

## Scheme – I

### Sample Question Paper

Program Name : Diploma in Electronics Program Group

Program Code : DE/EJ/IE/IS/ET/EN/EX

Semester : Second

Course Title : Basic Electronics

Marks : 70

22216

Time: 3 Hrs.

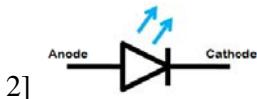
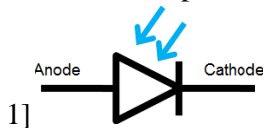
#### Instructions:

- (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.

#### Q.1) Attempt any FIVE of the following.

10 Marks

- a) Name the components of following symbols:



- b) State any two application of FET.
- c) State type of transistor configuration for obtaining highest current gain.
- d) Sketch the symbol of P-Channel and N-Channel Enhancement type MOSFET.
- e) State any two limitations of Zener diode regulator.
- f) Define: Load regulation and Line regulation.
- g) Identify the type of diode for the given V-I characteristics shown in figure 1:

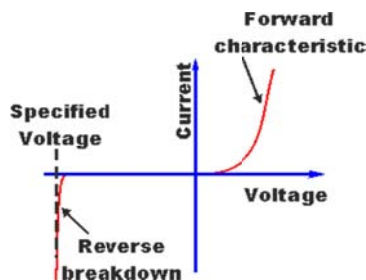


Figure 1

#### Q.2) Attempt any THREE of the following.

12 Marks

- a) Sketch the block diagram of Regulated DC power supply, explain working of each block with input and output waveforms.
- b) Sketch fixed bias and self bias BJT biasing circuit.
- c) Differentiate Zener breakdown and Avalanche breakdown on basis of:
  1. Definition
  2. Breakdown characteristics
- d) Explain the thermal runaway phenomenon for BJT

**Q.3) Attempt any THREE of the following. 12 Marks**

- a) Sketch input and output characteristics of CE configuration. Label various regions on characteristics.
- b) Explain the working of negative clipper with circuit diagram.
- c) A JFET has a drain current of 5mA .If  $I_{DSS} = 10\text{mA}$  and  $V_{GS(\text{off})} = -6\text{V}$  .Find the value of i)  $V_{GS}$  ii)  $V_p$
- d) Explain working of Zener as a voltage regulator with circuit diagram.

**Q.4) Attempt any THREE of the following. 12 Marks**

- a) Define the following parameters of rectifier:-
  - 1. Peak Inverse Voltage (PIV)
  - 2. Ripple factor
  - 3. Efficiency
  - 4. Transformer Utilization Factor.
- b) Describe operation of voltage divider biasing with circuit diagram.
- c) Compare CB and CC configuration of transistor with respect to
  - 1. Voltage Gain
  - 2. Input – output terminals
  - 3. Input Impedance
  - 4. Output Impedance
- d) Calculate input impedance of JFET if reverse gate source voltage of 15V and gate current is  $10^{-3} \text{ uA}$
- e) Sketch the block diagram of Regulated DC power supply, explain working of each block with output waveforms.

**Q.5) Attempt any TWO of the following. 12 Marks**

- a) Justify ‘ $\beta$ ’ for FET amplification factor depends on its transconductance
- b) Explain the working of bridge rectifier connected with capacitor filter, sketch circuit diagram and output waveforms with respect to ac signal input,
- c) Compare LED and photo diode on basis of:
  - 1. Function
  - 2. Symbol
  - 3. Construction

**Q.6) Attempt any TWO of the following. 12 Marks**

- a) Compare P-N Junction diode and Zener diode on following parameters:
  - 1. Doping Level
  - 2. Breakdown voltage
  - 3. Applications
- b) Draw the circuit diagram of CE amplifier, explain its working with input and output characteristics.
- c) Identify the given circuits in figure 2 and draw input and output waveforms for following circuits :

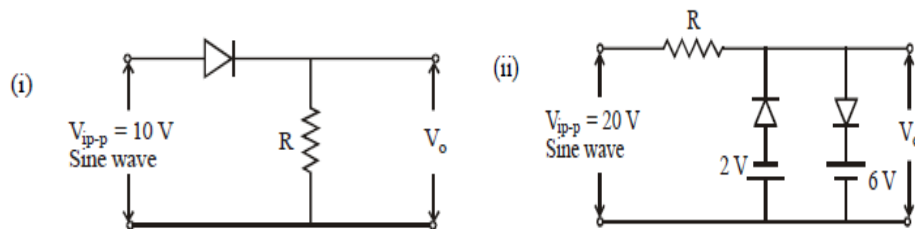


Figure 2

## Scheme – I

### Sample Test Paper - I

**Program Name** : Diploma in Electronics Program Group  
**Program Code** : DE/EJ/IE/IS/ET/EN/EX  
**Semester** : Second  
**Course Title** : Basic Electronics  
**Marks** : 20

**22216**

**Time: 1 Hour**

#### 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

#### Q.1 Attempt any FOUR.

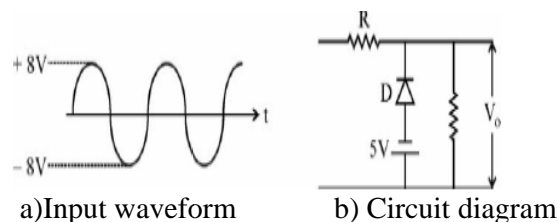
**08 Marks**

- a) Define the following terms of PN junction diode:
  1. Knee voltage
  2. Dynamic resistance.
- b) State any two types of rectifier circuit.
- c) Explain the function of capacitor in filter circuit.
- d) Sketch the characteristics of Zener diode.
- e) Compare LED and Photo diode on basis :
  1. function
  2. symbol
- f) State the function of Clipper circuit.

#### Q.2 Attempt any THREE.

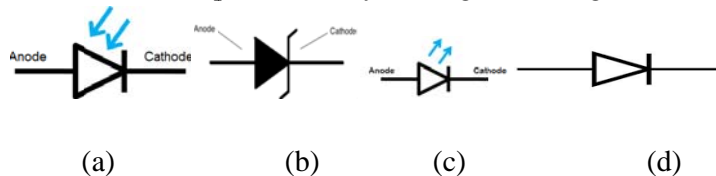
**12 Marks**

- a) Draw the output waveform  $V_o$  at the output of figure 1 for the given input waveform.



**Figure 1**

- b) Name the component of symbols given in Figure 2:



**Figure 2**

- c) Explain the working principle of LED with neat diagram
- d) Compare Half wave rectifier and Centre tapped full wave rectifier on the basis of following parameter:

- i. No.of diodes
- ii. Ripple factor
- iii. PIV
- iv. TUF

- e) Describe the working of Positive Clamper with circuit diagram and waveforms.
- f) Explain the energy band diagram for conductors, insulator, and semiconductors.

## Scheme – I

### Sample Test Paper -II

**Program Name** : Diploma in Electronics Program Group  
**Program Code** : DE/EJ/IE/IS/ET/EN/EX  
**Semester** : Second  
**Course Title** : Basic Electronics  
**Marks** : 20

**22216**

**Time: 1 Hour**

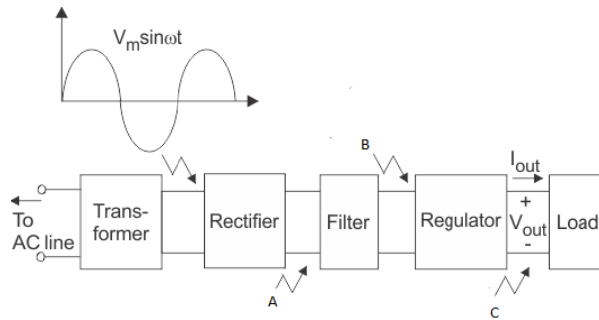
#### Instructions:

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

#### Q.1 Attempt any FOUR.

**08 Marks**

- a) State the need of biasing for BJT.
- b) State any two advantages of Transistorized series regulator.
- c) Sketch the output waveform at point A and B of figure 1.



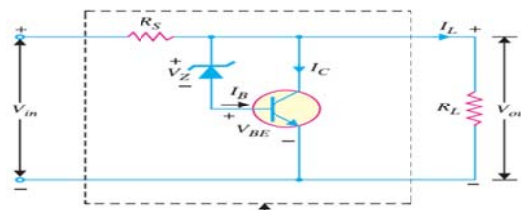
**Figure 1**

- d) Sketch the circuit diagram of fixed bias.
- e) Explain working of transistorized shunt voltage regulator with diagram.
- f) Draw the symbols of p channel MOSFET and n channel MOSFET

#### Q.2 Attempt any THREE.

**(12 Marks)**

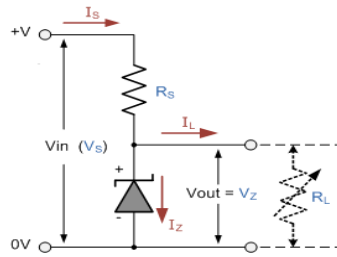
- a) Identify the circuit given in figure 2 and explain its working.



**Figure 2**

- b) Explain working of n-channel JFET with diagram.

