S.Y. Diploma : Sem. III
[EJ/EN/ET/EX/EV/ED/IU/DE/IS/IC/IE/MU]

Electronics Devices and Circuits

Time: 3 Hrs.] Prelim Question Paper **[Marks : 100**

Instructions :
(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data if necessary.
(5) Preferably, write the answers in sequential order.

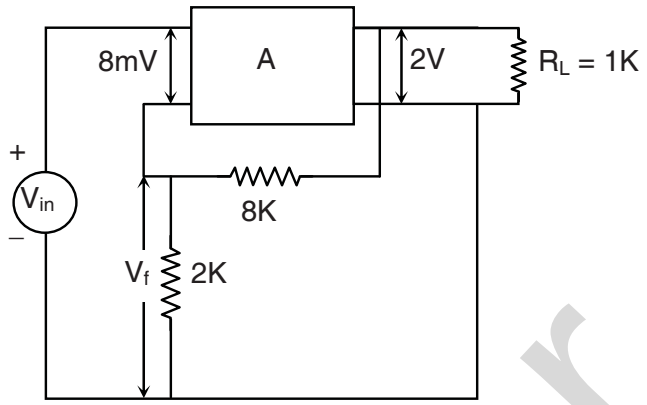
1. (a) Attempt any **SIX** of the following : **[12]**
(i) What are transistor biasing circuits and name the different biasing circuits?
(ii) Draw Drain (Output) characteristics of N–channel JFET & show different regions of operation on it.
(iii) Define multi-stage amplifier and state its necessity.
(iv) Define intrinsic standoff ratio (η) of UJT.
(v) Give the symbol of UJT and state why it is called uni-junction transistor.
(vi) State Barkhausen criterion on oscillation.
(vii) State the two types of transistor and give their symbols.

(b) Attempt any **TWO** of the following : **[8]**
(i) Give the comparison between –ve feedback and +ve feedback.
(ii) Explain self-bias circuit used in JFET.
(iii) Draw input characteristics for N–P–N transistor in common–Base configuration & explains it.

2. Attempt any **FOUR** of the following : **[16]**
(a) Draw block diagram of voltage amplifier. Show important parameters of amplifier on it and state the requirements of good voltage amplifier.
(b) Give the comparison between 3 configurations of transistor.
(c) Draw the functional block diagram of controlled series voltage regulator and explain the functions of each block.
(d) State the types of –ve feedback amplifiers and draw their functional block diagrams. Also state the effect on R_{IN} and R_0.
(e) Draw UJT relaxation oscillator circuit and explain its working with the help of 3 waveforms.
(f) Draw the circuit diagram of direct coupled amplifier and explain its working.

3. Attempt any **FOUR** of the following : **[16]**
(a) Give comparison between voltage amplifier and power amplifier.
(b) Write a note on "Thermal run–away" in transistor. Why is showed be avoided.
(c) Draw the block diagram of multi-stage amplifier and derive an expression for its overall voltage gain.
(d) Define the following characteristics of regulated power supply : (i) Voltage regulation or Load regulation, (ii) Line regulation, (iii) Ripple rejection and (iv) Output impedance.
(e) Define sweep speed for a sweep waveform. Name and define the errors which are present in sweep signal.

(f) A feedback amplifier is shown in figure calculate :
   (i) Value of feedback factor
   (ii) Voltage gain A of amplifier without feedback
   (iii) The feedback voltage V_f.



4. Attempt any **FOUR** of the following : **[16]**
(a) Draw the circuit diagram of Class B push-pull amplifier and explain its working.
(b) Give the comparison between BJT and JFET.
(c) Write a note on cross–over distortion.
(d) Find 'f' for UJT relaxation oscillator if R = 10k, C = 0.1μF. Assume suitable value for η.
(e) Prove that reverse leakage current in common emitter is 100 times more than the reverse leakage current of common base configuration. i.e. prove that $I_{CEO} = 100\ I_{CBO}$.
(f) Explain the working of RC phase shift oscillator.

5. Attempt any **FOUR** of the following : **[16]**
(a) Explain why stability of the amplifies improves when –ve feedback is used.
(b) Give the comparison between series and parallel resonant circuit.
(c) Draw the circuit diagram of single ended or transformer coupled class A amplifier and explain its working.
(d) State the advantages and disadvantages of –ve feedback amplifier.
(e) Derive an expression for the closed loop gain of –ve feedback amplifier.
(f) Draw functional block diagram of I.C. 723 and explain it.

6. Attempt any **FOUR** of the following : **[16]**
(a) Draw the circuit diagram of Zener diode voltage regulator and explain its working.
(b) Draw the circuit diagram of 2 stage transformer coupled amplifier and explain its working.
(c) Define voltage gain (A_V), current gain (A_I) and power gain (A_P) of the amplifier and derive the relation between them.
(d) Draw the circuit diagram of single tuned voltage amplifier and explain its working with the help of frequency characteristics.
(e) Give the advantages and dis-advantage of Class B push-pull power amplifier.
(f) Give comparison of class A, B and C power amplifier.

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