UNIVERSITY OF GUJRAT

A WORLD CLASS UNIVERSITY

(B.A/B.Sc. Part-I) (New Syllabus-2016)

Physics (Theory) (Paper-II)

Roll No: _____

Time Allowed : 3 hrs
Max. Marks : 35
Pass Marks : 33%

Attempt **FIVE** Questions by selecting at least **Two** Questions from each Section. All Questions carry equal marks.

SECTION-A

1- a)Define Simple Harmonic Motion. Write down its equation of motion and solve for displacement. Hence calculate its time period. *4*

b) Consider a block-spring system in which spring constant is 221 N/m and mass of block is 2.43 kg. The block is stretched in x-direction a distance of 11.6 cm from equilibrium and released. What is total energy in the system? *2*

c) Why amplitude of simple pendulum is kept small? *1*

2- a) What are sinusoidal waves? Calculate phase velocity and phase constant for these waves. *4*

b) A violin string tuned to concert a having frequency 440Hz and length of 0.34 m. What are three longest wavelengths of resonances of the string? *2*

c) Why sound waves travel faster in solids than in gases? *1*

3- a) What is interference of light? Describe young double slit experiment. Also obtain an expression to determine the condition for maxima and minima. *4*

b) If a mirror M in interferometer is moved through 0.233 mm, 792 fringes are counted with a light meter. What is the wavelength of the light? *2*

c) In Newton's ring experiment, is the central spot as seen by reflection, dark or light? Explain. *1*

4- a) What is diffraction? Explain single slit diffraction and derive diffraction equation. *4*

b) What requirement must be met for the central maximum of the envelope of the double slit interference pattern to contain exactly 11 fringes? *2*

c) How will the sky appear if there had been no atmosphere? *1*

5- a) What is Polarization? Explain briefly different states of polarization. *4*

b) At what angle of incident will light reflected from water be completely polarized? *2*

c) Is the light from the sky polarized? Why is it that clouds seen through polarized glasses stand in bold contrast to the sky? *1*

6- Write notes on following: i) Newton's Rings ii) Beats *3½,3½*

SECTION-B

7- a) Calculate pressure of a gas taking into account kinetic theory of gases. *4*

b) The temperature in interstellar space is 2.7K. Find the root mean square speed of hydrogen molecules at this temperature. *2*

c) Why does smoke rise, rather than fall, from a lighted candle? *1*

8- a) Define and explain mean free path of molecule travelling through a gas, hence calculate mean free path on microscopic level when target molecules are stationary and when target molecules are in motion. *4*

b) A container filled with molecules are of oxygen gas is maintained at 300K. What fraction of the molecules has speeds in the range (599 – 601) m/s. The molar mass "M" of oxygen is 0.032 kg/mole. *2*

c) Usually it has been observed that $V_{rms} > V_{av}$, under what condition $V_{rms} = V_{av}$? If not give a proof. *1*

9- a) State and explain second law of thermodynamics with reference to heat engine and refrigerator, hence show equivalence of two statements. *4*

b) Calculate efficiency of a fossil fuel power plant that is run by the heat supplied by coal at the rate 2968MW to produce useful work at the rate 755 MW. *2*

c) What is meant by heat death of the universe? *1*

10- a) Explain Joule Thomson effect. *4*

b) Show that for a perfect gas internal energy is only function of temperature. *2*

c) Explain why a thermos bottle is double walled, evacuated and silvered? *1*