(Pages : 6) **M – 1476**

Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2021

First Degree Programme Under CBCSS

Physics

Core Course VII

PY 1543 – ELECTRONICS

(2018 & 2019 Admission)

Time : 3 Hours Max. Marks : 80

PART – A

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

1. A junction where two (or) more than two network elements meet is known as a _____
2. State Kirchhoff's current law.
3. What is meant by peak inverse voltage?
4. Amongst the emitter, base and collector of a transistor, the most heavily doped region is _____
5. The transistor amplifier configuration that is biased much beyond cut-off is _____
6. The kind of feedback used in oscillator circuits is _____
7. What is the main purpose of modulation?
8. In a p-channel JFET, the charge carriers are _____
9. The typical input and output resistances of an Opamp is _____
10. Explain CMRR.

(10 × 1 = 10 Marks)

P.T.O.

PART – B

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

11. Explain how an ideal voltage source is defined.

12. What are extrinsic semiconductors?

13. Explain the d.c. resistance of a diode.

14. Explain avalanche breakdown.

15. Why is the transistor called a current controlled device?

16. In a bipolar transistor which region is wider and which region is thinner? Why?

17. Differentiate between positive and negative feedbacks.

18. Mention the advantages of negative feedback.

19. Explain the construction of an FET.

20. Explain pinch-off voltage with reference to a JFET.

21. What is an depletion type MOSFET?

22. What is a Uni-junction transistor?

23. List the properties of an ideal Opamp.

24. What is an inverting amplifier?

25. Explain slew rate of an Opamp.

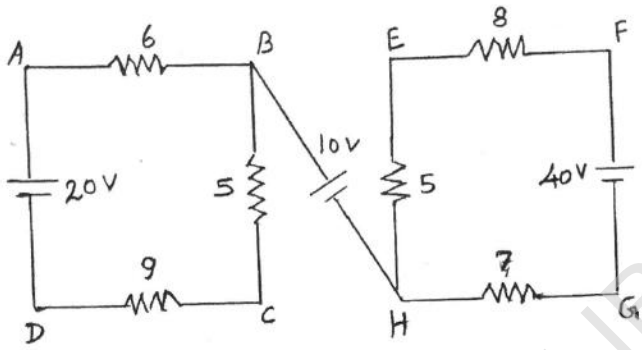
26. What is a non-inverting amplifier?

(8 × 2 = 16 Marks)

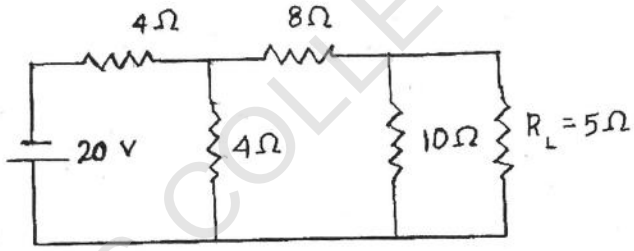
PART – C

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

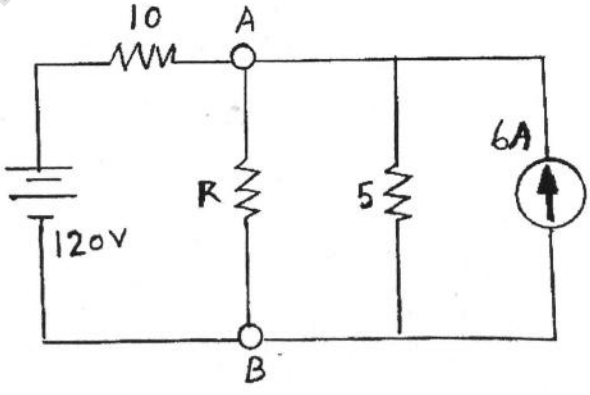
27. Find V_{CE} and V_{AG} for the circuit shown.



28. Using Thevenin theorem, calculate the current flowing through the load resistor $R_L = 5\Omega$.



29. Calculate the value of R which will absorb maximum power from the following circuit. Also, compute the value of maximum power.