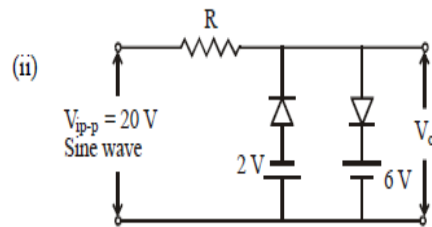
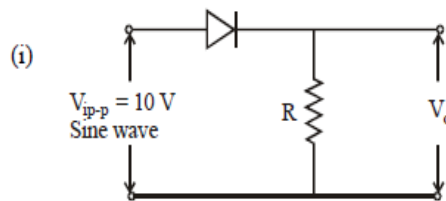
c) Identify given circuit and explain its working.



**Figure 3**

d) Draw the output characteristics of CE configuration, label its different region.

e) Identify circuit given in figure 4 and draw input and output waveforms for following circuits:



**Figure 4**

f. Compare CB with CE, configuration of transistor on the basis of:

- i. Input current,
- ii. output current,
- iii. Application
- iv. Output voltage

## Scheme – I

### Sample Question Paper

**Program Name** : Computer Engineering Program Group

**Program Code** : CO/CM/IF/CW

**Semester** : Second

**Course Title** : Basic Electronics

**Marks** : 70

**22225**

**Time: 3 Hrs.**

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#### 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.

#### **Q.1) Attempt any FIVE of the following.**

**10 Marks**

- a. Define Active Components and Passive Components
- b. Define the terms :Rectifier and Filter
- c. Define the following for CE Amplifier (i) Current gain (ii) Voltage gain
- d. Draw the symbol of n-channel and p-channel FET.
- e. Draw the symbol of Fixed Resistor & Variable Resistor
- f. Name the materials that are used in piezoelectric transducer
- g. Define transducers and name two active transducers

#### **Q.2 Attempt any THREE**

**12 Marks**

- a. Determine the value of resistance with the following colour code
  - i) Red Red Red Silver
  - ii) Brown Black Orange Gold
- b. Sketch the labeled Forward and reverse characteristics of PN Junction Diode
- c. Explain the working principle of LED with sketch.
- d. State four applications of BJT.

#### **Q3. Attempt any THREE**

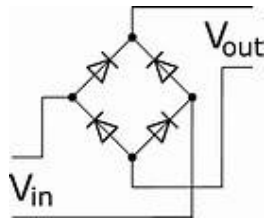
**12Marks**

- a. Draw the labelled drain characteristics of JFET and explain.
- b. Draw a sketch and describe the working of a capacitive transducer
- c. State the function of capacitor and inductor in a circuit
- d. With a circuit diagram, explain how transistor works as a switch.

**Q4. Attempt any THREE**

**12 Marks**

- a. Explain i) Seebeck effect ii) Peltier effect
- b. Identify the below circuit and draw the output waveform for a sinusoidal input



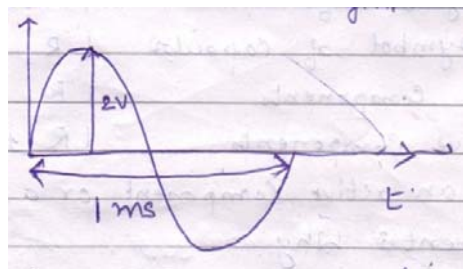
- c. Derive a relation between  $\alpha$  and  $\beta$  of a transistor
- d. When  $V_{GS}$  of a FET changes from  $-3.1\text{ V}$  to  $-3\text{ V}$ , the drain current changes from  $1\text{ mA}$  to  $1.3\text{ mA}$ . What is the value of transconductance?
- e. State the need for filters in Rectifier

**Q5. Attempt any TWO**

**12 Marks**

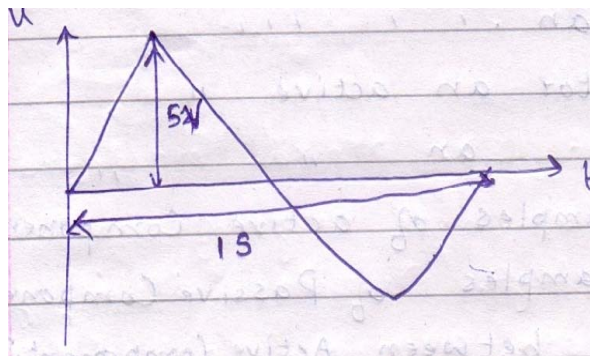
- a. Solve the following:
  - i. Given the following waveform state its Amplitude, Frequency, Phase and wavelength.

(4M)



- ii. Given below is triangular wave. Determine its Amplitude and frequency

(2M)



- b. In CE configuration, if  $\beta = 98$ , Leakage Current  $I_{CEO} = 50\ \mu\text{A}$ . If base current is  $0.5\text{ mA}$ , Determine Collector current  $I_c$  and Emitter current  $I_E$ .
- c. Sketch the block diagram of a regulated power supply. State the function of each block. Draw the waveforms at the output of each block.



**Q6. Attempt any TWO.**

**(12 Marks)**

a. Differentiate MOSFET & FET on the following points.

- i. Schematic symbol
- ii. Transconductance Curve
- iii. Modes of Operation
- iv. Input Impedance

Explain the phenomenon of “pinchoff” in JFET

b. Identify which configuration has following characteristics

Voltage gain =1

Input impedance =High

Output impedance = very Low

Current gain = 100.

Draw the circuit diagram

c. Draw the experimental setup for measuring the temperature of a liquid using thermocouple .State the procedure for measurement of temperature. State the principle of physics that is used for the same.

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## Scheme – I

### Sample Test Paper - I

**Program Name** : Computer Engineering Program Group  
**Program Code** : CO/CM/IF/CW  
**Semester** : Second  
**Course Title** : Basic Electronics  
**Marks** : 20

**22225**

**Time: 1 Hour**

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#### 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.

#### Q.1) Attempt any Four of the following.

**08 Marks**

- a. Define Resistor and Capacitor.
- b. Identify whether the following are active or passive elements.
  - i. Capacitor
  - ii. Voltage Source
- c. Define the following terms:
  - i. knee voltage
  - ii. static resistance
- d. Explain the internal resistance of an Ideal voltage Source & Ideal Current Source.
- e. Explain the unidirectional behavior of PN junction diode.
- f. Draw the symbol of Fixed Resistor & Variable Resistor

#### Q.2 Attempt any Three of the following

**12 Marks**

- a. State advantages of ICs over discrete components.
- b. Explain the working principle of LED.
- c. State the need for filters in Rectifier
- d. A 4 band resistor and a multimeter is provided. Explain the procedure to measure the value of resistance using multimedia and how to verify the measured value

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## Scheme – I

### Sample Test Paper - II

**Program Name** : Computer Engineering Program Group  
**Program Code** : CO/CM/IF/CW  
**Semester** : Second  
**Course Title** : Basic Electronics  
**Marks** : 20

**22225**

**Time: 1 Hour**

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#### 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.

#### Q.1) Attempt any Four of the following.

**08 Marks**

- a. Define the following FET parameter i) Amplification factor ii) Trans conductance
- b. Name two passive transducers. Give their functions.
- c. Draw the symbol of N-channel MOSFET. State any two applications of MOSFET
- d. Draw the symbol of n-channel and p-channel FET.
- e. Explain Seebeck effect with reference to thermocouple.
- f. Define  $\alpha$  and  $\beta$  of a transistor and give the relation between them.

#### Q.2 Attempt any Two of the following.

**12 Marks**

- a. Explain the parameters that need to be considered to use a transistor as a amplifier and state their typical values.
- b. Draw the construction of p-channel FET & describe it's working.
- c. Explain with sketch for temperature measurement using thermocouple and materials used in thermocouple.

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# 22225

**11920**

**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) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (6) 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) Define resistor and draw symbol of variable resistor.
- b) State need of Regulated power supply.
- c) List specification of BJT.
- d) State advantages of MOSFET.
- e) Give different types of IC.
- f) State selection criteria of transducer.
- g) Define Analog Transducer and give examples of it (any two).

P.T.O.

- 2. Attempt any THREE of the following: 12**
- State different types of electrical signal and draw all types of waveforms.
  - Define PIV, TUF, ripple factor, efficiency of rectifier.
  - Draw V-I characteristics of P-N junction diode and explain it.
  - Compare CB, CE and CC configuration of BJT.
- 3. Attempt any THREE of the following: 12**
- Sketch N-channel MOSFET and describe its working.
  - Describe strain gauge with labelled diagram.
  - With the help of circuit diagram describe conversion of VG. source to current source.
  - Draw circuit diagram of single stage RC coupled CE amplifier and describe with the help of input and output waveform.
- 4. Attempt any THREE of the following: 12**
- Describe LVDT with labelled diagram.
  - Draw a circuit diagram of bridge rectifier. Draw its input output waveforms and describe its operation.
  - Draw O/P characteristics of CB configuration and explain its working.
  - Give the relations between AC drain resistance ( $r_d$ ), Transconduction ( $g_m$ ) and amplification factor.
  - Sketch the constructional diagram of LED and describe its working.

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

- a) State the applications and specification of
  - (i) Resistor
  - (ii) Capacitor
  - (iii) Inductor
- b) Describe how transistor can be used as a switch and draw waveforms.
- c) Draw block diagram of regulated power supply, explain function of each block and draw waveforms of each stage.

