

**SIR SYED GOVT. GIRLS COLLEGE NAZIMABAD**  
Preliminary Examination 2017  
SECTION "B" (Short Answer Questions)

40 Marks

Note: Attempt any ten part questions from this section. All question carry equal marks. The use of scientific calculator is allowed. All notations are used in their usual meaning. Draw diagram where necessary.

- i. The weight of the body on the surface of earth is 980N and 490N at a certain height what is the value of g there and what the height.
- ii. Find the magnitude of the area of a triangle whose two sides are represented by  $\vec{A} = 6\hat{i} + 2\hat{j} - 2\hat{k}$ ,  $\vec{B} = \hat{i} + 2\hat{j} - 2\hat{k}$ .
- iii. A rickshaw driver moving with a speed of 36Km/hr notices a child standing in the middle of the road and brings his rickshaw to rest in 4sec, just in time to save the child. What is the average retarding force on the rickshaw? The mass of the rickshaw is 400 Kg and the mass of the driver is 65kg.
- iv. Why and how is artificial gravity created in a space craft derive a formula for spinning frequency of the space craft to provide artificial gravity.
- v. Derive an expression for the variation in g with altitude.
- vi. Find the temperature at which velocity of sound in air is twice its velocity at 10°C
- vii. It is observed that all bodies, sliding down a friction less inclined plane, have the same acceleration. How does it happen? Explain.
- viii. An automatic gun fires 'n' bullets with a speed of 1800 m/sec in 3 seconds. The mass of each bullet is 25gm. If 450N force is required to hold the gun in position, find the number of bullets fired in each second.
- ix. When an object is thrown upward it rises to a height h how high is the object in term of h when it has lost one third of its original kinetic energy?
- x. Why does a driver pull his hands and legs close to his body when jumping from diving board in the swimming pool to get more sommersaults?
- xi. A compound microscope has an objective and an eye-piece of focal length 1cm and 5cm respectively. The object is located at a distance of 1.05cm from the objective and forms an image 4.17cm. close to the eye - piece. Find the separation of the lenses and the magnifying power of the microscope.
- xii. A ball is kicked from ground level with a velocity of 25 ms<sup>-1</sup> at an angle of 30° to the horizontal direction. (a) When does it reach the greatest height (b) Where is it at that time.
- xiii. Two parallel slits are illuminated by light of two wave lengths one of which is 6.0x10<sup>-7</sup>m on a screen the fourth dark line of the known wave length coincides with the fifth bright line of the unknown wave length. Calculate the unknown wave length.  
OR  
Two vectors 10cm and 8cm long form an angle of 60°. Find the magnitude of difference and the angle with respect to the larger vector.
- xiv. Write the differences between fresnel and fraunhofer diffraction.
- xv. Why do the edges of a thin flim appear dark when illuminated by monochromatic light?

## SECTION "C" (Detailed Answer Questions)

28 Marks

Note: Answer any Two questions from this section. Draw diagrams where necessary.

- 3(a) Two vectors  $\vec{P}$  and  $\vec{Q}$  are acting on a point making angles  $\theta_1$  &  $\theta_2$  with positive x-axis respectively. Find the expression for the magnitude of the resultant vector and its direction.
- (b) What are Newton's rings? Derive the expression for the radius of  $n^{\text{th}}$  bright ring.
- OR
- Define centripetal acceleration and centripetal force. Drive an expression for centripetal acceleration.
- 4(a) Define Longitudinal waves & Transverse waves. Derive the expressions for the frequency of a stretched string vibration (i) One loop (ii) two loops (iii) three loops
- (b) With the help of a ray diagram, describe the construction & working of an astronomical telescope & derive the formula for its magnification when it is focused for infinity.
- 5(a) What is Doppler's effect? Derive the expressions for the frequency detected by a stationary listener.
- (i) When the source moves towards the listener
- (ii) When the source moves away from the listener
- OR

A body from a point in the gravitational field is moving slowly to infinity. What kind of energy will be stored in the body? Derive the relevant formula.

- (b) Two bodies of unequal masses are attached to the ends of a string which passes over a frictionless Pully. If one body moves vertically downward and the second body moves horizontally on a smooth horizontal surface. Drive the expression for tension in the string and acceleration of the bodies.

OR

A bob of mass  $m$  is attached to one end of an elastic, inextensible string which hangs vertically from a rigid support. When it is displaced from its mean position, show that it executes S.H.M. Derive the expression for its frequency.

