

E 7485

(Pages : 2)

Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2017

Third Semester

Core Course—ELECTRONICS

(Common for B.Sc. Physics—Model I, B.Sc. Physics—Model II, B.Sc Physics EEM,
B.Sc. Physics Instrumentation)

[2013 Admission onwards]

Time : Three Hours

Maximum Marks : 60

Part A (Short Answer Questions)

*Answer all questions briefly.
Each question carries 1 mark.*

Fill in the blanks using appropriate words :—

1. The name of the capacitance in the forward biased PN junction diode is called _____.
2. The value of ripple factor of a bridge rectifier without filter is _____.
3. The filter (in a rectifier) best suited for heavy load current outputs is _____.
4. The transistor shows minimum resistance when it is biased in _____ region.
5. If the voltage gain shown by an amplifier is 100, the gain in dB is _____ dB.
6. _____ type of oscillator is best suited for high stability of output frequency.
7. Virtual ground is exhibited in an op-amp circuit when _____ type of feedback is applied.
8. Frequency modulation index is _____ divided by modulating frequency.

(8 × 1 = 8)

Part B (Brief Answer Questions)

*Answer any six questions.
Each question carries 2 marks.*

9. Draw the equivalent circuit of a rectifier diode under : (i) Forward bias ; (ii) Reverse bias.
10. Draw the circuit to clip the voltage at exactly +5 V using silicon diode. Calculate the values of components in the circuit.
11. Draw the circuit diagram of a half wave rectifier which uses a π -filter.
12. With neat sketches of circuit and waveforms, explain a voltage tripler.
13. Define load line and Q point.
14. What happens to the drain current of JFET at pinch-off? Give reasons.

Turn over

15. List the advantages of MOSFET compared to BJT.
16. Using feedback, how (i) The input resistance of an amplifier can be increased ; and (ii) The output resistance can be decreased.
17. List any *four* properties of ideal op-amp, giving their values.
18. Draw and explain a detector circuit.

(6 × 2 = 12)

Part C (Problems/Descriptive Questions)

*Answer any four questions.
Each question carries 4 marks.*

19. Explain the mechanism of (i) Avalanche breakdown ; (ii) Zener breakdown. Bring out the differences between them.
20. Calculate the value of R_s , series resistance to be connected in a shunt voltage regulator if $V_o = 6V$, $I_L = 10 \text{ mA}$, $I_Z = 15 \text{ mA}$, V_{in} various from 8 V to 11 V.
21. BC 107 has $\beta = 150$. If the base current is $150 \mu\text{A}$, $I_{CO} = 8 \text{ nA}$, calculate the values of α , I_C and I_E . Derive the formulae used.
22. Explain how amplifiers are classified into class A, B, AB and C ? Discuss the application for which each one can be used ?
23. Using 741, design and draw an inverting amplifier to have a gain of 10 and input resistance 220Ω . Design non-inverting amplifier for the same gain and obtain its input resistance.
24. $v = 10 \sin (2 \times 10^7 t + 2 \sin 2000 t)$. What type of modulation is present ? What are its (i) Carrier r.m.s. amplitude ; (ii) Carrier frequency ? ; (iii) Modulating frequency ; and (iv) Modulation index ?

(4 × 4 = 16)

Part D (Long Essay Questions)

*Answer any two questions.
Each question carries 12 marks.*

25. With a neat circuit diagram and waveforms, explain how rectification takes places in a bridge rectifier. Derive expressions for its ripple factor and rectification efficiency.
26. Draw the voltage divider bias CE amplifier. Using h -parameter equivalent, determine its : (i) Current gain ; (ii) Voltage gain ; and (iii) Input resistance.
27. With neat block diagrams, explain the four types of negative feedback amplifiers. Explain what happens to their (i) Input resistance ; and (ii) Output resistance, with feedback.
28. Sketch the AM wave for sinusoidal waves. Derive expression for the AM wave and deduce the frequency spectrum from it:

(2 × 12 = 24)