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**PG CBCS**  
**M.Sc. Semester-I Examination, 2020**  
**PHYSICS**  
PAPER: PHS-104

**Full Marks: 40**

**Time: 2 Hour**

**Write the answer for each unit in separate sheet**

The figures in the right-hand margin indicate full marks.  
Candidates are required to give their answers in their own words as far as practicable

**104.1: Analog Electronics-I**

**Marks: 20**

**Answer any TWO questions of the following:**

**10×2**

1. Write Down the characteristics of an ideal OP-AMP. Explain the concept of virtual ground in an OP-AMP.
2. What is a non-inverting OP AMP? Derive an expression for the gain of a non- inverting amplifier using OP-AMP.
3. What is is the important physical difference between an enhancement and a depletion MOSFET? Sketch the basic structure of an n-channel depletion MOSFET?
4. What is the important of Modulation? What is basic difference Amplitude modulation and Frequency Modulation.
5. A modulating signal  $m(t)=10\cos(2\pi\times 10^3t)$  is amplitude modulated with a carrier signal  $c(t)=60\cos(2\pi\times 10^5t)$ . Find the modulation index, the carrier power, and the power required for transmitting in AM wave.
6. Write a short note Ionospheric Wave in radio propagation.

*(Turn Over)*

(2)

**104.2: Digital Electronics-I****Marks: 20****Answer any TWO questions of the following:****10×2**

1. Using the K- Map method, obtain the minimal sum of product expression of the following function.

$$Y = \sum(0,2,3,6,7,8,10,11,12,15)$$

**10**

2. Explain the term Universal gate. Design a Half Adder using NAND Gate only.

**10**

3. What is master slave flip flop? Draw the logic diagram of J-K flip flop and mention its advantage.

**10**

4. What is a shift register? Explain the working of serial in serial out shift register with logic diagram and waveform.

**10**

5. What is Multivibrator? Derive the expression the periode of pulse generated when 555 timer is used as a Astable Multivibrator.

**10**

6. What is Counter? Explain the difference between the performance of Asynchronous and Synchronous counters.

**10**

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