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B.Sc. (PCM)-10, B.A. (Math)-4
2nd Year Examination, Calendar Batch 2016
Mathematics-IV
(Special function & Mechanics)

Time : 3 Hours]

[Max. Marks : 100

Note. Attempt any five questions. Each questions carry equal marks.

- Q.1 Solve $\frac{\partial y}{\partial t} = 2 \frac{\partial^2 y}{\partial x^2}$, where $y(0, t) = 0 = y(5, t)$ and $y(x, 0) = 10 \sin 4\pi x$
- Q.2 Solve the partial differential equation $pz - qz = z^2 + (x^2 + y^2)$.
- Q.3 If h be the height due the velocity v at the earth's surface corresponding height when the variation of gravity is taken into account prove that $\frac{1}{h} = \frac{1}{H} + \frac{1}{r}$ where r is earth's radius?
- Q.4 Find moment of inertia of a solid sphere of radius a and mass M about its diameter?
- Q.5 Solve the following Legendre's equation
 $(1 - x^2) \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} + p(p+1)y = 0$, in descending powers of x.
- Q.6 Find the complete integral of the following partial differential equation
 $z = px + qy + p^2 + q^2$ by Charpit,s method.
- Q.7 Show that $J_n(x)$ is even and odd function for even n and for odd n respectively?
- Q.8 A point describes a cycloid $s = 4a \sin \psi$ with uniform speed v. Find its acceleration at any point.