*Total number of printed pages:* 2 **D/3rd Semester/DECE302**

**2022**

# ELECTRONIC DEVICES AND CIRCUITS

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer **any five** questions.*



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| 1. | a) | What do you understand by intrinsic and extrinsic semiconductor? Why is silicon preferred over germanium in the manufacture of semiconductor devices? | 4+3=7 |
| | b) | What is a PN junction? Explain the behavior of a PN junction under forward and reverse biasing. | 3+6=9 |
| | c) | Explain the terms (i) Knee voltage (ii) Zener voltage | 2+2=4 |
| 2 | a) | Draw the circuit diagram and explain the working principle of full wave bridge rectifier. What is the necessity of having filter in power supply? | 8+2=10 |
| | d) | Draw the block diagram of regulated d.c. power supply. A full wave P-N diode rectifier uses load resistor of 1500Ω. No filter is used. If wave voltage applied to each diode has amplitude of 30 volts and frequency 50 Hz, calculate (i) peak, d.c. and r.m.s. load current,(ii) d.c. power output (iii) rectifier efficiency. | 3+7=10 |
| 3 | a) | Why biasing is necessary in BJT amplifiers? Draw the load line on the output characteristics of a common emitter amplifier. What is the significance of load line? | 3+4+3=10 |
| | b) | Why the collector of a transistor is wider than emitter and base? What are the different types of amplifiers? | 4+6=10 |
| 4 | a) | Define FET. What are the advantages of FET over a BJT? Describe the construction and operation of an enhancement type n-channel MOSFET. | 2+3+7=12 |
| | b) | What are the similarities between JFET and MOSFET? Compare between BJT, FET, and MOSFET. | 2+6=8 |
| 5 | a) | Explain the construction and working of SCR. Draw the V-I characteristics of an SCR. | 10 |
| | b) | Why DIAC is called bidirectional? What is the main function of TRIAC? | 3+2+5=10 |

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| | | What is the difference between DIAC and TRIAC? | |
| 6 | a) | What do you mean by feedback in amplifiers? Define negative and positive feedbacks. Explain a feedback amplifier with the help of a block diagram. | 2+3+5=10 |
| | b) | State the merits and demerits of negative feedback in amplifiers. In a negative feedback amplifier, A=100, β=0.04 and Vs=50mV. Find (i) gain with feedback, (ii) output voltage, (iii) feedback factor, (iv) feedback voltage. | 4+6=10 |
| 7 | a) | What is an oscillator? What is Barkhausen criterion for sustained oscillations? Enumerate the different classes of oscillators. | 2+1+5=8 |
| | b) | What is Piezoelectric effect? Draw the equivalent circuit of quartz crystal. Describe the crystal oscillator. | 3+3+6=12 |