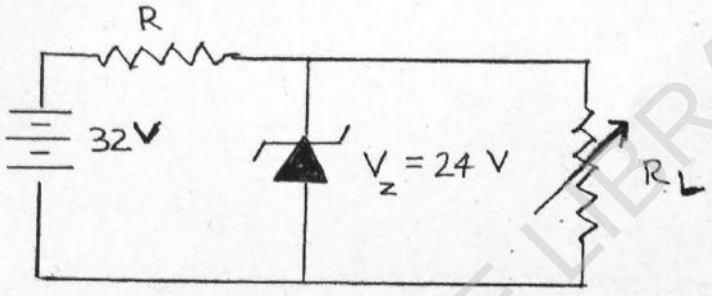


30. Compute the efficiency of a half wave rectifier.

31. A 24-V 600 mW Zener diode is to be used for providing a 24-V stabilized supply to a variable load (see the figure). If input voltage is 32 V. calculate the

    (a) series resistance R required

    (b) diode current when R_L = 1200Ω.



32. In a fixed bias transistor circuit. V_{CC} = 10 V, R_C = 2 kΩ, R_B = 300 kΩ, β = 75 and V_{BE} = 1 V. Find the operating point and also check whether it is in active region or not.

33. In a CE transistor amplifier, the load resistance in the collector circuit is 4 kΩ and V_{CC} = 12V. Find the coordinates of the operating point if the zero signal base current is 20 μA and β = 100.

34. A transistor is connected in the CE configuration. The voltage drop across 5 kΩ resistance which is connected in the collector circuit is 5 Volts. Find the base current The current gain α of the transistor is 0.998.

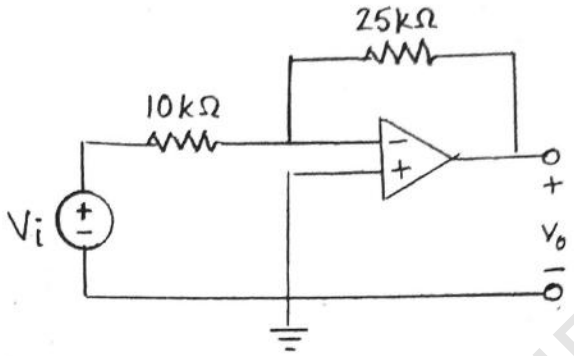
35. An amplifier having a gain of 500 without feedback has an overall negative feed-back applied which reduces the gain to 100. Calculate the fraction of output voltage fed back. If due to ageing of the components, the gain without feedback falls by 20%, calculate the percentage fall in gain without feedback.

36. A modulated carrier wave has maximum and minimum amplitudes of 750 mV and 250 mV. Calculate the value of percentage modulation.

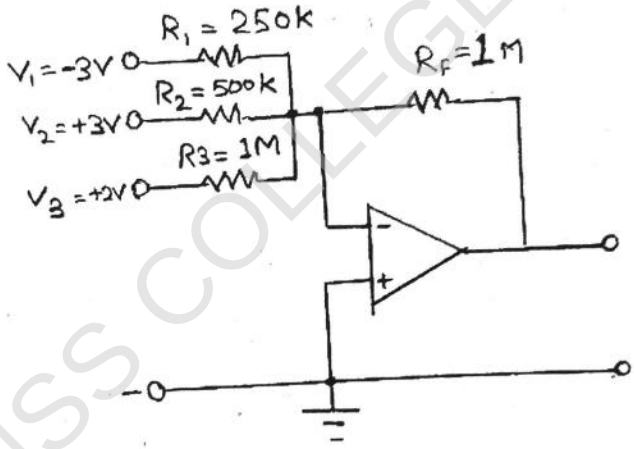
37. For the Opamp shown in the figure, if v_i = 0.5 V, calculate :

(a) the output voltage v_0, and

(b) the current in the 10 kΩ resistor.



38. Find the output voltages of the Opamp inverting adder for the sets of input voltages and resistors shown in the figure.



(6 × 4 = 24 Marks)

PART – D

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

39. Explain :

(a) the working of a half wave rectifier

(b) how a d.c. load line of a transistor can be drawn. Mention also about cut-off. active regions and how to locate the operating point of a transistor.

40. Explain the working of a push-pull amplifier.

41. (a) Empirically show that an amplitude modulated wave consists of upper and lower side bands in addition to the carrier wave.

    (b) Explain how subtraction is performed using Opamps.

42. Explain the operation of Hartley Oscillator.

43. Explain the construction and operation of a JFET.

44. State and prove Thevenin's theorem and Norton's theorem with suitable diagram.

(2 × 15 = 30 Marks)
