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PG (NEW) CBCS
M.Sc. Semester-I Examination, 2018
PHYSICS
PAPER: PHS-104

Full Marks: 40 **Time: 2 Hours**

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.

PHS 104.1: ANALOG ELECTRONICS - I

Marks: 20

Attempt Question number 1, 2 and any one from the rest.

1. Attempt any two of the following **(2 × 2 = 4)**
   a. What do you mean by VSB-AM modulation and where is it used?
   b. Explain pre-emphasis and de-emphasis in FM signal.
   c. What is the difference between CW radar and Pulsed radar?
   d. What is the advantage of n MOSFET over p MOSFET?
2. Attempt any two of the following **(4 × 2 = 8)**
   a. Explained the detailed operation of MTI radar.
   b. Determine the maximum range of a radar.
   c. With necessary block diagram, explain the detailed operation of a super heterodyne AM radio receiver. What is the value of IF used in AM receivers?
   d. Describe how you can use an OPAMP as constant current source.
3. a. Derive the expression for FM signal and hence find out the theoretical bandwidth of FM signal. **(4)**
   b. Explain any method of generation of FM signal. **(3)**
   c. What is the advantage of using limiter in FM receiver? **(1)**
4. a) What do you mean by radio horizon? **(2)**
   b) What is radiation resistance of an antenna? **(2)**
   c) Describe the radiation pattern of a half-wave dipole antenna. **(4)**

(Turn Over)

PHS 104.2: DIGITAL ELECTRONICS - I

Marks: 20

Attempt Question number 1, 2 and any one from the rest.

1. Attempt any two of the following **(2 × 2 = 4)**
   a. Define J-K flipflop using S-R latch.
   b. Design a 8:1 MUX using two 4:1 MUX.
   c. Use Karnough map to minimize the following logical expression
   $$Y = \sum_m(0,2,4,6)$$
   d. Convert the following circuit using NAND gate only
   $$Y = (A+B).(C+D)$$

2. Attempt any two of the following **(4 × 2 = 8)**
   a. Design a Full Adder circuit using MUX.
   b. Draw a binary to BCD converter.
   c. Design 3-bit up/down ripple counter with a proper mode select line.
   d. Explain the operation of a 4 bit SIPO register with proper circuit diagram.

4. a. Design a BCD to seven segment decoder. **(4)**
   b. Design a four bit binary converter using T Flip-Flop. **(4)**

5. a. Two signals A(A_1 A_0) and B(B_1 B_0) are applied to a digital circuit which goes high when two signals are equal. Write down the truth table and draw the circuit. **(4)**
   b. Give the circuit of 4 bit odd parity generator. **(4)**

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