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

- a) With the help of N-channel JFET describe the effect of input voltage  $V_{GS}$  on output current  $I_D$ .
  - b) Draw frequency response of RC coupled two stage amplifier write formula to calculate bandwidth and state any two methods to improve bandwidth.
  - c)
    - i) Compare
      - 1) Active and passive transducer.
      - 2) Analog and digital transducer.
    - ii) Differentiate following transducer in active and passive.
      - 1) Strain Guage
      - 2) Photovoltaic cell
      - 3) Thermocouple
      - 4) Thermister
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# 22225

**21819**

**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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

- 1. Attempt any FIVE of the following: 10**
- Draw the symbol of Inductor and Capacitor.
  - Draw the symbol of n-channel and p-channel JFET.
  - Write two applications of P-N junction diode.
  - Define transducers and name two active transducers.
  - Define active components and passive components.
  - List the type of transistor and draw their symbols.
  - Draw symbol of photodiode.
- 2. Attempt any THREE of the following: 12**
- What is the color code for a  $220\ \Omega$  10% and  $1.2\ \text{K}\Omega$  5% resistor.
  - Draw and explain reverse biased V-I characteristics of Zener diode.
  - Draw and describe working principal of LED.
  - Explain the construction of N-P-N transistor with the help of diagram.

P.T.O.

3. Attempt any THREE of the following: 12
- Draw a sketch and describe the working of resistive transducer.
  - Draw the construction and explain the operation of n-channel JFET.
  - Give four differences between analog and digital circuits.
  - Draw and explain voltage divider bias network.
4. Attempt any THREE of the following: 12
- In CE configuration if  $\beta = 150$ , leakage current  $I_{CEO} = 100 \mu\text{A}$ , if base current is  $0.2 \text{ mA}$ , determine collector current  $I_C$  and Emitter current  $I_E$ .
  - Sketch the block diagram of regulated power supply. Draw the waveforms at the output of each block.
  - Draw the construction of MOSFET and explain the working.
  - Explain:
    - Seeback effect
    - Peltier effect
  - Draw center tap full wave rectifier and explain its operation.
5. Attempt any TWO of the following: 12
- With circuit diagram explain how transistor works as a switch and as an amplifier.
  - Give the need of a filter. Draw the circuit diagram of  $\pi$  filter and state its working.
  - (i) Given below (Fig. No. 1) the following waveform. State its amplitude, frequency, phase and wavelength.

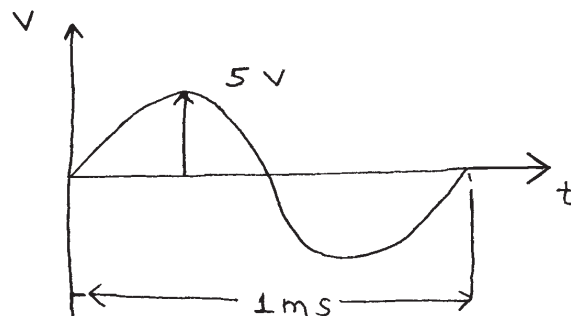


Fig. No. 1



- (ii) Given below is triangular waveform determine its amplitude and frequency. (Fig. No. 2)

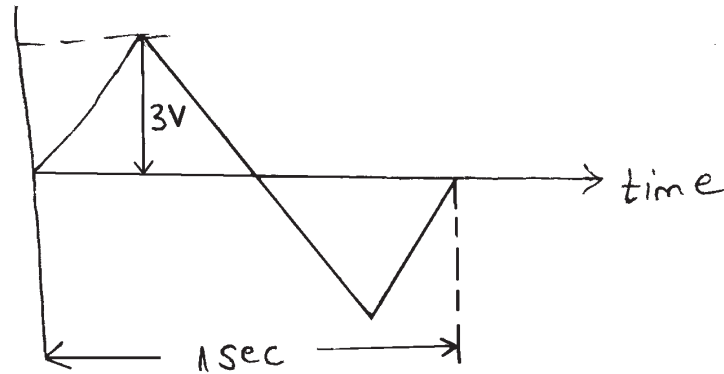


Fig. No. 2

6. Attempt any TWO of the following:

12

- a) Derive the relation between  $\alpha$  and  $\beta$  of a transistor. For CE configuration, BJT has  $\beta = 90$ . If collector current ( $I_C$ ) is 10 mA, then calculate:
- Base current  $I_B$
  - Emitter current  $I_E$
  - $\alpha$
- b) Draw the drain characteristics and transfer characteristic of JFET.
- c) Explain the working principal of phototransistor and photodiode with neat sketches.
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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  $\alpha$  and  $\beta$  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 ( $\eta$ )
  - (iii) Transformer Utilization Factor (TUF)
  - (iv) Peak Inverse Voltage (PIV)

[1 of 4]

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.

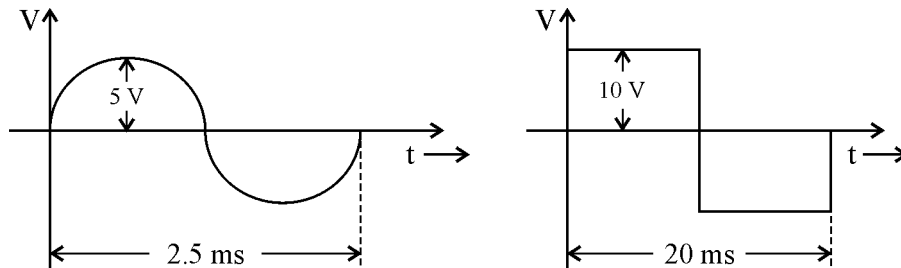


Fig. 1

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

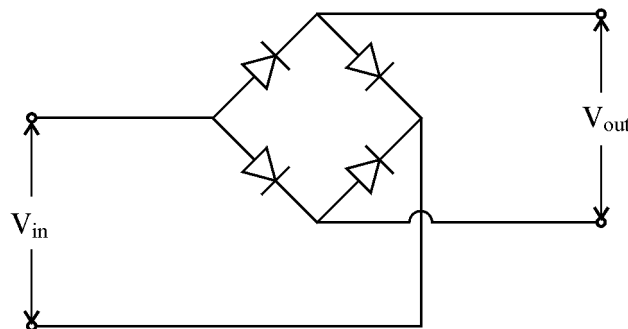


Fig. 2

## 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 :

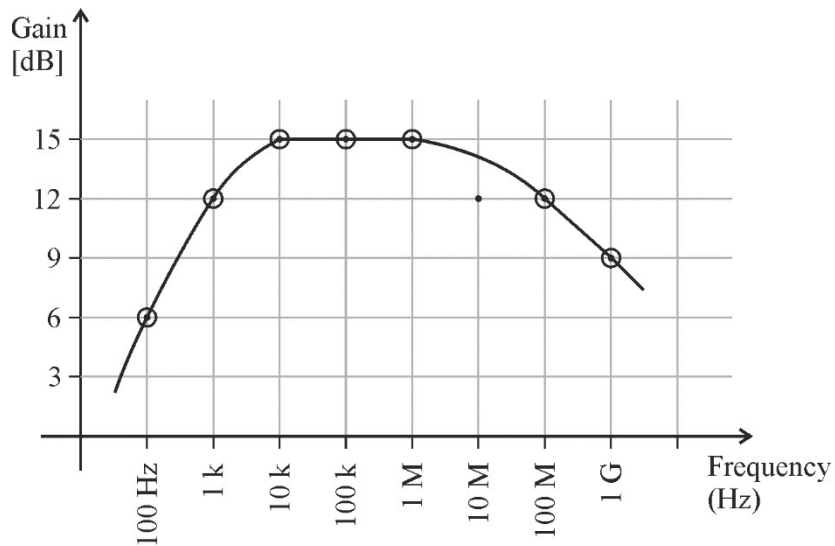
- (i) AC drain resistance
- (ii) Transconductance
- (iii) Amplification factor

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
-

22225

11819

3 Hours / 70 Marks

Seat No.

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- 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.

- |   | <b>Marks</b> |
|---|--------------|
| <b>1. Attempt any FIVE of the following :</b>   | <b>10</b>    |
| (a) Draw the symbol of inductor and capacitor. State the unit of inductor and capacitor.  |              |
| (b) State the need of filters. Define filter.   |              |
| (c) Define $\alpha$ and $\beta$ of transistor.  |              |
| (d) Define amplification factor and trans-conductance of JFET.  |              |
| (e) State the two advantages and disadvantages of integrated circuits.  |              |
| (f) Define transducer and name two passive transducers.   |              |
| (g) State seebeck and Peltier effect.   |              |
| <br>  |              |
| <b>2. Attempt any THREE :</b>   | <b>12</b>    |
| (a) Determine the value of capacitance with the following colour code.<br>(i) Orange, Orange, Blue<br>(ii) Yellow, Violet, Yellow |              |
| (b) Draw the neat sketch of center tap full wave rectifier. Draw i/p and o/p waveforms.   |              |
| (c) Draw and explain zener diode as a voltage regulator.  |              |
| (d) Describe the working principle of npn transistor with the help of diagram.  |              |

**3. Attempt any THREE :****12**

- Sketch the construction of n-channel JFET and explain its working principle.
- Differentiate active and passive transducer on the basis of any four points.
- State the different types of resistors. State any four specifications of resistors.
- Explain the working of two stage RC coupled amplifier with neat circuit diagram.

