B.Tech-2nd(Sec-D, E, F, G, H, I & J)
Basic Electronics

Full Marks : 50

Time : $2\frac{1}{2}$ hours

Answer **all** questions

The figures in the right-hand margin indicate marks

Symbols carry usual meaning

1. Answer *all* questions : 2×5

   (*a*) How does BJT acts as a switch ?

   (*b*) List the advantages of FET over BJT.

   (*c*) Explain virtual ground concept in case of ideal OPAMP.

   (*d*) Convert $(ABC)_{16}$ into decimal and octal.

   (*e*) Draw detailed diagram of CRT.

2. (a) A centre tap rectifier uses a Si diode of resistance 25 Ω. The secondary voltage from centre to each end of secondary is 120v (rms). If the load resistance of 1 KΩ is connected across this rectifier, calculate I_{dc} and I_{rms}.　　4

(b) Explain common base characteristic curves of NPN transistor.　　4

Or

(a) Explain step by step procedure of monolithic IC fabricating for NPN transistor.　④

(b) Explain why CE configuration preferred as an amplifier.　④

3. (a) Explain the working of Enhancement type n-channel MOSFET.　　4

(b) From the given drain characteristic identify the device and draw its transfer characteristics using graphical method.　4
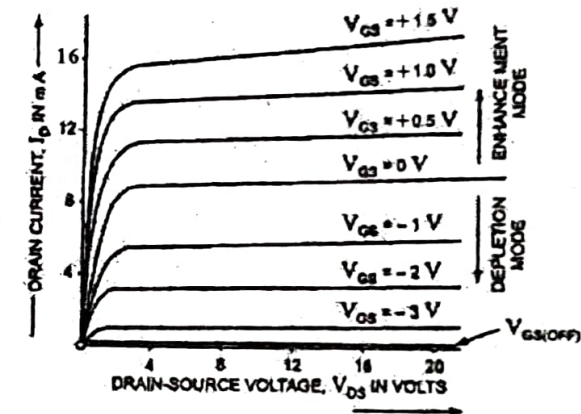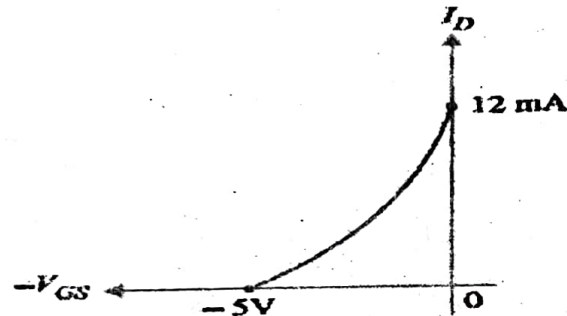

Or

(a) Explain the construction and working of P-channel JFET.　　4

(b) (i) A JFET has a drain current of 5 mA. If $I_{DSS} = 10$ mA and $V_{GS(off)} = -6$ V, Find the value of (a) V_{GS} and (b) V_p.
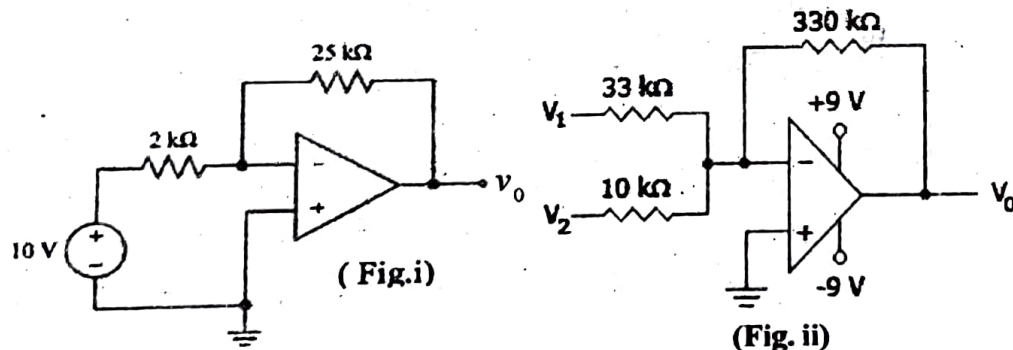
(4)

(ii) From the transfer characteristic of JFET shown in given figure, write the equation for drain current.   4

4. (a) Explain modes of operation of OPAMP.   4

(b) Compare negative and positive feedback along with their block diagrams.   4

Or

(a) Calculate v_0 in Fig. i and V_0 in Fig. ii.   4

(Fig.i)

(Fig. ii)

(5)

(b) Prove that input impedance increases and output impedance decreases in voltage series feedback.   4

5. (a) State the Absorption law and De-Morgans theorem. Apply the De-Morgans theorem to following expression

$$\overline{A\overline{B} + \overline{C}D + BD}$$ 4

(b) Using Boolean algebra, simplify the following   4

(i) $AB + A(B + C) + B(B + C)$

(ii) $(A\overline{B}(C + BD)\overline{A\overline{B}})C$

Or

(a) Write the truth table of $F = \overline{A} + BC + CD$ and draw the logic diagram using basic gates.   4

(b) Implement the following logic functions   4

     (i) $X = \bar{A} + BC$ using NAND gates only

     (ii) $Y = \bar{A}B + C$ using NOR gates only.

6. (a) Explain amplitude modulation in details.   4

    (b) List different applications of CRO.   4

<div align="center">Or</div>

(a) Explain the block diagram of DSO.   4

(b) Compare AM and FM.   4