



Reg. No. : .....

Name : .....

**First Semester M.Sc. Degree Examination, March 2018**  
**Branch : PHYSICS**  
**PH 213 : Basic Electronics**  
**(2014 Admission Onwards)**

Time: 3 Hours

Max. Marks : 75

**PART – A**

Answer **any five, each** question carries **three** marks.

- I. a) Explain the Miller effects in amplifier circuits.
- b) Draw a logic diagram that will divide the input clock frequency 16. Use negative edge triggered JK Flip-flop.
- c) Explain the working and applications of IMPATT diode.
- d) What is a universal shift register ?
- e) What are the advantages of synchronous counter over an asynchronous counter ?
- f) Explain the working of an LED.
- g) What is the difference between active and passive transducer ?
- h) What are the important sources of attenuation in optical fibres ?

**(5×3=15 Marks)**

**PART – B**

- II. A) a) Describe the working of BJT. 8
- b) Explain in detail about the high frequency analysis of BJT. 7
- OR
- B) a) What is Schmitt Trigger ? Discuss its operation. 7
- b) Design a triangular wave generator using two op-amps. 8

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- III. A) a) With a neat diagram, explain the working of a bidirectional shift register. 7
- b) Compare the RS and JK flip-flops. What are the advantages of master slave flip-flops? 8
- OR
- B) a) Describe the working of an arithmetic logic unit with a neat diagram. 7
- b) Draw the circuit diagram of binary adder and explain its working with an example. 8
- IV. A) a) Write an essay on working of Photodetector. 7
- b) Describe optical fibre as a waveguide. 8
- OR
- B) a) What are the important components of a cathode ray oscilloscope? And explain its working. 7
- b) Describe the principle of working of thermistor with a diagram. 8
- (3×15=45 Marks)**

### PART – C

Answer **any three**, each question carries **5** marks.

- V. a) A common source amplifier uses FET with drain resistor  $r_d = 100 \text{ k}\Omega$  and  $\mu = 10$ . Determine the voltage gain for load resistor  $R_L$  of  $500 \text{ k}\Omega$ .
- b) Design a bandpass filter with  $f_L = 500 \text{ Hz}$  and  $f_H = 2.5 \text{ kHz}$  for passband gain of 5. Draw the circuit diagram.
- c) Design an astable multivibrator for an output frequency of  $10 \text{ kHz}$ . Draw the circuit diagram.
- d) In the summing amplifier (inverting mode), the input signal to be combined are  $V_1 = 3\text{V}$ ,  $V_2 = 2\text{V}$  and  $V_3 = 1\text{V}$ . The input resistors are  $R_1 = R_2 = R_3 = 3\text{k}\Omega$ . The feedback resistor  $R_f = 1\text{k}\Omega$ , considering ideal op-amp determine the  $V_o$ .
- e)  $1\text{mA}$  meter movement with an internal resistance of  $100\Omega$  is to be converted in to a  $0\text{-}100 \text{ mA}$  ammeter. Calculate the value of the shunt resistor required.
- f) An optical fibre has core diameter of  $6 \mu\text{m}$  and operate with infrared light at  $1.31 \mu\text{m}$ . It has a numerical aperture of  $0.34$ , find the number of modes it will support. **(3×5=15 Marks)**