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Fifth Semester B.Sc. Degree Examination, February 2021

First Degree Programme Under CBCSS

Physics

Core Course VII

PY 1543 — ELECTRONICS

(2018 Admission – Regular)

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

SECTION – A

Very Short Answer type questions. (Answer all **10** questions of **1** mark each).

1. State Kirchhoff's voltage law.

2. What is the value of PIV of a centre tap full wave rectifier?

3. What is mean by intrinsic semiconductors?

4. Define distortion of power amplifier.

5. Discuss the phase reversal of CE configuration of a transistor.

6. What is regulated power supply?

7. What is meant by feedback in Amplifiers?

8. Explain conductive modulation in UJT.

9. What are the limitations of AM modulation?

10. Define input offset current of an op-amp.

(10 × 1 = 10 Marks)

SECTION – B

Short answer type questions. (Answer **any eight** questions of **2** marks **each**).

11. State and explain maximum power transfer theorem.

12. Draw and explain the forward and reverse bias VI characteristics of PN junction diode.

13. What are the advantages and disadvantages of RC phase shift oscillator?

14. Why we prefer NPN transistor over PNP transistor for commercial purpose?

15. Explain the function of a shunt capacitor in a filter circuit.

16. Explain the role of PN junction diode in AM modulation.

17. Write a short note on push pull amplifier.

18. What are the advantages of FET compared to BJT?

19. What are the difference between photodiode and solar cell?

20. Explain the enhancement mode working of DE-MOSFET.

21. Explain the transfer characteristic of JFET.

22. Draw the pin diagram of IC741 (Op-amp).

23. What is meant by tunnel effect?

24. How to form depletion region?

25. How to test a diode using multi meter?

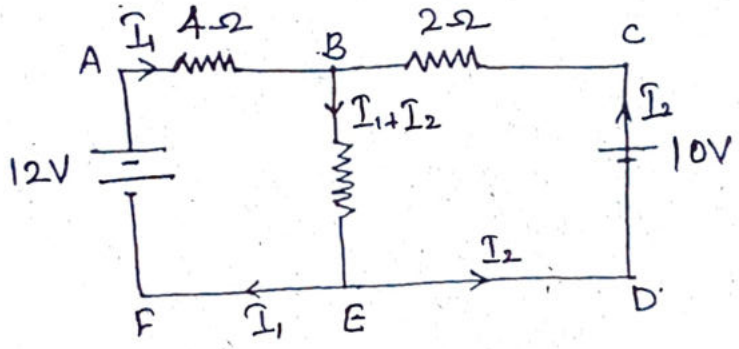
26. Draw and explain the circuit diagram of theft alarm using SCR.

(8 × 2 = 16 Marks)

SECTION – C

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

27. Using Kirchhoff's law, calculate the branch current in the network given below.



28. A silicon diode dissipates 3W for a forward current of 2A. Calculate the forward voltage drop across the diode and its bulk resistance.

29. A silicon diode passes a current of 100 mA at 1V. Find its bulk resistance. What would be its ac resistance for direct current of

    (a) 0.1 mA and

    (b) 25 mA.

30. A half wave rectifier supplies a power of a 1 KΩ load. The input supply voltage is 200 V_{rms}. Neglect the forward resistance of the diode, calculate

(a) V_{dc}

(b) I_{dc}

(c) ripple voltage (*rms value*)

31. A transistor has $\alpha = 0.98$, $I_B = 100\mu A$ and $I_{CO} = 6\mu A$. Calculate I_C and I_E.

32. In a negative feedback amplifier, A = 100, $\beta = 0.04$ and V_i = 50mV. Find

(a) gain with feedback

(b) output voltage

(c) feedback factor

(d) feedback voltage.

33. The windshield wiper motor of an automobile is controlled by a UJT with η = 0.6. The capacitor has available of 50 μF and the changing resistor is a series combination of 50 kΩ resistors and a 500 kΩ potentiometer. Determine the maximum and minimum number of blade strokes per minute possible with this arrangement.

34. A tuned collector oscillator has a fixed inductance of 100 μH and has to be tuneable over the frequency band of 500 kHz to 1500 kHz. Find the range of variable capacitor to be used.

35. The total power content of an AM wave is 2.64 kW at a modulation factor of 80%. Determine the power content of

(a) carrier

(b) each side band.

36. A certain diode has a reverse saturation current of 5 μA at 25°C for a reverse voltage of 20 V. Calculate its reverse resistance.

37. A CE connected transistor has $\beta = 100$ and $I_B = 50\,\mu A$. Compute the values of α, I_C and I_E.

38. A certain X-cut quartz crystal resonates at 450 kHz. It has an equivalent inductance of 4.2 H and an equivalent capacitance of 0.0297 pF. If its equivalent resistance is 60Ω calculate its Q-factor.

(6 × 4 = 24 Marks)

SECTION – D

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

39. With help of neat circuit diagram, explain the construction and working of full wave centre tap rectifier. Also explain how to regulate the output voltage of full wave rectifier using Zener diode.

40. What do you mean by ac and dc load line of a transistor circuit? Draw dc load line over output characteristics of transistor and explain the need of proper selection of operating point of the circuit.

41. Explain the principle and working of superheterodyne receiver with a neat block diagram.

42. What are the characteristic of an ideal op-amp? With the help of neat diagram, explain the working of non-inverting amplifier.

43. With the help neat circuit diagram, explain the principle and working of a single stage CE amplifier and also derive its parameters.

44. With the help neat diagram, explain different types of modulation and compare its merits and demerits.

(2 × 15 = 30 Marks)
