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(3rd Semester)

ELECTRONICS

THIRD PAPER

(**Electronic Devices and Amplifiers**)

(PART : A—OBJECTIVE)

(Marks : 20)

SECTION—I

(Marks : 5)

Each question carries 1 mark

Answer **all** questions

Tick (✓) the correct answer in the brackets provided :

1. For operation of enhancement-only n -channel MOSFET, the value of gate voltage has to be

- (a) zero ()
- (b) low positive ()
- (c) high voltage ()
- (d) high negative ()

2. After firing an SCR, the gating pulse is removed. The current in the SCR will

- (a) remain the same ()
- (b) immediately fall to zero ()
- (c) rise up ()
- (d) rise a little and then fall to zero ()

3. To obtain a square-wave output from the input sine wave, the clipping level of a Zener diode can be adjusted by

- (a) increasing peak value of signal voltage and less V_Z value ()
- (b) increasing peak value of signal voltage and higher V_Z value ()
- (c) decreasing peak value of signal voltage and less V_Z value ()
- (d) decreasing peak value of signal voltage and more V_Z value ()

4. Crossover distortion occurs in

- (a) class A ()
- (b) class B ()
- (c) class AB ()
- (d) push-pull (www.gzrsc.edu.in)

5. If $R_f = 1000 \text{ k}\Omega$, $R_1 = 1 \text{ k}\Omega$, then the voltage gain of an inverting amplifier is equal to

(a) 1000 ()

(b) -1000 ()

(c) 0.0001 ()

(d) -0.0001 ()

(4)

SECTION—II

(Marks : 15)

Each question carries 3 marks

Answer *any five* questions

1. Define the parameters of FET and derive the relation among these parameters.

(5)

2. With suitable diagram, explain the $V-I$ characteristics of SCR.

3. Draw a symbol for solar cell and explain the working of a solar cell.

4. Why are tuned amplifiers not used for low-frequency amplification?

5. State the applications of operational amplifier.

6. Mention how PIN diode can be used as high-frequency switching device.

(10)

7. Show the power diagram of transformer-coupled class A amplifier and locate the Q-point.

8. Derive the expression for input offset voltage of a differential amplifier.

Or

- (a) With the help of a circuit diagram, explain the operation of a balanced differential amplifier. 1+4=5

- (b) Derive the expression for gain in a non-inverting OP-AMP. 2

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2013

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(Electronic Devices and Amplifiers)

Full Marks : 55

Time : 2 hours

(PART : B—DESCRIPTIVE)

(Marks : 35)

The figures in the margin indicate full marks for the questions

1. (a) Explain the construction and working of a JFET. What is the difference between a JFET and a bipolar transistor? 2+2+1=5
- (b) Explain in brief how JFET can be employed as an amplifier. 2

Or

- (a) With suitable diagram, discuss the construction and working of depletion MOSFET. 2+2=4
- (b) Write down the applications of FET. 3

(2)

2. (a) Discuss biasing of a $p-n$ junction diode with the help of energy band diagrams. What are Zener and Avalanche breakdowns? 3+2=5

- (b) Explain the formation of depletion layer in a $p-n$ junction. 2

Or

- (a) Describe the operation of silicon-controlled rectifier. How will you explain this operation using two-transistor analogy? 3+2=5

- (b) Find the value of intrinsic stand-off ratio of a UJT if $R_{BB} = 10 \text{ k}\Omega$ and $R_{B2} = 4 \text{ k}\Omega$. 2

3. (a) Show with diagram how Zener diode can be used for meter protection. What is the characteristic of Zener diode which makes it possible for the use in voltage regulation? 3+2=5

- (b) Explain the function of a comparison element in controlled transistor series regulator. 2

Or

- (a) Why is liquid crystal used in LCD? With a diagram, explain the working of a liquid crystal display. 1+3=4

(3)

- (b) How is population inversion obtained in a laser diode? Describe how laser action is obtained by the application of forward bias to laser diode. 1+2=3

4. (a) Discuss the difference between power amplifier, and voltage amplifier. 2

- (b) Show that in a class B push-pull amplifier, the power efficiency is 78.5%. 5

Or

- (a) Mention the special characteristics that distinguish a tuned amplifier from other amplifiers. State their merits and demerits. 1+2+2=5

- (b) What are the important points that need consideration in using transformer coupled class A amplifier? 2

5. (a) What are the characteristics of an ideal operational amplifier? Why is the voltage at the summing point of a negative feedback OP-AMP reduced almost to zero? 2+2=4

- (b) What is the main function of a differential amplifier? Derive the equation for common-mode rejection ratio. 1+2=3