PART-A

Q.1 Define the meaning of foll. terms :(Attempt any four)   4x2=8 Marks

(i) Doping (ii) Depletion Layer (iii) BJT (iv) Clampers (v) Clippers (vi) Diode

2x3=6 Marks

Q.2 Attempt any two:

a) With the help of circuit diagram describe the working of Half Wave rectifier.

b) Briefly explain how materials are classified on the basis of band gap energy

c) What is BJT? Explain its various configurations with circuit symbol. A transistor has an emitter current of 10mA & a collector current of 9.5mA. Calculate its base current.

d) Fig 1 shows the circuit of Fixed-Bias circuit using a silicon transistor with $\beta=100$. Determine base current, collector current, operating point & stability factor S.
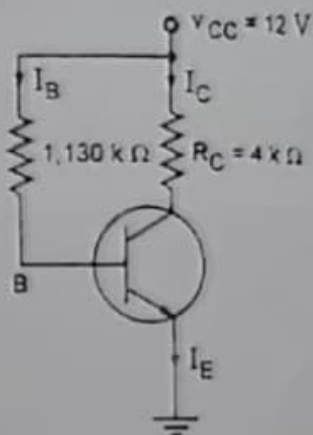

Fig.1 Fixed-Bias Circuit

PART-B

Q.3 Attempt any four: 4X4=16 Marks

a) With the help of circuit diagram explain the working of Full wave rectifier (both Centre tap & Bridge rectifier) along with output waveforms.

b) Explain the input & output characteristics of Common Emitter BJT Amplifier. In a certain transistor, collector current is 0.98mA & base current is 20µA, determine the values of emitter current, current amplification factor(α) & current gain factor(β)

c) Explain the input & output characteristics of Common Base BJT Amplifier. Why we prefer common emitter transistor configuration over other transistor configurations for amplifier applications. What is the significance of quiescent point (operating point).

d) In a CE configuration as shown in fig.1 collector supply voltage $V_{cc} = 10$ V, load resistance Rc is 8kΩ. Draw the dc load line. Determine the operating point Q for zero signal if base current is 15 μA and β is 40.
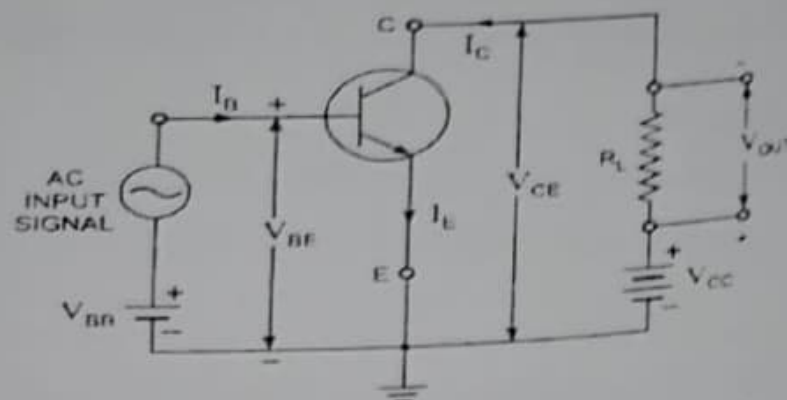

Fig.2 Common Emitter Transistor Configuration

e) What is Bias Stabilization? Why we need bias stabilization. Derive the general expression of stability factor 'S' for transistor biasing

f) With the help of circuit diagram explain the working of Fixed Bias circuit. Also derive the expression of stability factor 'S' for fixed bias circuit

$$\frac{dJ_c - \beta dI}{d\mathcal{E}_c}$$