Q.1 Two rings having masses M and 2M, respectively, having the same radius are placed coaxially as shown in the figure. If the mass distribution on both the rings is non-uniform, then gravitational potential at point P is



Q.2 A uniform sphere of mass M and radius R is surrounded by a concentric spherical shell of same mass but radius 2R.A point mass m is kept at a distance x(> R) in the region bounded by spheres as shown in the figure. The net gravitational force on the particle is



Q.3 Two concentric spherical shells have masses M_1 and M_2 and radii R_1 and R_2 ($R_1 < R_2$). What is the force exerted by this system on a particle of mass m if it is at a distance $\frac{(R_1+R_2)}{2}$ from the centre?



Q.4 A mass 2 kg is moved from point Ato B. If the increase in kinetic energy of mass is 4 J and work done on the mass is –10 J, then potential difference between B and **A**(**J**/**kg**) is



Q.5 The gravitational field due to a mass distribution is given by $E = -K/x^3$ in x –direction. Taking the gravitational potential to be zero at infinity, find its value at a distance x



Q.6 Gravitational potential in a region is given by V = -(x + y + z) J/kg. Find the gravitational field intensity at (2, 2, 2)



- **(A)** $(\hat{i} + \hat{j} + \hat{k})$ N/kg **(B)** $2(\hat{i} + \hat{j} + \hat{k})$ N/kg **(C)** $3(\hat{i} + \hat{j} + \hat{k})$ N/kg **(D)** $4(\hat{i} + \hat{j} + \hat{k})$ N/kg
- **Q.7** The gravitational field in a region due to a certain mass distribution is given by $\vec{E} = (4\hat{i} 3\hat{j})$ N/kg. the work done by the field in moving a particle of mass 2 kg from (2 m, 1 m) to $(\frac{2}{3} \text{ m}, 2 \text{ m})$ along the line 3x + 4y = 10 is

(A)
$$-\frac{25}{3}$$
 J (B) $-\frac{50}{3}$ J (C) $\frac{25}{3}$ J (D)Zero



Q.8 If V is the gravitational potential on the surface of the earth, then what is its value at the centre of the earth? (Assume that mass distribution is uniform)



Q.9 A particle of mass M is placed at the centre of a uniform spherical shell of equal mass and radiusa.Find the gravitational potential at a point P at a distance a/2 from the centre



- **Q.10** A uniform solid sphere of mass *m* and radius *r* is surrounded symmetrically by a uniform thin spherical shell of radius 2*r* and mass*m*. Choose the correct statement
 - (A) The gravitational field at a distance of 1.5r from the centre is $\frac{2}{9} \frac{\text{Gm}}{r^2}$

(B)The gravitational field at a distance of 2.5r from the centre is $\frac{8}{25} \frac{\text{Gm}}{r^2}$

(C)The gravitational field at a distance of 1.5*r* from the centre is zero.

(D)The gravitational field between the sphere and spherical shell is uniform.

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(A)	(A)	(C)	(D)	(A)	(A)	(B)	(C)	(A)	(B)