

2017

(Pre-CBCS)

(3rd Semester)

ELECTRONICS

THIRD PAPER

(Electronic Devices and Amplifier)*Full Marks :55**Time : 2½ hours*

(PART : A – OBJECTIVE)

*(Marks : 20)**The figures in the margin indicate full marks for the questions*

SECTION – I

*(Marks : 5)*Put a Tick (✓)mark against the correct answer in the brackets provided : 1×5=5

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

(a) zero	()	(b) low positive	()
(c) high positive	()	(d) high negative	()
2. A UJT has

(a) two <i>p-n</i> junctions	()	(b) one <i>p-n</i> junction	()
(c) three <i>p-n</i> junctions	()	(d) four <i>p-n</i> junctions	()
3. When used in a circuit, the Zener diode is always

(a) forward-biased	()	(b) connected in series	()
(c) troubled by overheating	()	(d) reverse-biased	()
4. The voltage gain of a tuned amplifier is _____ at resonant frequency.

(a) minimum	()	(b) maximum	()
(c) zero	()	(d) half-way between maximum and minimum	()
5. If $R_f = 1000 \text{ k}\Omega$, $R_l = 1 \text{ k}\Omega$, then the voltage gain of an inverting amplifier is equal to

(a) 1000	()	(b) - 1000	()
(c) 0.0001	()	(d) - 0.0001	()

(2)

SECTION – II
(Marks : 15)

Answer *any five* questions of the following : 3×5=15

1. What are Breakdown Devices? Why are they referred to as Latching Devices? Name any two of them.
2. With suitable diagram, explain the $V-I$ characteristics of SCR.
3. How will you transform a sine wave into a square wave using Zener diode?
4. Show that the overall maximum efficiency of class B push-pull amplifier is 78.5%.
5. Define input bias current of OP-AMP. A certain OP-AMP has bias current of 50 μA and 49.3 μA . Find the input bias current.
6. Define the parameters of FET and derive the relation among these parameters.
7. Explain the formation of $p-n$ junction diode.
8. Mention how PIN diode can be used as high frequency switching device.

(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) Why is the depletion type MOSFET also called the dual mode MOSFET? 2
- Or**
- (c) With suitable diagram, discuss the construction and working of depletion MOSFET. 2+2=4
(d) Compare MOSFET with JFET in terms of their characteristics. 3
2. (a) Discuss biasing of a $p-n$ junction diode with the help of energy band diagrams. What are Zener and avalanche break-downs? 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

Or

(3)

- (c) Derive the efficiency and ripple factor of a full-wave rectifier. 3
- (d) Explain firing and triggering of an SCR. Also explain 90° phase control of an SCR. 2+2=4
3. (a) What is PIN diode? Explain the function of I layer in a PIN diode. 1+2=3
- (b) Why is liquid crystal used in LCD? With a diagram, explain the working of liquid crystal display. 1+3=4

Or

- (c) Draw a circuit diagram of transistor series regulator and discuss the use of transistor in transistor series regulator. 1+3=4
- (d) Show with diagram how Zener diode can be used for meter protection. 3
4. (a) With a neat diagram, explain the working of double-tuned amplifier. Discuss its frequency response. 3+2=5
- (b) Write the difference between power amplifier and voltage amplifier. 2

Or

- (c) Draw a neat circuit diagram of class B push-pull amplifier and explain its working. 1+4=5
- (d) A double-tuned circuit operates at an operating frequency of 10 MHz having coefficient of coupling of 0.02. Determine the bandwidth. 2
5. (a) Derive an expression for the overall gain in an OP-AMP in the case of inverting configuration. Explain the input impedance and output impedance of inverting amplifier. 3+2=5
- (b) Define common mode signal and differential mode signal. 2

Or

- (c) What are the characteristics of an ideal OP-AMP? Why is the voltage at the summing point of a negative feedback OP-AMP reduced almost to zero? 3+2=5
- (d) Define input offset voltage and input bias current in an OP-AMP. 2

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