

**Comprehensive Test Series-11
(Application of Derivatives)**

XII

TIME: 1hr.

MM: 30

General Instructions:

- All Questions are compulsory.
 - Use of calculator is not permitted.
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- Q.1 Find two positive numbers whose sum is 16 and sum of whose cubes is minimum.
- Q.2 A square piece of tin of side 18 cm is to be made into a box without top, by cutting a square from each corner and folding up the flaps to form the box. What should be the side of the square to be cut off so the volume of the box is the maximum possible.
- Q.3 A rectangular sheet of tin 45 cm by 24 cm is to be made into a box without top, by cutting off square from each corner and folding up the flaps. What should be the side of the square to be cut off so that the volume of the box is maximum?
- Q. 4 Show that of all rectangles inscribed in a given fixed circle, the square has the maximum area.
- Q. 5 Show that the right circular cylinder of given surface and maximum volume is such that its height is equal to the diameter of the base.
- Q. 6 Of all the closed cylindrical cans (right circular), of a given volume of 100 cubic centimeters, find the dimensions of the can which has the minimum surface area?
- Q.7 A wire of length 28 m is to be cut into two pieces. One of the pieces is to be made into a square and the other into a circle. What should be the length of the two pieces so that the combined area of the square and the circle is minimum?
- Q.8 Prove that the volume of the largest cone that can be inscribed in a sphere of radius R is $\frac{8}{27}$ of the volume of the sphere.
- Q. 9 Show that the right circular cone of least curved surface and given volume has an altitude equal to $\sqrt{2}$ time the radius of the base.
- Q. 10 Show that the semi-vertical angle of the cone of the maximum volume and of given slant height is $\tan^{-1} \sqrt{2}$.
- Q. 11 Show that semi-vertical angle of right circular cone of the given surface area and maximum volume is $\sin^{-1} \left(\frac{1}{3} \right)$.