MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :…… **Name :…….**

Fifth Semester B.Sc. Degree Examination, November 2016
First Degree Programme under CBCSS
Core Course: Physics – VI
AUPY543: Electronics

Time: **3** Hours Max. Marks: **80**

SECTION – A

*Answer **ALL** questions in a word or one or two sentences.*

1. Why filters are needed in rectifier circuits ?
2. What is Zener breakdown ?
3. Define current amplification factor.
4. What is the value of V_{CE} when Q – point is in the middle of the load line ?
5. Deduce the stability factor in CE and CB configurations.
6. What is the difference between class A and class B amplifiers ?
7. Write down any two advantages of negative feedback.
8. Why is emitter follower is preferred to transformer for impedance matching ?
9. Modulation is required for long distance transmission of signals. Why ?
10. Draw the constructional design of a UJT.

(10 × 1 = 10 Marks)

SECTION – B

*Answer any **EIGHT** questions, not exceeding a paragraph.*

11. Draw the I – V characteristics of a PN junction diode and explain how ac and dc resistance can be calculated.
12. Explain the action of Shunt capacitor filter.
13. Obtain the relation between transistor current amplification factors.

14. Draw dc load line for a CE circuit. Why the Q – Point should be at the middle of the load line.
15. Write down any four characteristics of class B amplifier.
16. Mention the different types of distortion in amplifiers.
17. Explain the working principle of a Hartley oscillator.
18. Describe the potential divider method for transistor biasing.
19. Explain what you mean by modulation index in amplitude and frequency modulation.
20. What are the differences between a FET and a BJT ?
21. Explain the operation of Silicon Controlled Rectifier.
22. Explain the terms virtual ground and CMRR of an OPAMP.

(8 × 2 = 16 Marks)

SECTION – C

*Short essay type / Problems : Answer any **SIX** questions.*

23. A full wave rectifier uses two identical diodes of resistance 10 Ω. The transformer provides an r.m.s secondary voltage of 12 V between center tap and one end. If the load resistance of the rectifier is 1 KΩ, Calculate (a) maximum ac voltage (b) maximum load current (c) mean load current (d) dc output voltage (e) peak inverse voltage of the diode (f) rectifier efficiency
24. A 6.2 V zener is used to regulate an input voltage which fluctuates between 9V and 12V. It is connected across a load of 1 KΩ and a series resistor of 330Ω. Calculate the maximum and minimum values of zener current.
25. A transistor with $\alpha = 0.98$ carries a base current of 50 μA. It produces a collector to base leakage current of 5 μA. Determine the values of emitter current and collector current of the transistor.
26. A transistor is biased in the voltage divider method with resistors R_1 = 56 KΩ and R_2 = 10KΩ and R_E = 1 KΩ. If V_{CC} = 12 V and V_{BE} = 0.7 V, Calculate the following. (a) Voltage across R_2 and I_C (b) it's Q – Point.
27. A single stage CE amplifier has the following parameters, hie = 1.2KΩ, h_{fe} = 100, R_C = 3.3 KΩ and R_L = 1 KΩ. Calculate its current gain and voltage gain. Use approximate hybrid formula.

28. An amplifier has a gain without feedback of 80.With negative feedback its gain reduces to 20.Calculate its feedback factor.
29. Explain the working of N – channel depletion MOSFET.
30. An AM radio station broadcasts audio signals in the range 100 KHz to 4000 KHz. It uses a carrier wave of frequency 1000 KHz. Calculate the (1) maximum and minimum frequencies of side bands and (2) its channel width.
31. Calculate the amplification factor of a JFET with a trans – conductance of 300×10^{-6} mho and ac drain resistance of 200 KΩ.

(6 × 4 = 24 Marks)

SECTION – D

*Long essay type : Answer any **TWO** questions.*

32. Explain the working of a full wave rectifier using two diodes and derive the efficiency and ripple factor of the rectifier. Also explain terms Average value and Peak inverse voltage.
33. What are h – Parameters ? Obtain the h – Parameters of an ideal Common Base and Common Emitter transistors.
34. Discuss the comparison between AM and FM. Draw the block diagram of superhetrodyne AM receiver and explain its working.
35. What is an Operational amplifier ? Explain the application of operational amplifier as inverting amplifier, Non – inverting amplifier, Unity amplifier and summing amplifier.

(2 × 15 = 30 Marks)

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