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Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**First Degree Programme under CBCSS**

**Physics**

**Core Course**

**PY 1543 : ELECTRONICS**

**(2018 Admission onwards)**

Time : 3 Hours

Max. Marks : 80

**PART – A**

Answer **all** questions in one or two sentence; each question carries **1** mark.

1. State Norton's theorem.
2. What do you mean by depletion layer?
3. What do you mean by peak inverse voltage?
4. Define current amplification factor  $\alpha$ .
5. What do you meant by quiescent point?
6. What do you meant by multistage amplifier?
7. Explain Barkhausen criterion for oscillations.
8. Define the term modulation.
9. What is an operational amplifier?
10. What are the difference between BJT and FET?

**(10 × 1 = 10 Marks)**

P.T.O.

## PART – B

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

11. Explain maximum power transfer theorem.
12. What is load line in transistor biasing? What is its significance?
13. How zener diode maintains constant voltage across the load?
14. Explain how transistor works as an amplifier.
15. What is stability factor of fixed bias transistor? Explain the significance of stability factor.
16. Show that  $\gamma = \frac{1}{1-\alpha}$ .
17. Explain the circuit operation of a push pull amplifier.
18. What are the advantages of negative feedback amplifier?
19. Why modulation is necessary in communication?
20. What are the advantages and disadvantages of frequency modulation?
21. Describe the working principle of a MOSFET.
22. Discuss the operation of a summing amplifiers.
23. What is the role of coupling capacitors in an amplifier circuit?
24. Why dual power supply is used in Op-Amp?
25. What is the difference between open loop gain and ( $A_v$ ) and closed loop gain ( $A_{vf}$ )?
26. Draw the frequency spectrum of FM wave.

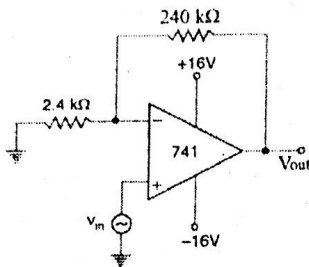
**(8 × 2 = 16 Marks)**

## PART – C

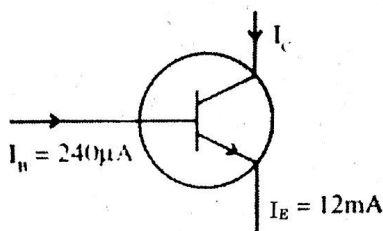
Answer **any six**, each questions carries **4** marks.

27. A crystal diode having internal resistance  $r_f = 20\Omega$  is used for half wave rectification. If the input voltage  $v = \sin \omega t$  and load resistance  $R_L = 800\Omega$ . Find
- $I_m, I_{dc}, I_{rms}$
  - ac power input and dc power output
  - dc output voltage.
28. A half wave rectifier uses two diodes, the internal resistance of each may be assumed constant at  $20\Omega$ . The transformer r.m.s secondary voltage from center tap to each end of secondary is 50V and load resistance is  $980\Omega$  Find
- the mean load current
  - the r.m.s value of load current.
29. A Germanium transistor is to be operated at zero signal  $I_c = 1mA$ . If the collector supply  $V_{cc} = 12V$ , what is the value of  $R_B$  in the base resistor method. Given  $\beta = 100$ .
30. The overall gain of a multistage amplifier is 140. When negative voltage feedback is applied, the gain is reduced to 17.5. Find the fraction of the output that is fed back to the input.
31. In a phase shift oscillator  $R_1 = R_2 = R_3 = 1M\Omega$  and  $C_1 = C_2 = C_3 = 68pF$ . At what frequency does the circuit oscillate?
32. The maximum peak to peak voltage of an AM wave is 16 mV and the minimum peak to peak voltage is 4 mV. Calculate the modulation factor.
33. A carrier wave of 500 watts is subjected to 100% amplitude modulation. Determine the power in side bands and the power of modulated wave.
34. A JFET has a drain current of 5mA. If  $I_{DSS} = 10mA$  and  $V_{GS(off)} = -6V$ . Find the value of  $V_{GS}$  and  $V_P$ .

35. Calculate the output voltage from the noninverting amplifier circuit shown in the following figure for an input of  $120 \mu V$ .



36. If  $\beta$  of the transistor circuit in figure is 50, find the value of  $I_c$  using both  $\alpha$  and  $\beta$ .



37. The first stage voltage gain of a two stage amplifier is 100 and its second voltage gain is 160. Find the total gain in dB.
38. An amplifier has a voltage gain of 50. To reduce the distortion present in it, 10% negative feedback is employed. Calculate voltage gain with feedback.

**(6 × 4 = 24 Marks)**

#### PART – D

Answer **any two** questions; each questions carries **15** marks.

39. Explain with circuit diagram, the action of a full wave rectifier using centre tap transformer. Derive an expression for rectification efficiency and ripple factor.
40. What are filter circuits? Explain the working of a capacitor filter and inductor filter?
41. What is the need of transistor biasing? Discuss the potential divider bias method for transistor biasing.
42. Discuss the characteristics of CB and CE transistor configurations with neat diagrams.
43. With circuit diagram explain the working of Hartley and Colpitt's oscillators.
44. With necessary diagrams, explain how OP-Amp works as an inverting and non-inverting amplifier.

**(2 × 15 = 30 Marks)**