Assignment-12

1. **Find the solution of the boundary value problem**

$$u_{xx} + u_{yy} = 0, \quad 0 < x < A, 0 < y < B,$$
$$u(x, 0) = x, \quad 0 \le x \le A,$$
$$u(x, B) = 0, \quad 0 \le x \le A,$$
$$u(0, y) = e^y, \quad 0 \le y \le B,$$
$$u(A, y) = 0, \quad 0 \le y \le B.$$

2. **Find the solution of the boundary value problem**

$$u_{xx} + u_{yy} = 0, \quad 0 < x < \pi, 0 < y < \pi,$$
$$u_y(x, 0) = 0, \quad 0 \le x \le \pi,$$
$$u_y(x, \pi) = 0, \quad 0 \le x \le \pi,$$
$$u_x(0, y) = 0, \quad 0 \le y \le \pi,$$
$$u_x(\pi, y) = 2\cos y, \quad 0 \le y \le \pi.$$

3. **Find the solution of the boundary value problem**

$$u_{rr} + \frac{1}{r}u_r + \frac{1}{r^2}u_{\theta\theta} = 0, \quad 1 < r < 2, 0 < \theta < 2\pi,$$
$$u_r(1, \theta) = \sin\theta, \quad 0 \le \theta \le 2\pi,$$
$$u_r(2, \theta) = 0, \quad 0 \le \theta \le 2\pi.$$

4. **Find the solution of the boundary value problem**

$$u_{rr} + \frac{1}{r}u_r + \frac{1}{r^2}u_{\theta\theta} = 0, \quad 1 < r < 2, 0 < \theta < \pi,$$
$$u(1, \theta) = 0, \quad 0 \le \theta \le \pi,$$
$$u(2, \theta) = \theta(\theta - \pi), \quad 0 \le \theta \le \pi,$$
$$u(r, 0) = 0, \quad 1 \le r \le 2,$$
$$u(r, \pi) = 0, \quad 1 \le r \le 2.$$

5. **Find the solution of the boundary value problem**

$$u_{rr} + \frac{1}{r}u_r + \frac{1}{r^2}u_{\theta\theta} = 0, \quad 1 < r < 3, 0 < \theta < \frac{\pi}{2},$$
$$u(1, \theta) = 0, \quad 0 \le \theta \le \frac{\pi}{2},$$
$$u(3, \theta) = 0, \quad 0 \le \theta \le \frac{\pi}{2},$$
$$u(r, 0) = (r - 1)(r - 3), \quad 1 \le r \le 3,$$
$$u\left(r, \frac{\pi}{2}\right) = 0, \quad 1 \le r \le 3.$$