



**VP & RPTP Science College**  
**Vallabh Vidyanagar**

**BSc Examination [Semester: I] 2018**  
**Subject: Physics Course: US01CPHY21**  
**Physics**

**Wednesday, Date 03-10-2018 Time: 12.30 pm to 2.30 pm**

**Total Marks: 50**

**INSTRUCTIONS:**

- 1 Attempt all questions.
- 2 The symbols have their usual meaning.
- 3 Figures to the right indicate full marks.

**Q-1 Multiple Choice Questions: [Attempt all]**

**08**

- (i) \_\_\_\_\_ is the nearly perfect elastic material.
- (a) Quartz fibre (b) Silver  
(c) Putty (d) Silicon
- (ii) The depression produced in the free end of a cantilever is \_\_\_\_\_.
- (a)  $y = \frac{2WL^3}{3Y I_g}$  (b)  $y = \frac{3WL^3}{Y I_g}$   
(c)  $y = \frac{WL^3}{3Y I_g}$  (d)  $y = \frac{LW^3}{3Y I_g}$
- (iii) The sound waves having frequency between 20 Hz to 20 KHz are called \_\_\_\_\_ waves.
- (a) Infrasonic (b) Ultrasonic  
(c) Supersonic (d) Audible
- (iv) If we increase the length of simple pendulum, its time period will \_\_\_\_\_.
- (a) Increase (b) Decrease  
(c) Not changed (d) Becomes infinite
- (v) How many number of independent node equations are required to analyze a network having three junction points and five branches?
- (a) 2 (b) 5  
(c) 3 (d) 6
- (vi) Schering bridge is used to determine the unknown \_\_\_\_\_.
- (a) Resistance (b) Capacitance  
(c) Reactance (d) Inductance
- (vii) The working principle of Jamin's interferometer is based on division of \_\_\_\_\_.
- (a) Amplitude (b) Wavelength  
(c) Frequency (d) Wave front
- (viii) The equation for resolving power of microscope is \_\_\_\_\_.
- (a)  $t \frac{d\mu}{d\lambda}$  (b)  $nN$   
(c)  $\frac{1.22 \lambda}{2 \sin i}$  (d)  $\frac{a}{1.22 \lambda}$



- Q-2 Answer the following questions in short. (Attempt any Five) 10**
- (1) Define (i) elasticity and (ii) plasticity.
  - (2) Define (i) Young's modulus and (ii) Bulk modulus.
  - (3) Define (i) infrasonic and (ii) ultrasonic.
  - (4) Draw Kater's Reversible pendulum.
  - (5) Define: (i) Network, (ii) Junction
  - (6) Draw Diagram of dc bridge.
  - (7) Calculate the minimum number of lines in diffraction grating, which will just resolve in the first order sodium lines of wavelength  $5890 \text{ \AA}$  and  $5896 \text{ \AA}$ .
  - (8) What is grating? Write formula of resolving power of grating.
- Q-3 Define Poisson's ratio ( $\sigma$ ). Describe an experiment to determine Poisson's ratio of a rubber tube and derive  $\sigma = \frac{1}{2} \left( 1 - \frac{1}{A} \frac{dV}{dL} \right)$ . 8**
- OR**
- Q-3 Define modulus of rigidity ( $\eta$ ). Describe dynamical method (Maxwell's vibrating needle method) to determine modulus of rigidity of a thin wire and derive  $\eta = \frac{8\pi l a^2 (m_2 - m_1)}{r^4 (t_2^2 - t_1^2)}$ . 8**
- Q-4 (a) Discuss the piezo-electric method for production of ultrasonic waves. 5**  
**(b) Calculate the capacitance to produce ultrasonic waves of 10 MHz with an inductance of 1mH. (use:  $f = \frac{1}{2\pi\sqrt{LC}}$ ) 3**
- OR**
- Q-4 (a) What is simple pendulum? Derive an expression for the periodic time of a simple pendulum. 4**  
**(b) Draw diagram of bar pendulum and explain how to determine g using bar pendulum. 4**
- Q-5 (a) What is mesh? Explain mesh current analysis of two mesh network. 5**  
**(b) What is superposition principle? 3**
- OR**
- Q-5 (a) Write note on Maxwell Bridge. 5**  
**(b) Three resistors,  $R_1 = 10 \Omega$ ,  $R_2 = 20 \Omega$  and  $R_3 = 30 \Omega$  are connected in series with a battery of 10 V. Find the voltage drop across  $R_2$ . 3**
- Q-6 Write a note on Michelson Interferometer. 8**
- OR**
- Q-6 What is Resolving Power? State Rayleigh's criteria for resolving power. Derive resolving power of prism. 8**