



# उत्तराखण्ड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल)

## M.A./M.Sc. Mathematics ASSIGNMENT-FIRST YEAR

Last date of Submission: 15/05/2014

(जमा करने की अन्तिम तिथि: 15/05/2014.)

Course Title: Differential Equation, Calculus of Variation and Special functionsation

Course Code: - M.A. /M.Sc. MAT 503

Year: 2013-14

Maximum Marks: 40

Section 'A' contains 08 short answer type questions of 5 marks each. Learners are required to answers 4 questions only. Answers of short answer-type questions must be restricted to 250 words approximately.

Briefly discuss the following:

1. Solve  $\frac{d^3 y}{dx^3} - \frac{d^2 y}{dx^2} = 2$

2. Solve the partial differential equation by mangle's method

$$y^2 r - 2ys + t = p + 6y$$

3. Solve diffusion equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} \quad 0 < x < 1, t > 0$$

$$u(x, 0) = 3 \sin n\pi x, u(0, t) = 0$$

$$u(1, t) = 0$$

4- Find the external of the function.

$$I [y(x)] = \int \frac{1+y^2}{y} dx, \text{ through the origin and the point } (1, 1).$$

5- Solve the differential equation in Series :

$$Y_2 + x^2 y = 0$$

6- Find the value of function in terms of Gauss hypergeometric function :

$$\frac{1}{Z} \log \left( \frac{1+z}{1-z} \right)$$

7- Prove that :

$${}_1F_1(a; c; 2) = \lim_{b \rightarrow \infty} {}_2F_1(a; b; c; \frac{2}{b})$$

8- Prove that :

$$X Q_n^1 - Q_{n-1}^1 = n Q_n$$

**Section 'B' contains 04 long answer-type questions of 10 marks each. Learners are required to answers 02 questions only.**

1- Show that :

$$\lim_{z \rightarrow 1} \frac{2F_1(a; b; a+b; z)}{-\log(1-z)} = \frac{\Gamma(a+b)}{\Gamma a \Gamma b}$$

2- Prove that :

$$\int_0^t J_0 \sqrt{x(t-x)} dx = 2 \sin t/2$$

3- Prove that :

$$\int_0^\infty e^{-x} x^{k+1} \left\{ \frac{L_n^k(x)}{L_n} \right\}^2 dx = \frac{L_n(n+k)(2n+k+1)}{L_n}$$

4- Reduce the equation  $\frac{\delta^2 z}{\delta x^2} + x^2 \frac{\delta^2 z}{\delta y^2} = 0$  to canonical form. Also find its nature.

