ISC SEMESTER 2 EXAMINATION
SPECIMEN QUESTION PAPER
ELECTRICITY AND ELECTRONICS

Maximum Marks: **40**

Time allowed: ***One and a half hour***

Candidates are allowed an additional **10 minutes** *for* only *reading the paper.*

They must ***NOT*** *start writing during this time.*

Answer all questions in ***Section A, Section B*** *and* ***Section C.***

The intended marks for questions or parts of questions are given in brackets. [ ]

SECTION A - 8 MARKS

Question 1

(i)   The emitter of a transistor is _____ doped (lightly, heavily)   **[1]**

(ii)   State whether the statement given below is True or False.   **[1]**
        The value of α of a transistor is more than 1.

(iii)   Define voltage gain of a Common – Emitter (CE) amplifier.   **[1]**

(iv)   With reference to Power Amplifier, what is meant by *impedance matching*.   **[1]**

(v)   With reference to vacuum tubes, state the importance of *cathode bypass capacitor*.   **[1]**

(vi)   If a triode has a mutual conductance of 1·5mA/V and plate resistance of 12KΩ,   **[1]**
        calculate its amplification factor.

(vii)   The base-emitter junction of a transistor, has _____.   **[1]**

    (a)   a reverse bias

    (b)   a wide depletion layer

    (c)   low resistance

    (d)   low conductance

(viii)   Output from a transistor amplifier is: **[1]**

(a)
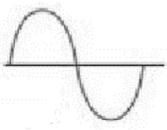
(b)
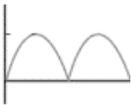
(c)
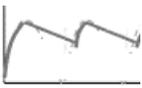
(d)

SECTION B - 12 MARKS

Answer the following questions briefly.

Question 2   **[2]**

State *any two* differences between *half wave rectifier* and *full wave rectifier*.

Question 3   **[2]**

Draw a neat circuit diagram of an RC filter.

Question 4   **[2]**

With reference to transistors, obtain the relationship between **α** and **β** (symbols have their usual meaning).

Question 5   **[2]**

What inference can be drawn by maintaining control grid at:

(i)   Positive potential

(ii)   Negative potential

Question 6   **[2]**

State *any two* advantages of Power Amplifier over Voltage Amplifier.

Question 7 [2]

(i) For the Common – Emitter (CE) transistor given in *Figure 1(a)*, β=45 and voltage drop across 1KΩ resistor which is connected to the collector circuit is 1V. Calculate the base current of the transistor.
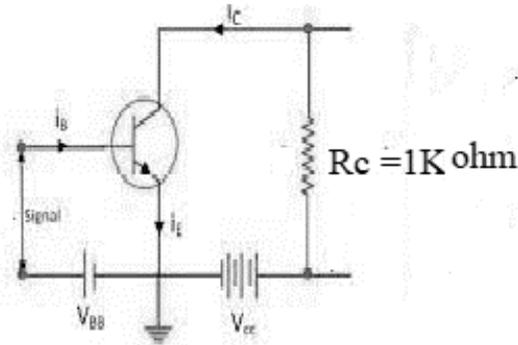

Figure 1(a)

OR

(ii) For the Common – base (CB) transistor given in *Figure 1(b)*, the current amplification factor is 0·9. If the emitter current is 1mA, calculate the base current of the transistor.
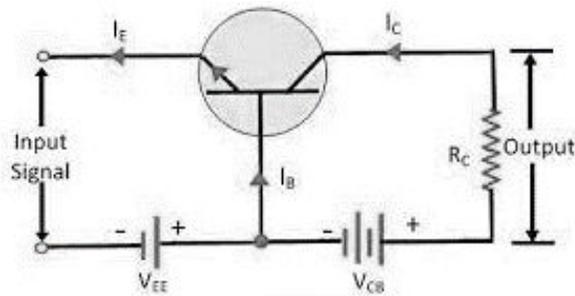

Figure 1(b)

SECTION C - 20 MARKS

Answer the following questions.

Question 8 [4]

With the help of a neat circuit diagram, explain the working of a bridge rectifier.

Question 9 [4]

With the help of a neat circuit diagram of a Common Emitter (CE) amplifier, explain how a weak signal can be amplified. **(Use either PNP or NPN type of transistor)**

Question 10 [4]

Figure 2 given below shows a circuit diagram of a voltage stabilizer. Explain the importance of the following:
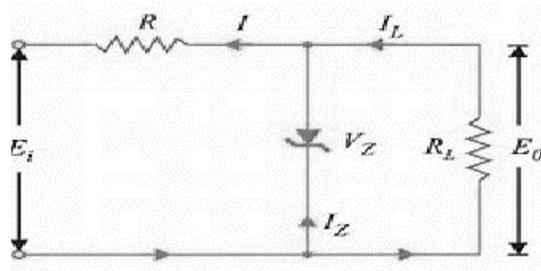
(i)   resistor 'R'

(ii)   Zener diode

Figure 2

Question 11 [4]

(i)   Prove $I_{rms} = \dfrac{I_0}{\sqrt{2}}$

OR

(ii)   Prove $I_{dc} = \dfrac{2I_0}{\pi}$

Question 12 [4]

Explain the working of a crystal microphone. Also, state the energy conversion that takes place in this microphone.