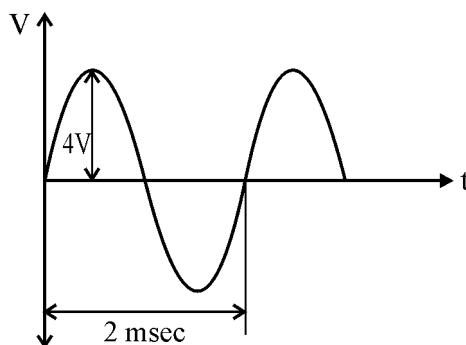
**4. Attempt any THREE :****12**

- Explain any four selection criteria of transducers for temperature measurement.
- Differentiate between P-N junction diode and zener diode.
- Draw DC load line of transistor. Explain working of transistor as a switch.
- Draw the Drain characteristics of JFET showing different operating regions. If drain current is 5 mA,  $I_{DSS} = 10 \text{ mA}$  &  $V_{as(off)} = -6\text{V}$ . Find the value of  $V_{as}$ .
- Draw the block diagram of regulated power supply and explain the working of each block.

**5. Attempt any TWO :****12**

- Solve the following :

- In the waveform shown in fig. (1). State it's amplitude, frequency, phase and wavelength.

**Fig. 1**

- Define : amplitude and frequency

- (b) (i) In Circuit shown in fig. (2), a silicon transistor with  $\beta = 50$  is used. Take  $V_{BE} = 0.7$  V. Find Q point value.

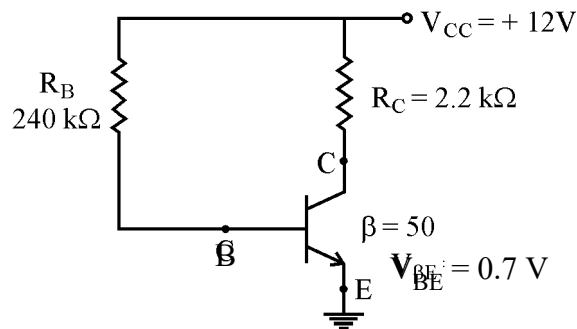


Fig. 2

- (ii) Define operating point of the transistor.
- (c) In full wave bridge rectifier  $V_m = 10 \text{ V}$ ,  $R_L = 10 \text{ k}\Omega$   
find out  $V_{DC}$ ,  $I_{DC}$ , ripple factor and PIV.

6. Attempt any TWO :

12

- (a) Explain working principle of N-Channel depletion type MOSFET with construction diagram. Compare depletion type MOSFET & enhancement type MOSFET.
- (b) Differentiate CE, CB, CC w.r.t. to
- (i) Input resistance
  - (ii) Output resistance
  - (iii) Current gain
  - (iv) Voltage gain
  - (v) Phase shift between input and output
  - (vi) Applications
- (c) List four types of electrical pressure transducers and describe one application of each one.





## Scheme – I

### Sample Question Paper

**Program Name** : Computer Engineering Program Group

**Program Code** : CO/CM/IF/CW

**Semester** : Second

**Course Title** : Basic Electronics

**Marks** : 70

**22225**

**Time: 3 Hrs.**

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#### 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.

#### **Q.1) Attempt any FIVE of the following.**

**10 Marks**

- a. Define Active Components and Passive Components
- b. Define the terms :Rectifier and Filter
- c. Define the following for CE Amplifier (i) Current gain (ii) Voltage gain
- d. Draw the symbol of n-channel and p-channel FET.
- e. Draw the symbol of Fixed Resistor & Variable Resistor
- f. Name the materials that are used in piezoelectric transducer
- g. Define transducers and name two active transducers

#### **Q.2 Attempt any THREE**

**12 Marks**

- a. Determine the value of resistance with the following colour code
  - i) Red Red Red Silver
  - ii) Brown Black Orange Gold
- b. Sketch the labeled Forward and reverse characteristics of PN Junction Diode
- c. Explain the working principle of LED with sketch.
- d. State four applications of BJT.

#### **Q3. Attempt any THREE**

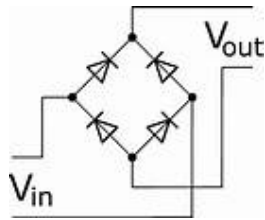
**12Marks**

- a. Draw the labelled drain characteristics of JFET and explain.
- b. Draw a sketch and describe the working of a capacitive transducer
- c. State the function of capacitor and inductor in a circuit
- d. With a circuit diagram, explain how transistor works as a switch.

**Q4. Attempt any THREE**

**12 Marks**

- a. Explain i) Seebeck effect ii) Peltier effect
- b. Identify the below circuit and draw the output waveform for a sinusoidal input



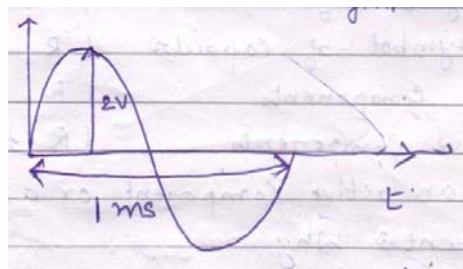
- c. Derive a relation between  $\alpha$  and  $\beta$  of a transistor
- d. When  $V_{GS}$  of a FET changes from  $-3.1\text{ V}$  to  $-3\text{ V}$ , the drain current changes from  $1\text{ mA}$  to  $1.3\text{ mA}$ . What is the value of transconductance?
- e. State the need for filters in Rectifier

**Q5. Attempt any TWO**

**12 Marks**

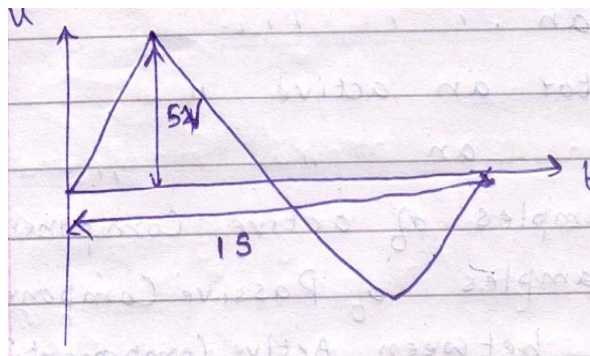
- a. Solve the following:
  - i. Given the following waveform state its Amplitude, Frequency, Phase and wavelength.

(4M)



- ii. Given below is triangular wave. Determine its Amplitude and frequency

(2M)



- b. In CE configuration, if  $\beta = 98$ , Leakage Current  $I_{CEO} = 50\ \mu\text{A}$ . If base current is  $0.5\text{ mA}$ , Determine Collector current  $I_c$  and Emitter current  $I_E$ .
- c. Sketch the block diagram of a regulated power supply. State the function of each block. Draw the waveforms at the output of each block.

**Q6. Attempt any TWO.**

**(12 Marks)**

a. Differentiate MOSFET & FET on the following points.

- i. Schematic symbol
- ii. Transconductance Curve
- iii. Modes of Operation
- iv. Input Impedance

Explain the phenomenon of “pinchoff” in JFET

b. Identify which configuration has following characteristics

Voltage gain =1

Input impedance =High

Output impedance = very Low

Current gain = 100.

Draw the circuit diagram

c. Draw the experimental setup for measuring the temperature of a liquid using thermocouple .State the procedure for measurement of temperature. State the principle of physics that is used for the same.

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## Scheme – I

### Sample Test Paper - I

**Program Name** : Computer Engineering Program Group  
**Program Code** : CO/CM/IF/CW  
**Semester** : Second  
**Course Title** : Basic Electronics  
**Marks** : 20

**22225**

**Time: 1 Hour**

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#### 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.

#### **Q.1) Attempt any Four of the following.**

**08 Marks**

- a. Define Resistor and Capacitor.
- b. Identify whether the following are active or passive elements.
  - i. Capacitor
  - ii. Voltage Source
- c. Define the following terms:
  - i. knee voltage
  - ii. static resistance
- d. Explain the internal resistance of an Ideal voltage Source & Ideal Current Source.
- e. Explain the unidirectional behavior of PN junction diode.
- f. Draw the symbol of Fixed Resistor & Variable Resistor

#### **Q.2 Attempt any Three of the following**

**12 Marks**

- a. State advantages of ICs over discrete components.
- b. Explain the working principle of LED.
- c. State the need for filters in Rectifier
- d. A 4 band resistor and a multimeter is provided. Explain the procedure to measure the value of resistance using multimedia and how to verify the measured value

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## Scheme – I

### Sample Test Paper - II

**Program Name** : Computer Engineering Program Group  
**Program Code** : CO/CM/IF/CW  
**Semester** : Second  
**Course Title** : Basic Electronics  
**Marks** : 20

**22225**

**Time: 1 Hour**

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#### 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.

#### Q.1) Attempt any Four of the following.

**08 Marks**

- a. Define the following FET parameter i) Amplification factor ii) Trans conductance
- b. Name two passive transducers. Give their functions.
- c. Draw the symbol of N-channel MOSFET. State any two applications of MOSFET
- d. Draw the symbol of n-channel and p-channel FET.
- e. Explain Seebeck effect with reference to thermocouple.
- f. Define  $\alpha$  and  $\beta$  of a transistor and give the relation between them.

#### Q.2 Attempt any Two of the following.

**12 Marks**

- a. Explain the parameters that need to be considered to use a transistor as a amplifier and state their typical values.
- b. Draw the construction of p-channel FET & describe it's working.
- c. Explain with sketch for temperature measurement using thermocouple and materials used in thermocouple.

