Name.................................

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FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(CUCBCSS–UG)

Physics/Applied Physics

PHY 5B 04/APY 5B 10—ELECTRONICS (ANALOG/DIGITAL)

Time : Three Hours

Maximum : 80 Marks

Section A

Answer **all** *questions in a word* **or** *a phrase.*
Each question carries 1 mark.

1. How much is the percentage of regulation in an ideal rectifier ?

2. Give the Barkhausen condition for oscillations.

3. How much is the gain of a buffer amplifier ?

4. In FM, when frequency deviation is doubled how does it affect the modulation ?

5. Binary equivalent of the Hexadecimal number $A5B_{16}$.

Write True *or* False :

6. CE configuration of transistor amplifier has the highest voltage gain.

7. Field effect transistor is a current-controlled device.

8. The output impedance of an amplifier decreases when current-shunt negative feedback is used.

9. The closed loop gain of an amplifier is always greater than the open loop gain.

10. Oscillators employ positive feedback.

$(10 \times 1 = 10 \text{ marks})$

Section B

Answer **all** *questions in two* **or** *three sentences.*
Each question carries 2 marks.

11. What is the difference between active and passive filters ?

12. Define Q point of a transistor.

13. What is the advantage of a bridge rectifier over a full wave rectifier ?

14. Give the schematic symbol of N-channel and P-channel FET.

15. Define the bandwidth of an amplifier.

16. What do you understand by the inverting and non9inverting terminals of an Op-Amp ?

17. In a code of base 7, the digits are 0, 1, 2, 3, 4, 5, 6. The number 468 is in decimal code. What is the equivalent in a code of base 7 ?

$(7 \times 2 = 14 \text{ marks})$

Turn over

Section C

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

18. Discuss the input and output characteristics of CB transistor configuration.

19. What is direct coupling in amplifiers ? What are the advantages of the same ?

20. Draw the circuit diagram of a phase shift oscillator with labels on the components. Give the expression for its frequency.

21. What are upper and lower side frequencies in AM ?

22. How does a light emitting diode get its colour ?

23. Explain 1's complement method of binary subtraction with example.

24. Why NAND and NOR are called universal gates ?

$(5 \times 4 = 20 \text{ marks})$

Section D

Answer any **four** *questions.*
Each question carries 4 marks.
Problems—write all relevant formulas, all important steps carry separate marks.

25. The turns ratio of a transformer used in half wave rectifier is n1 : n2 = 10 : 1. The primary connected to the power mains; 220 V, 50 Hz. Neglecting the diode resistance in forward bias calculate the d.c. voltage across the load. What is the PIV of the diode ?

26. An RC coupled amplifeir has a voltage gain of 120 in the frequency range of 500 to 30 kHz. On either side of these frequencies, the gain falls so that it reduced by 3 dB at 100 Hz and 50 kHz. Calculate the gain in dB at cut-off frequencies and also plot the frequency response curve.

27. A transistor has $\alpha = 0.96$ and a collector leakage current I_{CO} of 1 µA. Calculate the collector and base curents, when I_E = 2 mA.

28. For a single stage transistor amplifier, the collector load is 3 kΩ and the input resistance is 1 kΩ. If the current gain is 100, calculate the voltage gain of the amplifier.

29. A water pump is required to turn on automatically whenever the water level in any two or more three tanks A, B and C falls below a pre-set level. Each water tank is provided with a level detector that generates a high voltage whenever the water level in the tank is low. (a) Write down the Boolean expression for the working of water pump whenever a high voltage turn on. (b) Implement the Boolean expression using AND, OR and NOT gates. (c) Reudce the Boolean expression to minimum number of literals and (d) Obtain a much simpler circuit.

30. Obtain the output of an Op-Amp adder with the following data. Inputs are V1 = 0.1 V, V2 = 0.3 V and V3 = 0.5V. Input resistors are R1 = 2 kΩ, R2 = 3 kΩ and R3 = 4 kΩ and the feedback resistor R = 12 kΩ.

31. A computer is transmitting the following groups of bytes to an outupt device. Give the equivalent octal and hexadecimal listings, 10110110, 01111011, 10010101, 00101110.

$(4 \times 4 = 16 \text{ marks})$

Section E

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

32. Discuss the need of biasing in transistor amplifiers. Describe the different methods of biasing.

33. Descirbe the term feedback in amplifiers. Explian the principle of negative feedback and discuss the advantages of negative feedback.

34. What is modulation ? Discuss frequency modulation and explain the term carrier swing.

35. Briefly describe the Karnaugh map method and its applications. Obtain the simplified SOP and POS forms of the function $F(A, B, C, D) = \Sigma(0, 1, 2, 5, 8, 9, 10)$ using K map.

$(2 \times 10 = 20 \text{ marks})$