KPK, **PUBLIC SERVICE COMMISSION, PESHAWAR**

(31)

COMPETITIVE EXAMINATION FOR PROVENCIAL MANAGEMENT SERVICES, 2016

APPLIED MATHEMATICS (PAPER-II)

TIME ALLOWED:- Three Hours **Max. Marks:-100**

INSTRUCTIONS:- *(a) Selecting **TWO** questions from section-**I** and **THREE** questions from section-**II**, attempt **FIVE** questions. **ALL** questions carry **EQUAL** marks.*
(b). Simple calculator is allowed.

SECTION-I

1. **(a) Using method of VARIATION OF PARAMETERS, solve the following differential equation:**

$$4y'' + 36y = \operatorname{cosec} 3x \qquad (10)$$

(b) Determine the solution of the following differential equation:

$$x^3\frac{d^3y}{dx^3} + 5x^2\frac{d^2y}{dx^2} + 7x\frac{dy}{dx} + 8y = 0 \qquad (10)$$

2. **(a) Find the POWER SERIES solution to the following equation:**

$$y'' - 2xy = 0 \qquad (10)$$

(b) Obtain the solution of the following Boundary Value Problem:

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \qquad (10)$$

subject to the conditions:

$$u(x,0) = 0, \qquad u(x,b) = f(x), \qquad 0 < x < a$$

and

$$\frac{\partial u}{\partial x}\Big|_{x=0} = 0, \qquad \frac{\partial u}{\partial x}\Big|_{x=a} = 0 \qquad 0 < y < b$$

3. (a) **Find the solution of equation** $\frac{\partial^2 u}{\partial x^2} = 4\frac{\partial u}{\partial y}$ **by means of method of SEPARATION OF VAIRIABLES.** (10)

(b) **Solve the wave equation** $a^2\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}$, **where** $0 < x < L$, **and** $t > 0$ **subject to the conditions:** (10)

$$u(0,t) = 0 \text{ and } u(L,t) = 0, \text{ where } t \geq 0$$

and

$$u(x,0) = f(x), \quad \frac{\partial u}{\partial t}\Big|_{t=0} = g(x), \quad \text{where } 0 < x < L$$