

22225

21718

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) List any four specifications of resistors.
- (b) State the need of filters in a regulated DC power supply.
- (c) Define α and β of transistor.
- (d) Draw the symbol of N-channel and P-channel enhancement type MOSFET.
- (e) List the types of signals.
- (f) Draw constructional diagram of piezoelectric transducer.
- (g) State the function of proximity sensors and photodiode.

2. Attempt any THREE of the following :

12

- (a) State the advantages of integrated circuits over circuits with discrete components.
- (b) Define the following terms with respect to rectifier :
 - (i) Ripple factor
 - (ii) Rectification efficiency (η)
 - (iii) Transformer Utilization Factor (TUF)
 - (iv) Peak Inverse Voltage (PIV)

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P.T.O.

- (c) Draw construction of LED and explain working principle.
- (d) Compare CB, CE and CC configuration on the basis of :
 - (i) Input impedance
 - (ii) Output impedance
 - (iii) Current gain
 - (iv) Application

3. Attempt any THREE of the following :

12

- (a) Draw and explain the construction of N-channel JFET.
- (b) State any four selection criteria for transducers.
- (c) Determine the value of resistance with following colour code :
 - (i) Red, Red, Orange, Gold
 - (ii) Brown, Black, Black, Silver
- (d) Explain the concept of DC load line and operating point for biasing circuit.

4. Attempt any THREE of the following :

12

- (a) Explain :
 - (i) Seebeck effect
 - (ii) Peltier effect
- (b) Draw the basic block diagram of regulated DC power supply. Explain the function of each block.
- (c) Describe the working of transistor as a switch with circuit diagram.
- (d) A JFET has a drain current of 5 mA. If $I_{DSS} = 10$ mA and $V_{GS(OFF)} = -6$ V. Find the value of
 - (i) V_{GS}
 - (ii) V_P
- (e) Compare P-N junction diode and zener diode on the basis of
 - (i) Symbol
 - (ii) Direction of conduction
 - (iii) Reverse breakdown
 - (iv) Application

5. Attempt any TWO of the following :

12

- (a) Calculate peak-to-peak amplitude, frequency and wavelength of waveforms shown in Fig. 1.

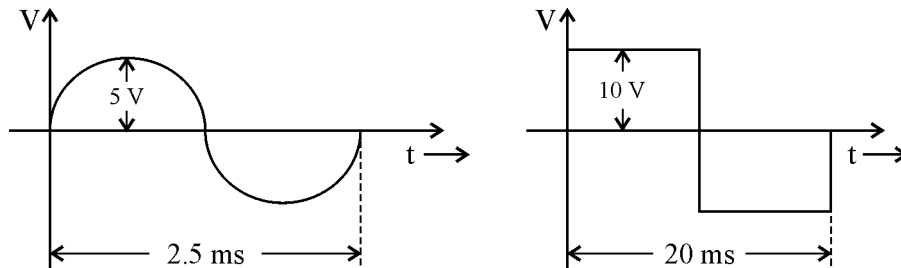


Fig. 1

- (b) In CE configuration, if $\beta = 100$, leakage current $I_{CEO} = 150 \mu\text{A}$. If the base current is 0.2 mA , calculate the value of I_C , I_E and α .
- (c) Identify the circuit shown in Fig. 2 and explain working with input-output waveforms for a sinusoidal input.

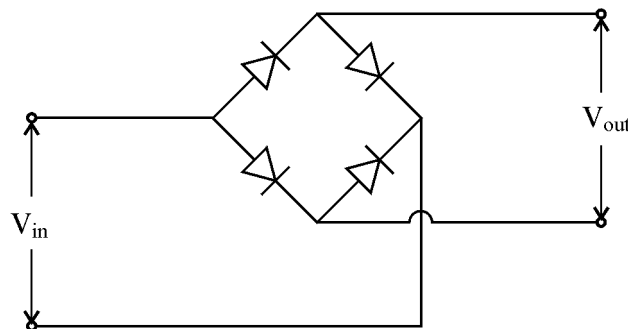


Fig. 2

6. Attempt any TWO of the following :

12

- (a) The following readings were obtained experiment from JFET.

V_{GS}	0 V	0 V	-0.2 V
V_{DS}	7 V	15 V	15 V
I_D	10 mA	10.25 mA	9.65 mA

Determine :

- (i) AC drain resistance
- (ii) Transconductance
- (iii) Amplification factor

P.T.O.

(b) Observe the given frequency response of RC coupled amplifier in Fig. 3

Calculate :

- (i) Lower cut-off frequency (F_L)
- (ii) Higher cut-off frequency (F_H)
- (iii) Bandwidth (BW)

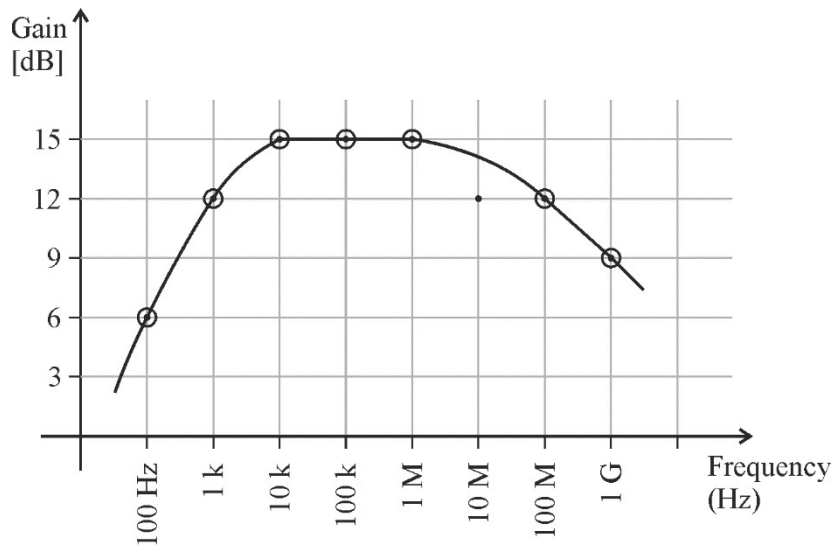


Fig. 3

(c) Identify active and passive transducer from the following transducers :

- (i) Capacitive transducer
 - (ii) Photovoltaic cells
 - (iii) Piezoelectric transducer
 - (iv) Strain gauge
 - (v) Thermocouple
 - (vi) Thermistors
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