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22225

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- 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) Draw the symbols of resistor & capacitor. State the unit of measurement of resistance & capacitor.
- (b) Give two points of distinction between half wave & full wave rectifier.
- (c) Define  $\alpha$  &  $\beta$  of a transistor.
- (d) Draw the symbols of N channel & P channel JFET.
- (e) Give two points of distinction between active & passive components.
- (f) Give two points of distinction between active & passive transducers.
- (g) State the selection criterion of transducers.

- 2. Attempt any THREE of the following :** **12**
- (a) With suitable graph, define voltage source & current source.
  - (b) Draw a neat diagram of bridge rectifier. Draw input & output waveforms.
  - (c) With suitable diagram, explain the working of P-N junction diode.
  - (d) With suitable diagram, explain the working of NPN transistor.
- 3. Attempt any THREE of the following :** **12**
- (a) Draw the drain & transfer characteristics of JFET.
  - (b) Give the steps followed to measure temperature of metal using given transducer. Draw suitable diagram.
  - (c) List two advantages of Integrated Circuits. Distinguish between analog & digital ICs.
  - (d) With suitable diagram, explain the working of transistor as an amplifier.
- 4. Attempt any THREE of the following :** **12**
- (a) Explain :
    - (i) Seebeck effect
    - (ii) Peltier effect
  - (b) Draw block diagram of regulated power supply. Explain function of each block.
  - (c) With suitable diagram, explain the working of transistor as a switch.
  - (d) A JFET has a drain current of 3 mA. If  $I_{DSS}$  is 10 mA &  $V_{GS}(\text{OFF})$  is  $-6\text{V}$ . Find  $V_{GS}$  &  $V_p$ .
  - (e) With suitable diagram, explain the working of capacitor filter with full wave rectifier. Draw i/p & o/p waveforms.



5. Attempt any TWO of the following :

- (a) (i) From the sinusoidal wave given below, in fig. (i) & fig. (ii) calculate Amplitude, Frequency.

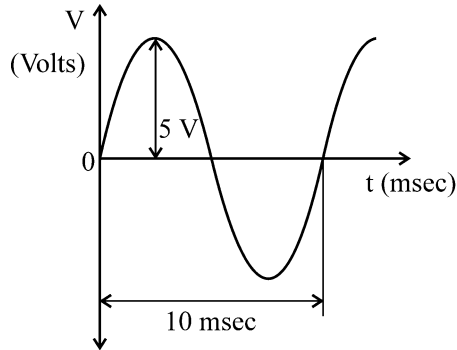


Fig. (i)

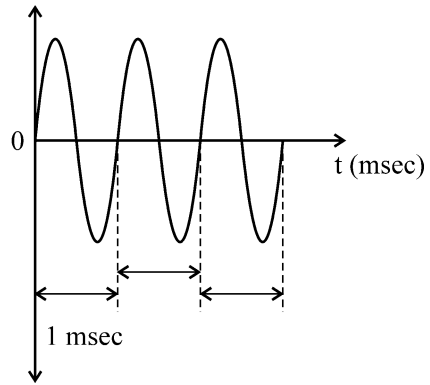


Fig. (ii)

- (ii) Give the value of resistance for the following colour codes –  
Red Blue Green Gold.
- (b) (i) In NPN transistor,  
 $I_{CE0} = 1000 \mu A$ ,  $\beta = 50$ ,  $I_B = 10 \mu A$   
Find  $I_C$  &  $I_E$ .
- (ii) Define operating point of a transistor.
- (c) (i) Identify the given circuit in fig. (iii) and explain its working.  
(ii) Draw the input and output for the same circuit.

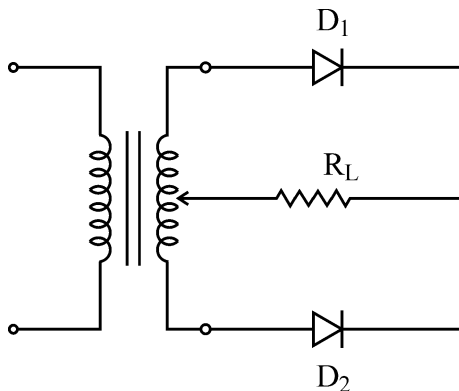


Fig. (iii)

- (iii) State application for the given circuit.

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

- (a) Draw suitable diagrams showing depletion regions before & after pinch-off for N channel JFET.
  - (b) Distinguish between CB, CC, CE (four points). Explain, why CE configuration is the most preferred combination.
  - (c) With suitable diagram, explain how photodiode & phototransistor can be used as control device for the given application.
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22225

12223

3 Hours / 70 Marks

Seat No.

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- 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) Use of Non-programmable Electronic Pocket Calculator is permissible.

**Marks**

1. Attempt any FIVE of the following :

10

- (a) Define Active and Passive Components.
- (b) Draw V-I characteristics of an ideal P-N junction diode.
- (c) Define Rectifier. List the types of Rectifiers.
- (d) Define  $\alpha$  and  $\beta$  of Transistor.
- (e) Define transducers and name any two active transducers.
- (f) Draw constructional diagram of a photodiode.
- (g) State two advantages of Integrated circuits.



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

- (a) List the types of signals. State the expression for frequency  $f$  and wavelength  $\lambda$ , of an A.C. signal.
- (b) Derive the relationship between  $\alpha$  and  $\beta$  of transistor.
- (c) State and explain the operating principle of P-N junction diode under forward bias condition.
- (d) Draw the construction of Cup Type LED. List any two applications of it.

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

- (a) Compare FET and BJT (Any Four points).
- (b) Explain the working principle of phototransistor. State any two advantages of phototransistor.
- (c) Determine the value of resistance with following colour code :
  - (i) Brown Black Black Sliver
  - (ii) Red Red Orange Gold
- (d) Describe the working principle of n-p-n transistor with the help of neat diagram.

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

- (a) State any four selection criteria for transducers.
- (b) Define the following terms with respect to Rectifier :
  - (i) Ripple Factor
  - (ii) Rectification Efficiency (h)
  - (iii) Transformer Utilization Factor (TUF)
  - (iv) Peak Inverse Voltage (PIV)

- (c) Draw the circuit diagram of single stage RC coupled CE amplifier. State any two advantages of it.
- (d) Draw and explain Drain characteristics of n-channel JFET.
- (e) Draw and explain the working of CLC filter.

5. Attempt any TWO of the following :

12

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

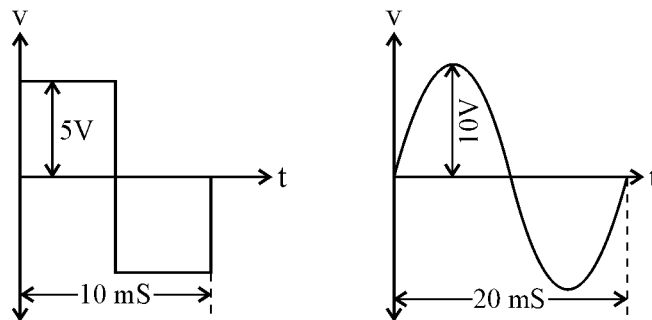


Figure – 1

- (b) In CE configuration of transistor, if  $\beta = 50$ , leakage current  $I_{CEO} = 100 \mu\text{A}$ . If the Base current is 0.2 mA. Calculate the value of  $I_C$ ,  $I_E$  and  $\alpha$ .
- (c) (i) Sketch the Full Wave Bridge Rectifier and draw the waveforms of Load Voltage and Load Current.
- (ii) State any two advantages of FWR over HWR.

6. Attempt any TWO of the following :

12

- (a) (i) A JFET has a drain current of 10 mA. If  $I_{DSS} = 20 \text{ mA}$  and  $V_{GS}(\text{off}) = -8\text{V}$ . Find the value of: (i)  $V_{GS}$  (ii)  $V_P$
- (ii) Draw the symbol of N-channel and P-channel MOSFET.

(b) Observe the given frequency response of RC coupled amplifier, shown in Figure-2. Calculate :

- (i) Lower cutoff frequency ( $f_L$ )
- (ii) Higher cutoff frequency ( $f_H$ ) and
- (iii) Bandwidth (BW)

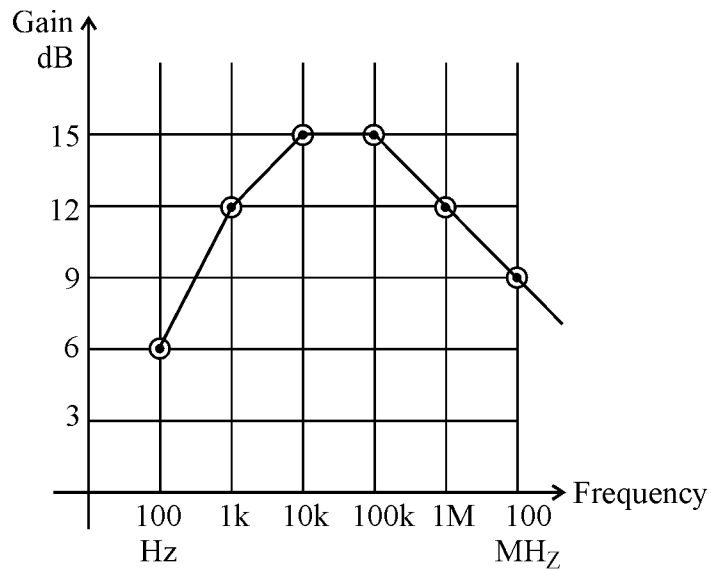


Figure – 2

(c) List four types of electrical pressure transducers and state one application of each type.

