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

Reg. No..................................

FIFTH SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT) EXAMINATION, NOVEMBER 2016

(UG—CCSS)

Physics

PH 5B 12—ELECTRONICS (ANALOG AND DIGITAL)

(2013 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Section A (Objective Type Questions)

Answer all **twelve** *questions.*

I. Choose the correct answer :

1 Open-loop gain of an amplifier is given by :

  (a) A.

  (b) $A\beta$.

  (c) β.

  (d) None of these.

2 Maximum rectifying efficiency of a full wave rectifier is :

  (a) 40.6 %.

  (b) 81.2 %.

  (c) 0.48 %.

  (d) 1.21 %.

3 In a Darlington pair :

  (a) The two transistors are connected in parallel.

  (b) The emitter of the first transistor feeds the base of the second.

  (c) The collector of the first transistor feeds the base of the second.

  (d) None of the above.

4 JFET is a :

  (a) Is a current-controlled device.

  (b) Has a low input resistance.

  (c) Is a voltage-controlled device.

  (d) Is always forward-biased.

5 If $I_C = 2$ mA and $I_B = 50$ μA, the current gain for a BJT equals :

  (a) 20.

  (b) 25.

  (c) 30.

  (d) 40.

Turn over

6 In a negative feedback, series mixing :

   (a) Tends to increase the input resistance.

   (b) Tends to decrease the input resistance.

   (c) Does not alter the input resistance.

   (d) None of these.

7 The best frequency response is of ——— coupling.

   (a) RC.   (b) Transformer.

   (c) Direct.   (d) Indirect.

8 Half adder is a logic circuit that performs binary addition of :

   (a) 3 bits.   (b) 2 bits.

   (c) 4 bits.   (d) 8 bits.

II. Fill in the blanks with appropriate word or numerical value :

9 If three stage amplifier has individual stage gains of 10db, 5db and 12db, then total gain is ———.

10 Input impedance of an ideal op-amp equals ———.

11 $1100_2 + 101_2 = $ ———.

12 Binary equivalent of 26_8 is ———.

(12 × ¼ = 3 weightage)

Section B (Short Answer Type Questions)

Answer all **nine** *questions.*
Each question carries 1 weightage.

13 Why are filter circuits used in power supplies ?

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

15 Obtain the output of a voltage doubler, if the input r.m.s voltage is 2 V ?

16 What is meant by the Alpha cut off frequency ?

17 What are the essentials of a feedback LC oscillator ?

18 Why are junction transistors called bipolar devices ?

19 What is meant by half-power frequencies of an amplifier ?

20 Which are Universal gates and why are they called so ?

21 What do the letters R and S stand for, in the term 'RS latch'. Explain with the help of a truth table.
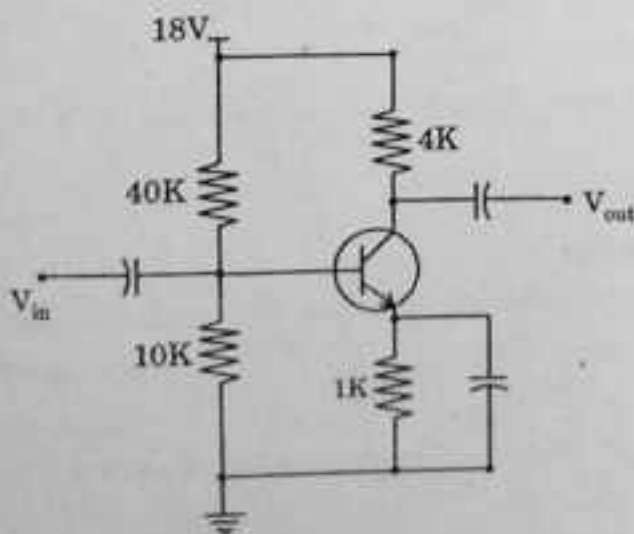
(9 × 1 = 9 weightage)

Section C (Short Essay or Paragraph Questions)

Answer any **five** *questions from seven.*
Each question carries 2 weightage.

22 What do you understand by class A amplifier ?

23 An amplifier has a voltage gain of – 100. The feedback ratio is – 0.04. Find (i) The voltage gain with feedback ; (ii) The amount of feedback in dB ; (iii) The output voltage of the feedback amplifier for an input voltage of 40 mV ; (iv) The feedback factor ; and (v) The feedback voltage.

24 An inverting amplifier has $R_f = 3$ KΩ and R = 1 KΩ. Determine the output voltage, the input resistance and the input current for an input voltage of 2V.

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

26 An FM transistor sends out a 100 MHz carrier wave frequency modulated by a 15 KHz sinusoidal audio signal. The maximum frequency deviation is 30 KHz. Find (i) The modulation index ; (ii) The three significant pairs of side frequencies ; and (iii) Channel width required for these three side frequency pairs.

27 For a Zener regulator circuit, $V_Z = 6V$, $R_S = 2$ KΩ, $R_L = 3$ KΩ and the input voltage varies from 20 V to 40 V. Find the maximum and minimum values of the Zener current.

28 Find the values of V_{CE} and A_v for the transistor amplifier circuit shown below :

$(5 \times 2 = 10$ weightage)

Section D (Essay Questions)

Answer any **two** *questions from three.*
Each question carries 4 weightage.

29. Discuss the circuit details and operation of a transformer coupled two stage amplifier. What are the advantages of transformer coupling ?

30. Explain the principle and working of an RC phase shift oscillator with a neat circuit diagram. Also give the expression for frequency.

31. What is amplitude modulation ? Describe the mathematical analysis of AM wave. Explain upper and lower side frequencies.

(2 × 4 = 8 weightage)