breakdown voltage

　　b)　Describe the working of half wave rectifier with LC filter using neat circuit diagram

　　c)　Explain transistor as a switch with neat sketch.

　　d)　Sketch the block diagram of DC regulated power supply. State the function of each block.

3.　　**Attempt any <u>THREE</u> of the following:**　　　　**12**

　　a)　Explain the functional block diagram of IC 723 with neat sketch.

　　b)　Describe the working of crystal oscillator with neat diagram.

　　c)　State the various transistor configurations. State any four applications of BJT.

　　d)　Compare half-wave rectifier with full wave centre-tapped rectifier on the basis of Ripple factor, Rectifier efficiency, TUF and PIV.

4.　　**Attempt any <u>THREE</u> of the following:**　　　　**12**

　　a)　State the Barkhausen criteria. Draw the circuit diagram of colpitt's oscillator.

　　b)　Draw the circuit diagram of bridge rectifier with π filter. Draw it's input and output waveforms.

　　c)　A transistor has $I_B = 110\,\mu A$, $I_C = 2\,mA$. Calculate α and β.

　　d)　Describe the construction details of light emitting diode (LED) with neat sketch. State the application of LED.

e) Figure No. 01. shows the centre tapped full wave rectifier circuit. Assume both the diodes to be ideal. Determine

   i)   DC output voltage (Vdc) and
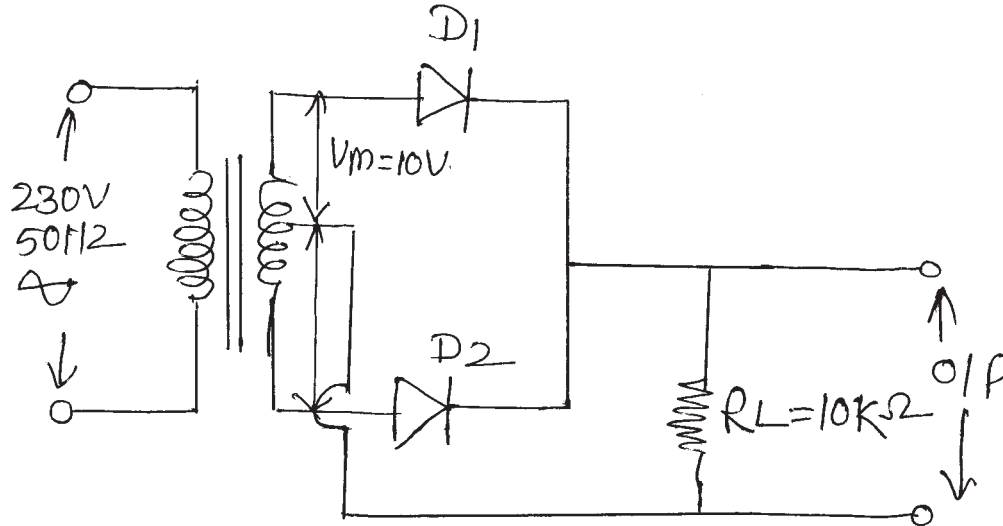
   ii) Peak inverse voltage (PIV) of diode

Figure No. 01.

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

a) A transistor has a typical $\beta = 100$. If the collector circuit is 40 mA. Determine the value of base current, emitter current and α.

b) For zener voltage regulator, if $I_{Zmin} = 2\,mA$, $I_{Zmax} = 20\,mA$, $V_Z = 4.7\,V$. Determine the range of input voltage over which output voltage remains constant. $R_L = 1\ k\Omega$, $R = 1\Omega$, $Z_Z = 0\Omega$. Refer Figure No. 02.
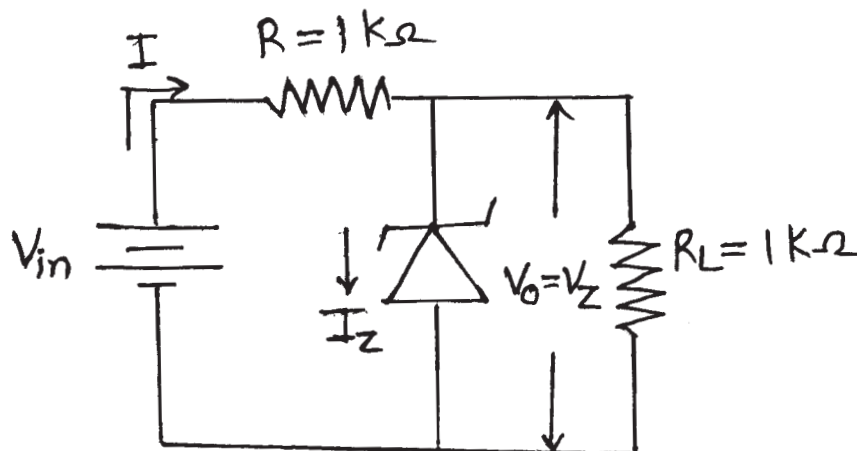

Figure No. 02.

c) State the disadvantage of JK flip-flop. Explain the working of MS JK flip-flop with proper diagram.

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

a) Compare RC and LC oscillators. (six points)

b) Sketch common base configuration input characteristics for two different values of V_{CB} and O/P characteristics for two different values I_E. Write the formula for input resistance and output resistance.

c) Convert the following

   i) $(208)_{10}$ = ($)_2$

   ii) $(AgC)_{16}$ = ($)_8$

   iii) $(247)_8$ = ($)_{10}$

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