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22225

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- 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) Draw the symbols of resistor & capacitor. State the unit of measurement of resistance & capacitor.
- (b) Give two points of distinction between half wave & full wave rectifier.
- (c) Define  $\alpha$  &  $\beta$  of a transistor.
- (d) Draw the symbols of N channel & P channel JFET.
- (e) Give two points of distinction between active & passive components.
- (f) Give two points of distinction between active & passive transducers.
- (g) State the selection criterion of transducers.

- 2. Attempt any THREE of the following :** **12**
- (a) With suitable graph, define voltage source & current source.
  - (b) Draw a neat diagram of bridge rectifier. Draw input & output waveforms.
  - (c) With suitable diagram, explain the working of P-N junction diode.
  - (d) With suitable diagram, explain the working of NPN transistor.
- 3. Attempt any THREE of the following :** **12**
- (a) Draw the drain & transfer characteristics of JFET.
  - (b) Give the steps followed to measure temperature of metal using given transducer. Draw suitable diagram.
  - (c) List two advantages of Integrated Circuits. Distinguish between analog & digital ICs.
  - (d) With suitable diagram, explain the working of transistor as an amplifier.
- 4. Attempt any THREE of the following :** **12**
- (a) Explain :
    - (i) Seebeck effect
    - (ii) Peltier effect
  - (b) Draw block diagram of regulated power supply. Explain function of each block.
  - (c) With suitable diagram, explain the working of transistor as a switch.
  - (d) A JFET has a drain current of 3 mA. If  $I_{DSS}$  is 10 mA &  $V_{GS}(\text{OFF})$  is  $-6\text{V}$ . Find  $V_{GS}$  &  $V_p$ .
  - (e) With suitable diagram, explain the working of capacitor filter with full wave rectifier. Draw i/p & o/p waveforms.



5. Attempt any TWO of the following :

- (a) (i) From the sinusoidal wave given below, in fig. (i) & fig. (ii) calculate Amplitude, Frequency.

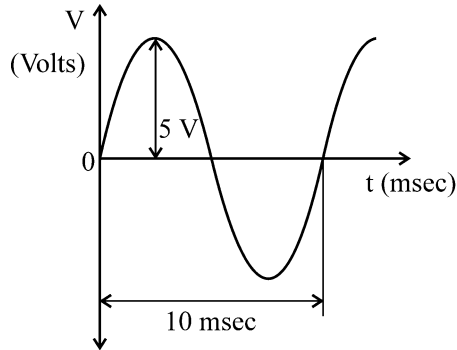


Fig. (i)

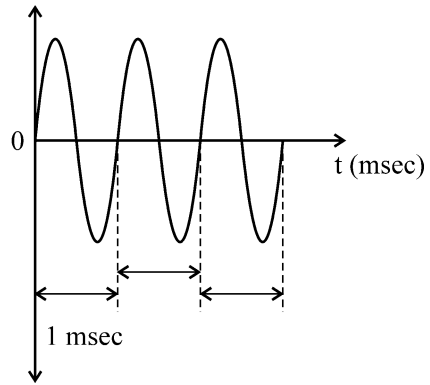


Fig. (ii)

- (ii) Give the value of resistance for the following colour codes –  
Red Blue Green Gold.
- (b) (i) In NPN transistor,  
 $I_{CE0} = 1000 \mu A$ ,  $\beta = 50$ ,  $I_B = 10 \mu A$   
Find  $I_C$  &  $I_E$ .
- (ii) Define operating point of a transistor.
- (c) (i) Identify the given circuit in fig. (iii) and explain its working.  
(ii) Draw the input and output for the same circuit.

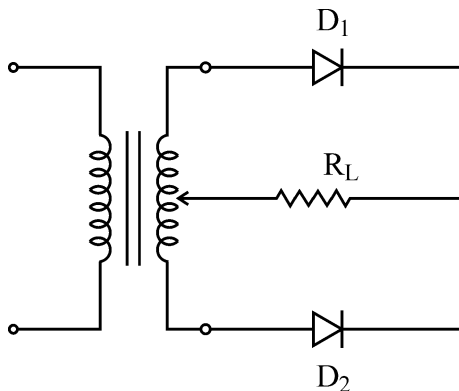


Fig. (iii)

- (iii) State application for the given circuit.

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

- (a) Draw suitable diagrams showing depletion regions before & after pinch-off for N channel JFET.
  - (b) Distinguish between CB, CC, CE (four points). Explain, why CE configuration is the most preferred combination.
  - (c) With suitable diagram, explain how photodiode & phototransistor can be used as control device for the given application.
-



22216

12223

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 the constructional diagram of LED and label it.
- (b) State the working principle of photodiode.
- (c) Define Operating point and give its significance.
- (d) List two applications of FET.
- (e) Name two types of JFET & draw their symbols.
- (f) Draw the circuit of Zener diode as voltage regulator.
- (g) State the advantages of transistorized regulator.



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

- (a) Define Energy band and state the effect of temperature on it for a semiconductor with an example.
- (b) Draw the circuit diagram of transistor in CE configuration and explain its output characteristics.
- (c) Draw the circuit of base bias with emitter feedback and describe its operation.
- (d) Draw the block diagram of DC regulated power supply and describe the working of each block.

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

- (a) A full wave rectifier uses two diodes, the internal resistance of each diode may be assumed constant at  $20\ \Omega$ . The transformer r.m.s. secondary voltage from centre tap to each end of secondary is  $50\ \text{V}$  and load resistance is  $980\ \Omega$ .

Find :

- (i) D.C. load current
  - (ii) r.m.s. value of load current.
- (b) Define the following terms :
    - (i) PIV
    - (ii) Efficiency
    - (iii) Ripple factor
    - (iv) TUF
  - (c) Draw the output characteristics of JFET and describe the salient points related to it.
  - (d) Draw the circuit of transistorized series voltage regulator and explain its operation.

## 4. Attempt any THREE of the following :

12

- (a) Compare between LC filter and  $\pi$  filter on the basis of :
- Load regulation
  - Ripple factor
  - Suitable for type of load
  - Components used
- (b) Explain the terms w.r.t. BJT biasing :
- Stabilization
  - Thermal runaway
- (c) Calculate the emitter current in the voltage divider circuit shown in Fig. 4(c). Also find the value of  $V_{CE}$  and collector potential  $V_C$ .

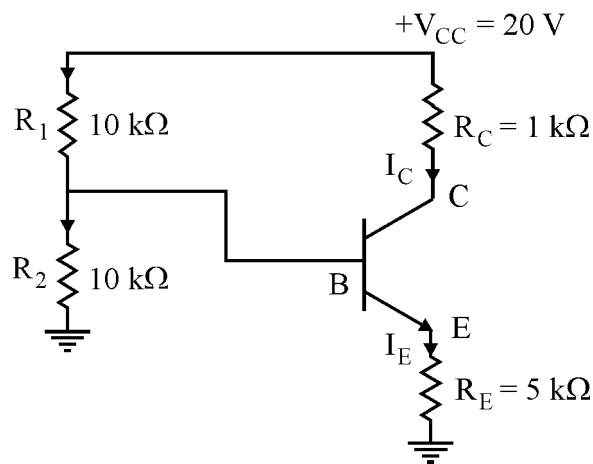


Fig. 4 (c)

- (d) Compare between source self bias and drain to source bias. (any 4 points).
- (e) Describe the terms :
- Load regulation
  - Line regulation

## 5. Attempt any TWO of the following :

12

- (a) State the working principle of E-MOSFET and draw and explain its constructional sketch.

- (b) Identify the circuit in Fig. 5(b) (i) & (ii) and draw the input and output waveforms.

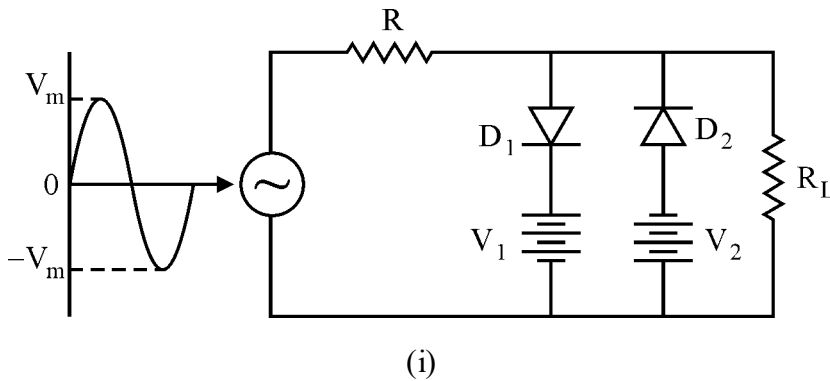


Fig. 5 (b)

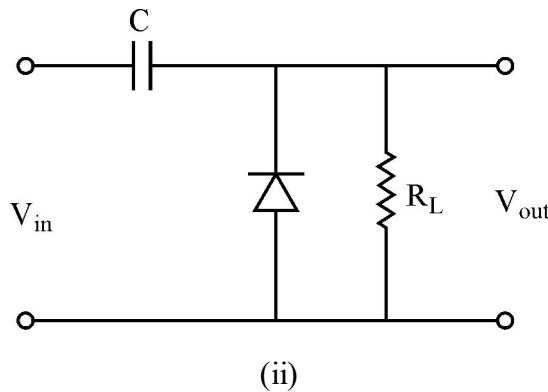


Fig. 5 (b)

- (c) Draw the V-I characteristics of Zener diode in reverse bias and explain it.

