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FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS—UG)

Physics/Applied Physics

PHY 5B 09/APY 5B 10—ELECTRONICS (ANALOG AND DIGITAL)

Time : Three Hours   Maximum : 80 Marks

Symbol used in this question paper have their usual meanings.

Section A (Answer in a word or phrase)

Answer **all** *questions.*

Each question carries 1 mark.

1. What is the ripple factor of a full wave rectifier ?

2. The point of intersection of DC and AC load line is ————.

3. A JFET is a ———— driven device.

4. If A_{DM} = 3500 and A_{CM} = 0.35, the CMMR of an Op-amp is ————.

5. The binary equivalent of a hexadecimal number EF is ————.

Questions 6 to 10 : *Write True or False.*

6. Intrinsic semiconductor is the pure form of semiconductor.

7. Positive feedback amplifier works as an oscillator.

8. The inputs to an XOR gate are 1, 0, 1. Then the output will be one.

9. The binary equivalent of decimal number 23 is 11010.

10. Two's complement of 10111 is 01000.

                                                   (10 × 1 = 10 marks)

Section B (Answer in Two or Three Sentences)

Answer **all** *questions.*
Each question carries 2 marks.

11. Define α of a transistor and show that it is always less than unity.

12. Define the operating point of a transistor.

                                                        Turn over

13. What is the importance of modulation factor in communication system ?

14. What is positional number system ?

15. Draw the circuit diagram of a RC coupled amplifier.

16. Draw the block diagram of a full adder and write down its truth table.

17. Draw the block diagram and truth table of Exclusive OR gate.

(7 × 2 = 14 marks)

Section C

Answer in a paragraph of about half a page to one page.
Answer any five questions.
Each question carries 4 marks.

18. With a neat diagram, explain the working of a Colpitt's collector oscillator and derive the expression for frequency.

19. Distinguish between positive and negative feedback amplifiers.

20. Briefly discuss the Characteristic of a FET.

21. Draw the circuit diagram and explain the working of differentiator using Op-amp.

22. Write any four limitations of amplitude modulation.

23. With the help of diagrams explain the working of RS flip-flop.

24. Draw the circuit diagram and explain the working of a voltage multiplier circuit.

(5 × 4 = 20 marks)

Section D

(Problems Write all relevant formulas. All important steps carry separate marks)
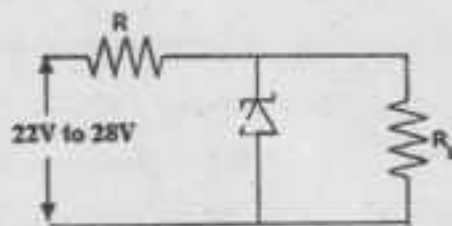*Answer any four questions.*
Each question carries 4 marks.

25. In an FM modulator, when the modulating frequency is 600 Hz, the modulating voltage is 2.4 V and the modulation index is 1.5. What is the modulation index when the frequency is reduced to 400 Hz and modulating voltage is simultaneously increased to 3.2 V

26. In a negative feedback amplifier, A = 100, B = 0.04 and V_i = 50 mv. Find (a) Gain with feedback ; (b) Output voltage ; (c) Feedback factor ; (d) Feedback voltage.

27. A diode with V_F = 0.7 V is connected to as a halfwave rectifier. The load resistance is 500 Ω and the (r.m.s.) as input is 22 V. Determine the peak output voltage, the peak load current and the diode peak inverse voltage.

28. For a transister amplifier shown in figure, V_{CC} = 15V, R_1 =10 KΩ, R_2 = 5 KΩ, R_C = 1 KΩ, R_E = 2 KΩ and R_L = 1 KΩ. Draw the DC load line and hence find the operating point
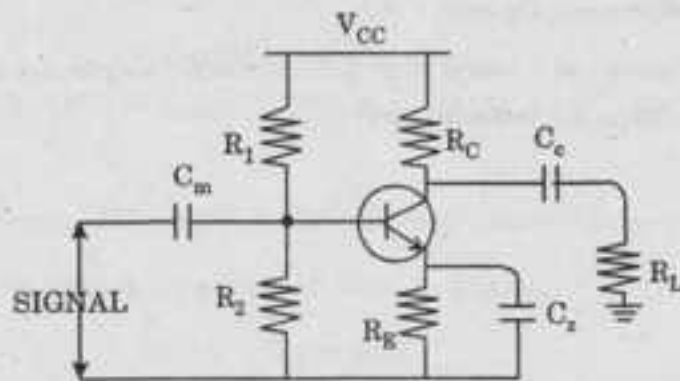
29. A JFET has a drain current of 5 mA. If I_{DSS} = 32 mA ; VGS (off) = – 6 V ; find the value of :
   (i) V_{GS} ; and (ii) V_p.

30. A three-stage amplifier has a first stage of voltage gain of 100, second stage of voltage gain of 200 and the third stage voltage gain of 400. Find the total voltage gain in db.

31. The Zener diode shown in the figure has V_z = 18 V as long as I_z is maintained between 200 mA and 2 A. Find the value of series resistance R so that E_0 remains 18 V while input voltage E_i is free to vary between 22 V to 28 V.

(4 × 4 = 16 marks)

Section E

(*Essays-Answer in about* two pages)

Answer any two *questions.*
Each question carries 10 *marks.*

32. Draw the Circuit diagram and explain the working of a full wave bridge rectifier. Also derive an expression for I_{dc}, I_{rms}, Peak inverse voltage, ripple factor and efficiency.

Turn over

33. Explain negative feedback. Derive an expression for gain in a negative voltage feedback amplifier. What are the advantages of negative feedback ?

34. Draw the circuit diagram and derive the expression for voltage gain of an Inverting and non-inverting configuration using Op-amp.

35. Draw the circuit diagram of a single stage CE amplifier. Describe its working with necessary theory and explain frequency response curve.

$(2 \times 10 = 20$ marks$)$