Sample Question Paper Engineering Mathematics-3

1. Find the Laplace transform of $t\sqrt{1+\sin\ t}$

2. Find the constants a, b, c, d, e if
   f(z) $= (ax^3 + bxy^2 + 3x^2 + cy^2 + t) + i(dx^2y - 2y^3 + exy + y)$ is analytic.

3. Calculate the Spearman's rank correlation coefficient R
   X: = 85,74,85,50,65,78,74,60,74,90
   Y: 78,91,78,658,60,72, 80, 55,68,70

4. Find inverse Laplace transform of $\tan^{-1}\left(\frac{s+a}{b}\right)$.

5. Find the ta place transform of $e^{-4t}\int_0^t, \sin\ 3udu$

6. find the value of k if the function f(x) $= kx^2(1-x^3), 0 \le x \le 1.$

$$F(x) = 0$$

   Is a probability density function. find mean and variance.

7. Obtain the Fourier series to represent $f(x) = x^2$ in $(0,2\pi)$

   Hence show that $\frac{\pi^2}{12} = \frac{1}{1^2}\frac{1}{2^2} + \frac{1}{3^2} < \frac{P}{4^2}$

8. Find the analytic function $f(z) = u + iv$ such that

$$u + v = \frac{2\sin\ 2x}{e^{2y} + e^{-2y-2\cos\ 2x}}$$

10. Obtain the Fourier series to represent $f(x) = 9 - x^2$ in $(-3,3)$.

11. Find the coefficients of regression and hence obtain the equation of the lines of Regression for the following data
    X: 78,36,98,25,75,82,90,62,65,39.
    Y: 84,51,91,60,68,62,86,58,53,47.

12. Prove that $\int_0^\infty e^{-t}\frac{\sin\ 2t+\sin\ 3t}{t}dt = \frac{3\pi}{4}$.

13. Find the orthogonal trajectories of the family of curves $3x^2y + 2x^2 - y^3 - 2y^2 = c$.

14. If X denotes the outcome when a fair die is tossed, find Moment generating function Of X and hence find the mean and variance of X.

15. Obtain the half range cosine series of f(x) = x($\pi - x$) in $(0, \pi)$
Hence show that $\frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \frac{1}{4^4}$

16. Find inverse Laplace transform of $\frac{s+29}{(s+4)(s^2+9)}$.

17. The probability density function of a random variable is

X	:	0	1	2	3	4	5	6^3
P(X = x)	:	k	3 k	5 k	7 k	9 k	11 k	13 k

Find $k, p(X < 4), P(3 < X \leq 6)$.

18. Verify Laplace equation for u = $\left(r + \frac{a_2^2}{r}\right)\cos\ \theta$.also find v and f(z).