6. Attempt any TWO of the following :

- (a) Draw and explain forward and reverse V-I characteristics of PN junction diode and justify their use as rectifier.
- (b) Draw the bridge rectifier circuit. Describe its working with the input and output waveforms.
- (c) Justify the use of CE configuration in transistor amplifiers with respect to their DC load line & operating point.



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22216

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

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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) Draw the symbol of LED and Zener diode.
- (b) State types of JFET and draw its symbol with terminal names.
- (c) Define transistor & state its types.
- (d) State any two application of FET.
- (e) State the need of DC regulated power supply.
- (f) Define :
  - (i) Line regulation
  - (ii) Load regulation
- (g) Draw the forward bias characteristics of Silicon (Si) pn junction diode.

## 2. Attempt any THREE of the following :

12

- (a) Compare pn junction diode and zener diode.
- (b) Describe operation of voltage divider biasing with neat circuit diagram.
- (c) Draw block diagram of DC regulated power supply and write function of each block.
- (d) Explain the phenomenon of thermal runaway in BJT. Write the method to avoid it.

## 3. Attempt any THREE of the following :

12

- (a) State the values of the following parameters with reference to full wave rectifier :
  - (i) Ripple factor
  - (ii) Efficiency
  - (iii) TUF
  - (iv) PIV
- (b) Draw circuit diagram and waveforms for full wave center tapped rectifier.
- (c) Sketch input & output characteristics of CE configuration. Label various regions on it.
- (d) Determine output voltage  $V_O$ , load current  $I_L$ , zener current  $I_Z$  & power dissipation in zener diode for the circuit shown below (Fig. – 1).

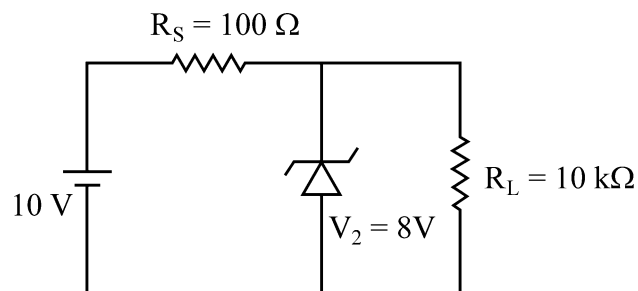


Fig. – 1



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

- (a) Compare L, C, LC and TT filters (any 4 points).
- (b) Explain working of NPN transistor with neat labelled diagram.
- (c) Compare CB, CE & CC configuration of transistor on the basis of any four factors.
- (d) A JFET has a drain current of 5 mA. If  $I_{DSS} = 10 \text{ mA}$  &  $V_{GS}(\text{off}) = -6\text{V}$ . Find the value of (i)  $V_{GS}$  (ii)  $V_P$
- (e) With the help of reverse characteristics of zener diode explain its use as a regulator.

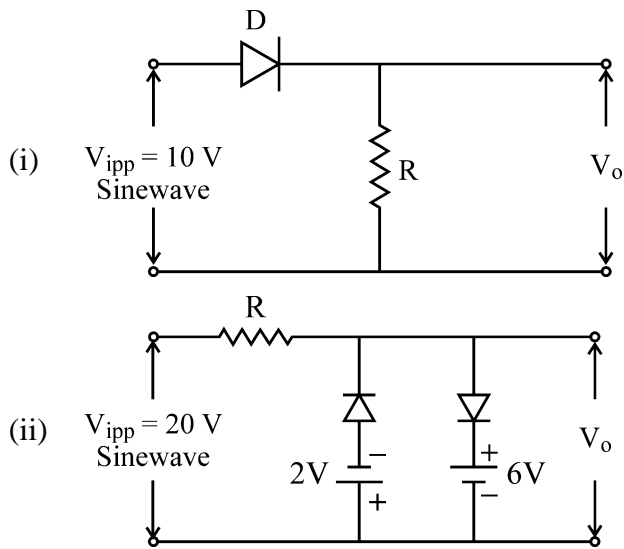
**5. Attempt any TWO of the following :****12**

- (a) Draw & explain the drain & transfer characteristics of N-channel JFET.
- (b) An AC supply of 230 V is applied to HWR through a transformer with turns ratio of 10 : 1. Find average DC output voltage, output current and PIV of diode, also rms value of voltage & current.
- (c) Explain forward and reverse biased VI characteristics of PN junction diode.

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

- (a) Draw the construction of LED & write advantages, disadvantages and applications of it (each two points).
- (b) (i) In CE configuration if  $\beta = 99$ , leakage current  $I_{CEO} = 50 \mu\text{A}$ . If base current is 0.5 mA, determine  $I_C$  &  $I_E$ .
- (ii) Derive relation between  $\alpha$  &  $\beta$ .

- (c) Identify the given circuits in figure 2 and draw input and output waveform for following circuit (Fig. – 2) :



**Fig. – 2**

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# 22216

11920

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

**Marks**

1. Attempt any FIVE of the following:

10

- Define : Intrinsic semiconductor and Extrinsic semiconductor.
- State any two applications of FET.
- Draw symbol of NPN and PNP transistor.
- Sketch the drain characteristics of N-channel MOSFET.
- Define : Load regulation and Line regulation.
- Draw basic block diagram of a DC regulated power supply.
- Identify the components of following symbol.

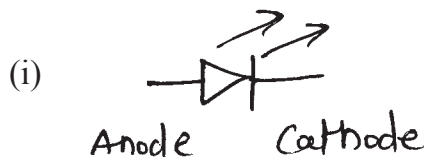


Fig. No. 1

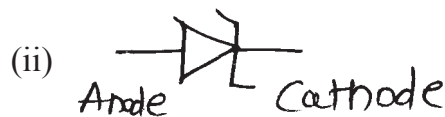


Fig. No. 2

P.T.O.

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

- a) Compare P-N junction diode and zener diode on following parameters:
- (i) Symbol
  - (ii) Doping Level
  - (iii) Breakdown Voltage
  - (iv) Applications.
- b) Sketch input and output characteristics of CE configuration. Label various regions on characteristics.
- c) Sketch circuit diagram of transistorized series voltage regulator and explain its working.
- d) Derive the relationship between  $\alpha$  and  $\beta$  of a transistor.

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

- a) Define following parameter of rectifier :
- (i) Ripple factor
  - (ii) Efficiency
  - (iii) Peak Inverse Voltage
  - (iv) Transformer utilization factor
- b) Sketch circuit diagram of positive biased clipper using diode and explain its working.
- c) Define with respect to FET :-
- (i) Static drain resistance
  - (ii) Dynamic resistance
  - (iii) Trans conductance
  - (iv) Pinch-OFF voltage
- d) State any four applications of regulated D.C. power-supply.

- 4. Attempt any THREE of the following:** **12**
- a) Compare half wave rectifier and full wave bridge rectifier with following parameters.
    - (i) No of diodes used
    - (ii) Efficiency
    - (iii) Peak inverse voltage
    - (iv) Ripple frequency
  - b) Sketch the experimental setup for CB transistor configuration.
  - c) If  $\alpha$  of a transistor is 0.9; Calculate  $\beta$ .
  - d) State advantages of MOSFET over JFET.
  - e) Sketch block diagram of an unregulated power supply and explain function of each block.
- 5. Attempt any TWO of the following:** **12**
- a) Sketch construction of N-channel JFET and explain it's operating principle.
  - b) Draw circuit diagram for  $\pi$  filter and explain it's working with waveforms.
  - c) Sketch constructional diagram of LED and state it's three applications.
- 6. Attempt any TWO of the following:** **12**
- a) Describe classification of solids on the basis of energy band diagram.
  - b) Sketch the circuit diagram of centre tap rectifier and explain it's working with input and output waveforms.
  - c) Explain with circuit diagram, voltage divider biasing method and state it's two advantages.
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# 22216

**21819**

**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.
  - (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) Sketch energy band diagram of insulator and semiconductor.
  - b) State function of ‘Gate’, ‘Source’ and ‘Drain’ terminals of FET.
  - c) Sketch symbol of NPN and PNP transistor.
  - d) List out any two applications of FET.
  - e) Define the term ‘Voltage Regulation’
  - f) Draw the circuit diagram of transistorised series voltage regulator.
  - g) Define the term ‘knee voltage’ of P-N junction diode.

P.T.O.

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

- a) Compare P-N junction diode with zener diode on the basis of:
  - (i) Symbol
  - (ii) Type of reverse break down
  - (iii) V. I characteristic
  - (iv) Material.
- b) Define following terms related to BJT:
  - (i) Current gain in CE configuration (Beta)
  - (ii) Quiescent point
  - (iii) Stability factor
  - (iv) Dynamic input resistance of CE configuration
- c) Sketch and explain zener diode as voltage regulator.
- d) Derive relationship between alpha ( $\alpha$ ) and beta ( $\beta$ ) of BJT.

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

- a) Sketch circuit diagram of bridge rectifier with  $\pi$  filter.
- b) Compare half wave rectifier with full wave (centre tapped) rectifier on the basis of:
  - (i) No. of required diodes
  - (ii) Rectifier efficiency
  - (iii) Ripple factor
  - (iv) Transformer utilization factor.
- c) Derive relationship between transconductance ( $g_m$ ), amplification factor ( $\mu$ ) and drain resistance ( $\gamma_d$ ) of FET.
- d) Sketch transistor shunt voltage regulator and explain how voltage regulation is done.

