This question paper contains 4+1 printed pages]

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. **1** is compulsory.

Attempt *Five* questions in all.

Use of non-programmable scientific calculator is allowed.

1. (*a*) What is the intrinsic standoff ratio of UJT ? Express Mathematically.   3

    (*b*) Differentiate between Zener and Avalanche breakdown.   3

    (*c*) Calculate the value of I_C and I_E for a BJT that has α_{dc} = 0.98 and
    I_B = 150 μA.   3

    (*d*) Draw Frequency response of CE amplifier. Why the gain of the amplifier reduces at
   higher frequencies ?   3

(*e*) A phase shift oscillator uses three identical RC sections in feedback network. Calculate the frequency of oscillation if R   200 KΩ and C = 0.001 μF. Also calculate the gain of the amplifier needed for the sustained oscillations.   3

2. (*a*) Draw the circuit diagram of a Full Wave Bridge Rectifier and calculate :

      (*i*) I_{rms}

      (*ii*) ripple factor

      (*iii*) efficiency of rectification.   8

(*b*) Sketch the output waveforms for the circuits shown below :   4

V_{in} C V_{out}

R

$V_{in} = 12\ sin\omega t$ V_{out} 5 V
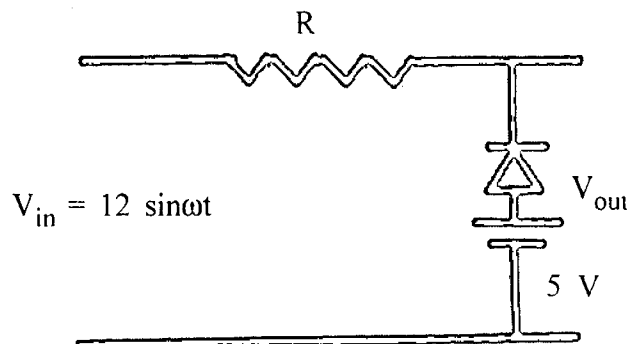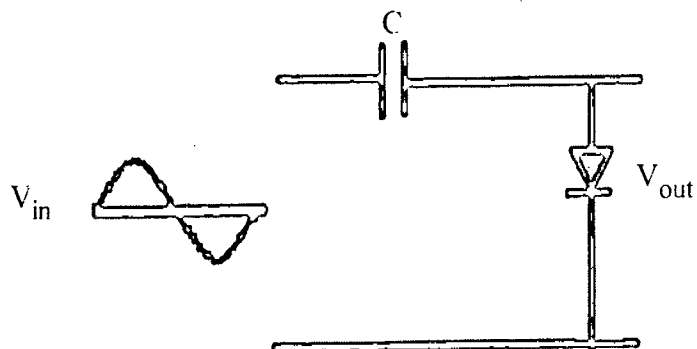
(c)   Draw the block diagram of a regulated power supply.   3

3.   (a)   Calculate the coordinates of Q point for the following circuit. Given β = 40.   7
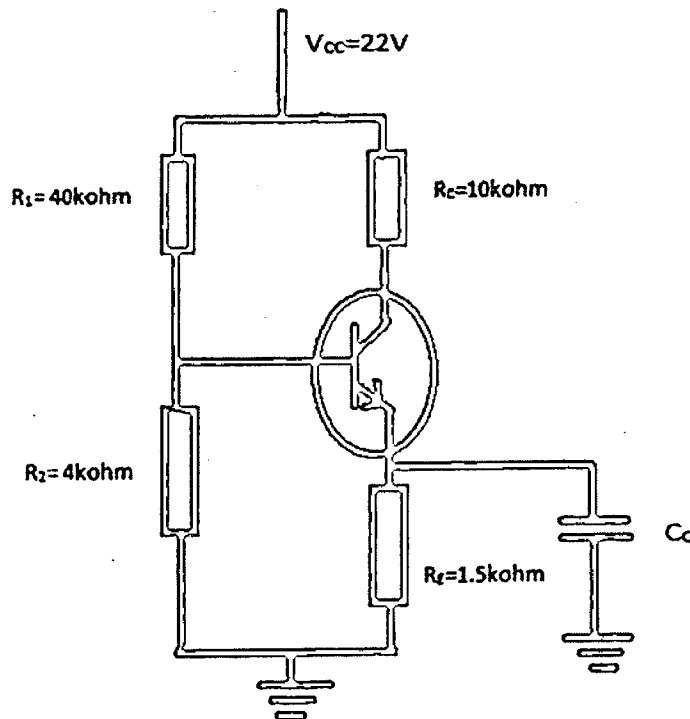
Does the above circuit provide stability against temperature and β variations ?

Explain.

(b)   Draw an equivalent circuit of common emitter configuration using h parameters.

Calculate hybrid parameters with a.c. input open circuited having I_b = 0,

V_{be} = 0.35 mV, I_c = 30 μA and V_{ce} = 2 V.   5

(c)   Derive the relationship between input current and output current for CE transistor

configuration.   3

4. (*a*) What is Barkhausen criterion for sustained oscillations ? Draw the circuit diagram of an RC phase shift oscillator and obtain an expression for its frequency of oscillation. 8

(*b*) For a class-B power amplifier using a supply of V_{CC} = 30 V and driving a load of 16 Ω, determine the maximum input power and output power. 4

(*c*) What is the principle of operation of a crystal oscillator ? State its any *two* applications. 3

5. (*a*) Explain the working of a *n*-channel junction field effect transistor (JFET). Draw its transfer characteristics. 8

(*b*) Explain how UJT can be used as relaxation oscillator with suitable diagram. 4

(*c*) What is the difference between the depletion and enhancement mode MOSFET ? 3

6. (*a*) Draw the circuit diagram of CE amplifier. Draw its ac equivalent circuit using hybrid parameters. Find out the expression for : 8

(*i*) current gain

(*ii*) voltage gain

(*iii*) input impedance.

(b) For the given zener diode calculate V_L, V_R, I_Z and P_Z. 4
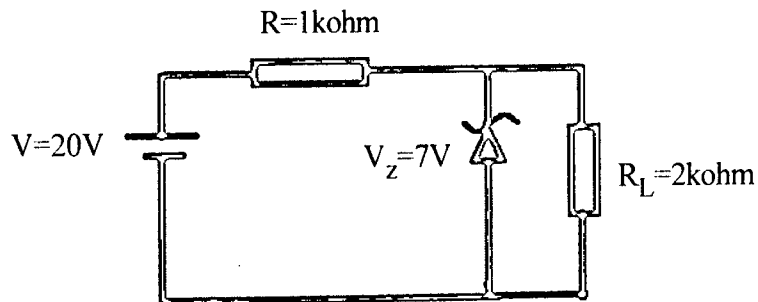
(c) What is the ripple factor of a half wave rectifier and a center tapped full wave

rectifier ? 3

7. (a) Explain the working of a *p*-channel depletion mode MOSFET. Also draw its output

characteristics. 8

(b) Draw the circuit diagram of a push pull amplifier. 4

(c) Sketch the input and output characteristics for CB transistor configuration. 3