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03 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.
- (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. **Attempt any FIVE of the following :** **10**
- a) List out any two application of IC KBU808.
 - b) Define transistor and its types.
 - c) Calculate gain of two stage amplifier if first stage has gain 20 and second stage has gain 400.
 - d) Draw the symbol of p-channel and n-channel depletion type MOSFET.
 - e) State the need of regulated power supply.
 - f) Define amplifier. Define the term voltage gain.
 - g) Classify amplifiers on the basis of coupling technique and operating frequency.

P.T.O.

2. Attempt any THREE of the following : 12

- a) Compare p–n junction diode and schottky diode on the following parameters.
 - i) Symbol
 - ii) Switching speed
 - iii) Barrier potential
 - iv) Application
- b) Explain voltage divider bias method for biasing of a transistor with circuit diagram.
- c) Compare class A, class B, class AB, class C amplifier, on the basis of efficiency conduction angle, 'Q' point location and distortion.
- d) A JFET has drain current of 5 mA. If $I_{DSS} = 10 \text{ mA}$ and $V_{GS(off)} = -6 \text{ V}$. Find the value of
 - i) V_{GS}
 - ii) V_P

3. Attempt any THREE of the following : 12

- a) Describe the procedure to minimize the thermal runaway effect.
- b) State the advantages of MOSFET over JFET.
- c) Draw and explain 2–stage transformer coupled amplifier.
- d) In CF configuration, if $\beta = 100$, leakage current $I_{CEO} = 150 \text{ } \mu\text{A}$. If base current is 0.2 mA. Calculate the value of I_C , I_E and α .

4. Attempt any THREE of the following : 12

- a) Explain working of zener diode as a voltage regulator with diagram.
- b) A JFET has $I_{DSS} = 10 \text{ mA}$, $V_P = -5 \text{ V}$, $g_{mo} = 2 \text{ ms}$ calculate the transconductance and drain current of the JFET for $V_{GS} = -2.5 \text{ V}$.
- c) Draw and explain block diagram of regulated D.C. power supply, draw it's input and output waveform.

- d) Compare CB, CE, CC transistor configurations.
- e) State the need of multistage amplifier.

5. Attempt any TWO of the following :

12

- a) Explain with neat labelled diagram how transistor can be used as –
 - i) a Switch
 - ii) an Amplifier
- b) Draw the construction of LED, Explain the working principle and write any two application of it.
- c) State the working principle of E-MOSFET and draw and explain its constructional sketch.

6. Attempt any TWO of the following :

12

- a) State the need of SMPS. Draw the block diagram of SMPS and describe function of each block.
 - b) Draw the drain characteristics of JFET and explain it.
 - c) i) Derive the relationship between α , β and γ .
ii) If α of transistor is 0.9 calculate β of transistor.
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