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

- a) Define the term 'clipper circuit'. State classification of clipper circuit.
- b) Sketch the input and output characteristics of CB configuration. Label it.
- c) For common base (CB) configuration of BJT if  $I_E = 2 \text{ mA}$  and  $I_B = 20 \text{ } \mu\text{A}$ . Calculate value of  $I_C$  and current gain  $\alpha$  (Alpha).
- d) Compare BJT with FET on the basis of:
  - (i) Symbol
  - (ii) Input impedance
  - (iii) Thermal stability
  - (iv) Charge carrier polarity.
- e) Sketch block diagram of D.C regulated power supply and sketch waveform at each stage.

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

- a) With neat constructional diagram explain operation of Depletion type N-channel MOSFET.
- b) Sketch positive clamper circuit diagram to clamp output at  $+7\text{V}$  for input sine signal with  $V_{pp} = 20 \text{ V}$ . Sketch input and output waveform.
- c) Sketch V-I characteristics of P-N junction diode. Calculate static forward resistance if applied forward bias voltage is  $0.8 \text{ V}$  and corresponding diode current is  $150 \text{ mA}$ .



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

- a) Suggest proper diode for following applications:
- (i) For optical communication as a source
  - (ii) For rectifier circuit
  - (iii) For voltage regulation
  - (iv) For clipper circuit
  - (v) For light intensity meter
  - (vi) For meter protection circuit.
- b) Explain with circuit diagram voltage divider biasing method for BJT.
- c) Draw the circuit diagrams and output waveforms of series inductor filter, LC filter and  $\pi$  filter.
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11819

3 Hours / 70 Marks

Seat No.

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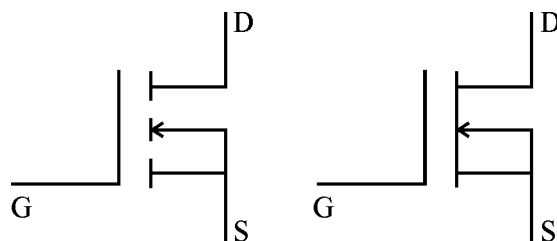
- Instructions :**
- (1) All Questions are *compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.

**Marks**

1. Attempt any FIVE of the following :

**10**

- (a) Draw the symbol of photodiode.
- (b) Define Transistor. State its type.
- (c) Define load and line regulation.
- (d) State application of FET.
- (e) Sketch energy band diagram of semiconductor.
- (f) State the need of DC regulated power supply.
- (g) Name the components of following symbol :



(i)

(ii)

## 2. Attempt any THREE of the following :

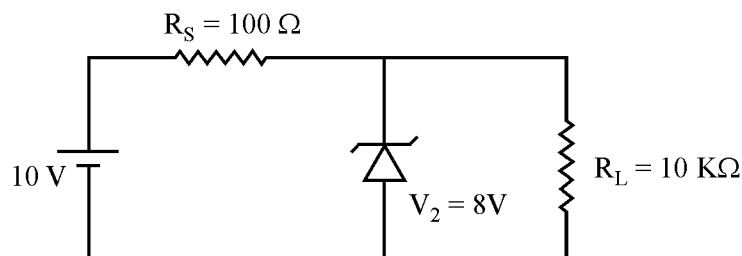
12

- (a) Compare PN junction diode & zener diode (four points).
- (b) Explain with a neat circuit diagram of voltage divider bias method for biasing a transistor.
- (c) Draw the block diagram of DC power supply. Explain the function of each block.
- (d) Explain the concept of DC load line and operating point.

## 3. Attempt any THREE of the following :

12

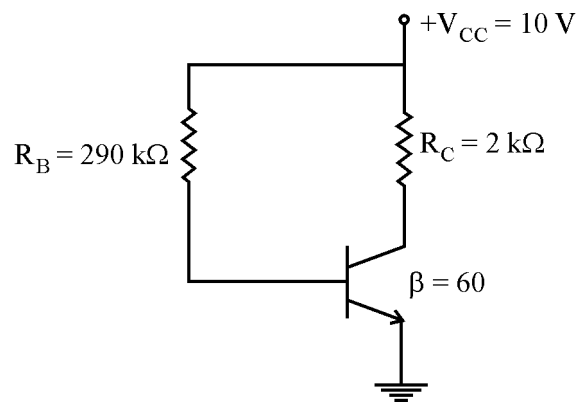
- (a) An AC supply of 230 V is applied to HWR through a transformer with turns ratio 10 : 1. Find Average DC output, Voltage current and P/V of diode, RMS value of voltage and current.
- (b) State the values of following parameters with reference to full wave rectifier :
  - (i) Ripple factor
  - (ii) Efficiency
  - (iii) TUF
  - (iv) P/V
- (c) Compare EMOSFET & DMOSFET.
- (d) Determine output voltage  $V_o$ , load current  $I_L$ , zener current  $I_Z$  & power dissipation in zener diode for the circuit shown below.



4. Attempt any THREE of the following :

12

- (a) Compare L, C, LC and  $\pi$  filter on the basis of usefulness in reducing ripple or suitability for heavy / light load.
- (b) Explain the operating principle of PNP transistor.
- (c) Find the Q point values for the following circuit. Assume  $V_{BE} = 0.7 \text{ V}$  &  $\beta = 60$



- (d) Compare BJT & JFET with reference to following point :
  - (i) Symbol
  - (ii) Transfer characteristics
  - (iii) I/P impedance
  - (iv) Application
- (e) Describe the working of zener diode as a voltage regulator with reverse characteristics of zener diode.

P.T.O.

## 5. Attempt any TWO of the following :

12

- (a) With neat circuit diagram and mathematical expressions, explain the self biasing used in FET.
- (b) Identify the following circuit shown in Fig. No. 1 and draw input and output waveforms

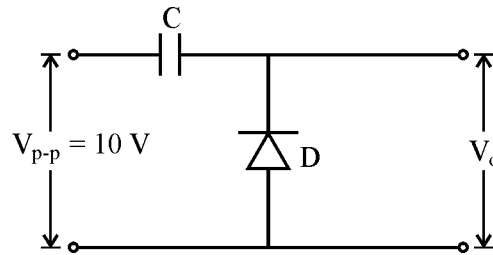


Fig. 1

- (c) Explain V-I characteristics of zener diode.

## 6. Attempt any TWO of the following :

12

- (a) Draw the characteristics of LED and write advantages, disadvantages and application of it. (each two points)
- (b) Draw circuit and describe working of full wave rectifier using center tapped transformer with waveforms.
- (c) (i) In CE configuration if  $\beta = 99$  leakage current  $I_{CEO} = 50 \mu\text{A}$ . If base current is 0.5 mA. Determine  $I_C$  and  $I_E$ .
- (ii) Derive relation between  $\alpha$  &  $\beta$ .

22216

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) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (6) 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) State materials used for LED's to emit different colour light.
- (b) Sketch the symbol of P-channel and n-channel depletion type MOSFET.
- (c) List any two BJT biasing circuits with respect to operating point.
- (d) State different methods of biasing of FET.
- (e) Sketch reverse characteristics of zener diode with proper labelling.
- (f) Define line regulation. State the formula for its regulation.
- (g) State cut in voltage value of diode for silicon and germanium.

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

- (a) Describe experimental set-up for operation of P-N junction diode in forward bias. Draw its characteristics.
- (b) Define alpha and beta of a transistor and state the relation between them.
- (c) Explain basic block diagram of regulated DC power supply, draw its input and output waveforms.
- (d) Explain the need of stabilization of Q point.

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

- (a) Describe circuit diagram of bridge rectifier, draw its input and output waveforms.
- (b) Explain the working of positive clamper with proper circuit diagram and draw the waveforms at input & output of clamper.
- (c) A JFET has  $I_{DSS} = 10 \text{ mA}$ ,  $V_p = -5 \text{ volts}$ ,  $g_{mo} = 2 \text{ ms}$ . Calculate the trans-conductance and drain current of the JFET for  $V_{GS} = -2.5 \text{ volts}$ .
- (d) Draw the circuit diagram for transistor series regulator and explain functions of each component.

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

- (a) State the values of following parameters for half wave and full wave rectifiers :
  - (i) Number of diode used in circuit.
  - (ii) Rectification efficiency ( $\eta$ )
  - (iii) Transfer Utilization Factor (TUF)
  - (iv) Ripple factor

- (b) Explain the operation of npn transistor in the active region.
- (c) Draw the input and output characteristics of CE configuration with proper labelling of various regions.
- (d) Draw the constructional details of n-channel MOSFET. State its working principle.
- (e) Describe the working of zener as a voltage regulator.

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

**12**

- (a) Explain drain characteristics of JFET with ohmic region, saturation region, cut off region and break down region.
- (b) Draw circuit diagram and input and output waveforms of full wave rectifier connected with  $\pi$  filter.
- (c) Describe V-I characteristics of zener diode.

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

**12**

- (a) Show constructional details of LED. Give any two applications of LED.
  - (b) Describe the working of single stage CE amplifier with neat circuit diagram.
  - (c) Differentiate clipper and clamper with following points :
    - (i) Components used in circuit.
    - (ii) Function
    - (iii) Application
    - (iv) Configuration
-



