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Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2023

First Degree Programme under CBCSS

Physics

Core Course VII

PY 1543 : ELECTRONICS

(2018 Admission Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentences. Each question carries **1** mark.

1. A Norton's equivalent circuit consist of ————————.
2. Distinguish between extrinsic and intrinsic semiconductors.
3. What does the Q point of a transistor represent?
4. What is the basic feature of a class a amplifier?
5. What happens to stability and bandwidth with negative feedback?
6. A 2 kHz audio signal is used to frequency modulate a 80 MHz carrier causing a frequency deviation of 10 kHz. Determine the modulation index.
7. What is the decibel equivalent of the CMRR 10^5 ?
8. Why does UJT be known as a breakdown device?

9. What is meant by transconductance of JFET?

10. Draw the circuit diagram of op-amp integrator.

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions, not exceeding a paragraph. Each question carries **2** marks.

11. State Kirchhoff's laws.

12. Explain the characteristics of a zener diode.

13. Explain the features of depletion barrier in pn junctions.

14. Define the stability factor of a transistor. Explain its significance.

15. Briefly mention the different classes of distortion in amplifiers.

16. Compare an oscillator and an amplifier.

17. Why do we need modulation? Explain.

18. Give a brief description on the demodulation process of AM signals.

19. Draw the drain characteristics of JFET without any bias and mark the regions

20. Draw the block diagram of DE MOSFET.

21. Describe the construction of UJT.

22. Derive the expression of voltage gain of a non-inverting amplifier.

(8 × 2 = 16 Marks)

SECTION – C

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

23. State maximum power transfer theorem. Find the efficiency under this condition. Give an application.

24. In a half wave rectifier with shunt capacitor of $10\,\mu F$, the load is varied between $1\,k\Omega$ and $10\,k\Omega$. Determine the ripple factor. Is there any change in ripple factor if the capacitor is replaced with $100\,\mu F$ capacitor?

25. In a transistor amplifier, when the signal changes by 0.03 V, the base current changed by $11\,\mu A$ and the collector current by 1.1 mA. Find the current gain, input impedance and ac load if R_C= 4 kΩ and R_L = 8 kΩ.

26. A Si transistor working in the voltage divider bias method has the following parameters. V_{CC} = 15 V, R_1 = 10 kΩ, R_2= 5 kΩ, R_C = 1 kΩ, R_E = 2 kΩ. Find out the operating point and plot the load line.

27. Determine the power efficiency of push-pull amplifiers.

28. In a negative feedback amplifier A = 100, β = 0.05 and V_i = 10 mV. Find (a) the gain with feedback (b) output voltage (c) feedback factor and (d) feedback voltage.

29. Plot the amplitude modulated waves with the following modulation factors 0, 0.5, 1 and 1.5.

30. An AM wave has 4 V peak value for the carrier and 2 V peak value for both lower and upper sideband components. If the AM wave drives a 2 kΩ. resistor, find the power delivered to the resistor by (a) carrier and (b) the sideband components. What is the total power delivered?

31. Find the output voltage of an op-amp inverting adder for the following set of input voltages and resistors. $Rf = 10\,k\Omega$, $v_1 = -1V$, $v_2 = 1V$, $v_3 = 2V$, $R1 = 1k\Omega$, $R2 = 1.5\,k\Omega$, $R3 = 1.2\,k\Omega$.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. Compare the features of pn junction diode rectifiers with suitable diagrams.

33. Plot the input, output and current transfer characteristics of CB, CE and CC configurations of a transistor and briefly explain it,

34. Briefly explain various oscillator circuits.

35. Explain the circuit and operation of differential amplifier.

(2 × 15 = 30 Marks)
