

Register Number:

Name of the Candidate:

B.Sc. DEGREE EXAMINATION December 2014

(CONSTRUCTION MANAGEMENT)

(SECOND SEMESTER)

220: MATHEMATICS-II

Time: Three hours

Maximum: 75 marks

Answer ALL questions

(5× 15 = 75)

1. a. Verify Cayley-Hamilton theorem and hence find A^{-1} and A^4 , $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$

(OR)

- b. Diagonalise the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ by orthogonal transformation.

2. a. Obtain the Fourier series for $f(x) = 1+x+x^2$ in $(-\pi, \pi)$ deduce that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots = \frac{\pi^2}{6}$

(OR)

- b. Express $f(x)=x$ as a half-range cosine series in $(0, l)$ and deduce $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} = \frac{\pi^2}{8}$

3. a. Find the Fourier Transform of $f(x) = \begin{cases} 1-x^2 & \text{in } |x| \leq 1 \\ 0 & \text{in } |x| > 1 \end{cases}$ Hence prove that

$$\int_0^{\infty} \left(\frac{\sin s - s \cos s}{s^3} \right) \cos \frac{s}{2} ds = \frac{3\pi}{16}$$

(OR)

- b. (i) Find the Fourier cosine transform of e^{-x^2}
 (ii) Find the Fourier sine transform of $\frac{x}{x^2 + a^2}$

4. a. (i) Find the PDE by eliminating the arbitrary constants a and b from $\log(az-1)=x+ay+b$.

(ii) Solve $z=px+qy+\sqrt{1+p^2+q^2}$

(OR)

- b. (i) Solve $p(1-q^2)=q(1-z)$
(ii) Solve $(D^2+3DD'-4D'^2)z=\sin y$.

5. a. (i) Find $z(n^3)$ and $z\left(\frac{1}{n+1}\right)$

(ii) Find $z^{-1}\left(\frac{z-4}{z^2+5z+6}\right)$

(OR)

b. (i) Find $z^{-1}\left(\frac{8z^2}{(2z-1)(4z+1)}\right)$ using convolution theorem.

(ii) Solve $y_{n+2}+y_n=2$, given $y_0=y_1=0$ using z-transform.
