**B.Sc. (A & G) Sem. – IV (Animation & Gaming) (CBCS - 2015 COURSE) : WINTER - 2018**

**SUBJECT- PHYSICS & MATHEMATICS FOR GAMES**

Day: Tuesday | **W-2018-1123** | Time: 02.30 pm to 05.30 pm

Date: 27/11/2018 | Max. Marks: 60

**N.B.:**

1) Attempt **ANY SIX** full questions.
2) Figures to the right indicate **FULL** marks.
3) Draw neat diagrams **WHEREVER** required.
4) Assume values of physical constants if required. Clearly indicate values used.

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**Q.1** A flagstaff is placed on top of a building. The flagstaff and building subtend equal angles at a point on level ground which is 200 m away from the foot of the building. If the height of the flagstaff is 50 m find an expression for the height of the building. **(10)**

**Q.2** **a)** List the forces of nature. Give one example each to show where their effect can be seen. **(05)**

**b)** State Newton's laws of motion. **(05)**

**Q.3** Draw the free body diagram for the following situations considering all forces acting on the body: (i) a skydiver is descending with a constant velocity; (b) a cricket ball that has been hit for a six, after it has reached the highest point in its trajectory; (iii) Two masses suspended on a string passed over a pulley; (iv) an aircraft in level flight. **(10)**

**Q.4** A cannon is mounted on the top of a hill of height H m. A cannonball is fired with an initial velocity $V_0$ m/s. Derive an expression for the range of the cannonball. Hence determine the angle for maximum range. **(10)**

**Q.5** A fast bowler and a spin bowler can both make the ball "swing", i.e., change trajectory while in the air. Explain the effects that cause the ball to swing in each case. **(10)**

**Q.6** A basketball player bounces the ball by throwing it vertically downward from a height of 1.5 m with a velocity of 5 m/s. If the coefficient of restitution between the ball and the floor is 0.8, calculate the height to which the ball will rise after bouncing. **(10)**

**Q.7** A 150 g bullet is fired from a gun at a muzzle velocity of 756 m/s. The bullet takes 0.008 s to travel through the 61 cm barrel. Calculate the impulse and average impulse force exerted on the bullet. **(10)**

**Q.8** **a)** Distinguish between analog and digital signals. List the steps for analog to digital conversion. **(05)**

**b)** Why is centrifugal force called a pseudo force? **(05)**

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