

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

Core Course—Physics

PH 5B 12—ELECTRONICS (ANALOG AND DIGITAL)

Time : Three Hours

Maximum : 30 Weightage

Section I

I. Answer all *twelve* questions :

Questions 1 – 4 : Choose correct alternative.

- 1 The efficiency of a half-wave rectifier is :

(a) 81.2%.	(b) 40.6%.
(c) 100%.	(d) 50%.

- 2 Which of the following is wrong ?
 - (a) Collector is made physically larger than emitter.
 - (b) Collector is moderately doped.
 - (c) Collector and emitter are of same type semiconductor.
 - (d) Collector and emitter can be interchanged.

- 3 The condition for sustained oscillation in the case of a feedback amplifier is :

(a) $A_{vf} < A_v$.	(b) $A_{vf} > A_v$.
(c) $A_{vf} = \infty$.	(d) $A_{vf} = 0$.

- 4 $(101)_2 = (\text{---})_{10}$:

(a) 6.	(b) 5.
(c) 8.	(d) 10.

Questions 5 – 8 : Fill in the blanks.

- 5 Zener diodes are commonly used as _____.
- 6 An amplifier in _____ configuration has the highest output impedance.
- 7 A JFET has the disadvantage of _____.
- 8 A full adder has _____ inputs and *two* outputs.

Turn over

Questions 9 – 12 : Give *one* word answers.

- 9 How the amplitude and intensity of a sound wave are related ?
- 10 To invert a given signal which logic gate is used.
- 11 Write the expression for gain of the amplifier, if negative feedback is applied.
- 12 Write the decimal equivalent of $(1101101)_2$.

($12 \times \frac{1}{4} = 3$ weightage)

Section II

II. Answer all *nine* questions :

- 13 What are voltage multipliers ?
- 14 Draw the circuit diagram of a choke-input filter circuit.
- 15 Write the expression for voltage gain of a CE amplifier.
- 16 Write the relation between γ and α of a common-collector transistor configuration.
- 17 Draw the input and output waveforms of a class A amplifier.
- 18 Draw the circuit diagram of an Op-amp differentiator.
- 19 What is a MOSFET ?
- 20 What is a Flip-flop ?
- 21 Write the Boolean expression for Exclusive – OR gate.

($9 \times 1 = 9$ weightage)

Section III

III. Answer any *five* questions :

- 22 A diode having an internal forward resistance $r_f = 30 \Omega$ is used for a HW rectifier. The input a.c. voltage is $V_i = 5.3 \sin \omega t$ volt and the load resistance is 500Ω . Find the a.c. input power and rectifier efficiency.
- 23 In a common base connection, current gain is 0.9. If the emitter current is 1 mA, calculate base current.
- 24 In a transistor CE amplifier $V_{cc} = 12.5$ V, collector load $R_c = 2.5$ k Ω . Draw the d.c. load line.
- 25 Explain the potential divider biasing method and discuss its advantages.
- 26 A class A power amplifier has zero signal collector current of 50 mA. If the collector supply voltage is 5V, find (i) the maximum a.c. power output ; (ii) the maximum collector efficiency.
- 27 In the phase shift oscillator, $R_1 = R_2 = R_3 = 1$ M Ω and $C_1 = C_2 = C_3 = 68$ pF. At what frequency does the circuit oscillate ?

28 Simplify the Boolean expressions :

(i) $ABC + \bar{A}\bar{B}\bar{C} + \bar{A}BC + ABC + A\bar{B}C$

(ii) $(AB + C)(AB + D)$.

(5 × 2 = 10 weightage)

Section IV

IV. Answer any *two* questions :

29 (a) Explain the principle of a full wave bridge Rectifier.

(b) Derive the expression for efficiency.

30 (a) With a circuit diagram, explain the working of a transformer coupled class A amplifier.

(b) Discuss its advantages.

31 Explain RC oscillation. With the help of a circuit diagram, describe the working of a phase shift oscillator. What are its merits and demerits ?

(2 × 4 = 8 weightage)