

22346

24225

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Attempt any FIVE of the following :

10

- (a) Draw labelled symbol of :
 - (i) NPN transistor
 - (ii) PNP transistor
- (b) Define the following terms w.r.t.
JFET :
 - (i) Transconductance
 - (ii) Pinch-off voltage
- (c) Define collector efficiency of power amplifier.
- (d) State the need of multistage amplifier. Enlist different types of coupling methods used in multistage amplifier.



- (e) State Barkhausen's criteria for sustained oscillations.
- (f) Compare linear and nonlinear wave shaping circuit (any two points).
- (g) Draw RC differentiator circuit and state the equation of its output voltage.

2. Attempt any THREE of the following :

12

- (a) Describe the working of transistor as a switch and give the application of it.
- (b) Describe FET as an amplifier with neat diagram.
- (c) Draw following types of feedback connections :
 - (i) Voltage series feedback
 - (ii) Current shunt feedback
- (d) Design a Regulated dual power supply for ± 5 V using regulator IC's.

3. Attempt any THREE of the following :

12

- (a) Compare BJT and JFET on the basis of :
 - (i) Signal controlling in terms of voltage or current
 - (ii) Thermal stability
 - (iii) Switching speed
 - (iv) Thermal Noise
- (b) Draw the circuit diagram of two stage RC coupled amplifier and describe its working.
- (c) Describe the operation of UJT relaxation oscillator with neat circuit diagram.
- (d) Identify linear wave-shaping circuit used to generate following waveforms and draw the circuit diagram for it :
 - (i) Narrow pulses from square wave
 - (ii) Triangular wave from square wave

4. Attempt any THREE of the following :**12**

- (a) Draw the block diagram of DC regulated power supply and describe the working of each block.
- (b) Derive the relation between α & β of transistor.
- (c) With the help of neat construction, explain working of E-MOSFET.
- (d) Compare Class A, Class B and Class C amplifier on the basis of :
 - (i) Operating point
 - (ii) Efficiency
 - (iii) Output voltage waveforms
 - (iv) Applications
- (e) Draw the circuit diagram for positive clipper and describe its operation with input and output waveforms.

5. Attempt any TWO of the following :**12**

- (a) State the need of transistor biasing. Draw the circuit diagram of voltage divider bias and state the function of each component.
- (b) Describe working of N-channel JFET with neat circuit diagram. Also draw its drain characteristics with labelled operating regions on it.
- (c) Draw neat circuit diagram for Class B push pull amplifier and describe its working with neat waveforms.

6. Attempt any TWO of the following :**12**

- (a) Draw the circuit of RC phase shift oscillator. Explain its working. Give formula for frequency of oscillation.

- (b) The DC level of + 2 V is to be added to the given input signal ($v_i = 10 \sin \omega t$).

Explain the working principle of this application along with circuit diagram and input output waveforms.

- (c) Draw the circuit diagram of Zener diode as voltage regulator and describe its operation for :

- (i) Variable input voltage and constant load resistance.
 - (ii) Constant input voltage and variable load resistance.
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