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**BSCPHC 355**

**Credit Based VI Semester B.Sc. Degree Examination, April/May 2017  
(2014-2015 Batch Onwards)**

**Paper – VIII : PHYSICS  
Electronics**

Time : 3 Hours

Max. Marks : 80

- Instructions :**
- 1) Answer questions from **all** Units.
  - 2) Answer to multiple choice questions should be written on the **first** page of answer book only.
  - 3) Scientific calculators are **allowed**.

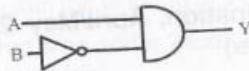
**PART – A**

1. Answer the following questions by choosing the most appropriate answer : **(1×8=8)**
- i) The intersection of DC/AC load line with the output characteristics curve is called
    - a) Operating point
    - b) Free point
    - c) Floating point
    - d) Fixed point
  - ii) The field effect transistor is a
    - a) Voltage controlled device
    - b) Current controlled device
    - c) Temperature controlled device
    - d) Light controlled device
  - iii) An OP-AMP is a
    - a) Non linear IC
    - b) Linear IC
    - c) Not IC
    - d) None of these
  - iv) The voltage gain of an amplifier with negative feed back
    - a) Increases
    - b) Decreases
    - c) Remains same
    - d) Toggles
  - v) Flip-Flop is a
    - a) Sequential circuit
    - b) Combinational circuit
    - c) Half adder circuit
    - d) Full adder circuit

**P.T.O.**



vi) The Boolean expression for the given circuit is



a)  $Y = A + B$

b)  $Y = A \cdot \bar{B}$

c)  $Y = A \cdot B$

d)  $Y = \overline{A \cdot B}$

vii) The ratio of amplitude of modulating signal to the amplitude of carrier wave is called

a) Frequency index

b) Radiation index

c) Modulation index

d) Communication index

viii) \_\_\_\_\_ monitors use fluorescent and cold-cathode technologies in Laptops and Televisions.

a) Light Emitting Diode

b) Photo Emissive Diode

c) Photo Voltaic Diode

d) Liquid Crystal Diode

2. Answer **any six** of the following :

(2×6=12)

i) Mention any two differences between BJT and MOSFET.

ii) Draw AC equivalent circuit of CE amplifier.

iii) What is rectification ? What are the use of filter circuits in rectifiers ?

iv) Write the circuit diagram of a phase shift oscillator obtained using transistor.

v) Realize OR gate using NAND gate.

vi) Give the working of BCD to 7 segment decoder.

vii) Give any two advantages of Diode detector.

viii) Give two categories of mobile communication system.



PART – B  
UNIT – I

- 3. a) Explain the operation of a JFET.
- b) Explain the h-parameter of CE-amplifier and derive the expression for input resistance, output resistance, current gain and voltage gain. (4+7)

OR

- 4. a) Explain drain characteristics of an e-MOSFET.
- b) Explain the method to draw the dc load line and also explain how Q-point is located? (4+7)

- 5. a) For a transistor amplifier  $R_1 = 10\text{ k}\Omega$ ,  $R_2 = 5\text{ k}\Omega$ ,  $R_C = 1\text{ k}\Omega$ ,  $R_E = 2\text{ k}\Omega$ . Draw dc load line and determine the operating point. Given  $V_{BE} = 0.7\text{ V}$  and  $V_{CC} = 15\text{ V}$ . 4

OR

- b) Sketch the transfer characteristics for an e-MOSFET. Given,  $V_T = 3\text{ V}$ ,  $I_D(\text{ON}) = 6\text{ mA}$ ,  $V_{GS}(\text{ON}) = 8\text{ V}$ . 4

UNIT – II

- 6. a) With a circuit diagram explain the working of a non-inverting amplifier using OP-AMP. Obtain an expression for voltage gain.
- b) Explain with a circuit diagram the working of a bridge rectifier and obtain expressions for ripple factor and efficiency. (4+7)

OR

- 7. a) Derive an expression for gain in a feedback amplifier in terms of feedback fraction.
- b) Distinguish between line and load regulation. With the circuit diagram, explain the working of a Zener voltage regulator. (4+7)

- 8. a) Determine the out-put voltage for both differential and common mode of an OPAMP for input voltages  $V_{i1} = 150\mu\text{ V}$  and  $V_{i2} = 140\mu\text{ V}$ . The amplifier has differential gain  $A_d = 4000$  and  $\text{CMRR} = 10^5$ . 4

OR

- b) The gain of an amplifier is 300. Calculate the percentage change in gain, if 3% negative feedback is applied. 4



## UNIT – III

9. a) Explain the working of a RS flip-flop using NOR gates.  
 b) What is an adder ? Explain the working of a half adder and a full adder with truth tables. (4+7)

OR

10. a) Explain the working of a JK flip-flop.  
 b) What is a logic gate ? Explain the working of OR and NOT gate using discrete components. Write truth tables and symbols in each case. (4+7)

11. a) Simplify and draw the logic diagram.  $Y = (A + B)(A + \bar{B})(\bar{A} + C)$ . 4

OR

- b) Simplify the equation  $Y = \bar{A}BC + A\bar{B}C + ABC\bar{C} + ABC$ . 4

## UNIT – IV

12. a) Give the block diagram of a CRO and mention the functions of different sub-systems.  
 b) Derive an expression for the instantaneous voltage of an AM wave and obtain the expression for total power in terms of modulation index. (4+7)

OR

13. a) Give a comparison between AM and FM.  
 b) Write a short note on classification of radio waves on the basis of modes of propagation and explain the role of ionosphere in radio wave propagation. (4+7)

14. a) A sinusoidal carrier voltage of frequency 1 MHz and amplitude 100 V is amplitude modulated by sinusoidal voltage of frequency 5 kHz producing 60% modulation. Calculate frequency and amplitude of side bands. 4

OR

- b) The central frequency of an FM carrier wave is 105 MHz. The highest frequency of the modulating signal is 105.04 MHz, when modulated by a signal of 8 kHz. Find the modulation index. 4