(b) Six coins are tossed 6400 times. Using the Poisson distribution, determine the approximate probability of getting six heads x times.

Section-D

8. (a) The 9 items of a sample have the following values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these values differ significantly from the assumed mean 47.5.

(b) A die is thrown 270 times and the results of these throws are given below :

No. appeared on the die	1	2	3	4	5	6
Frequencye	40	32	29	59	57	59

Test whether the die is biased or not.

9. Using simplex method :

Maximize $z = x_1 + 2x_2 + x_3$

subject to $2x_1 + x_2 - x_3 \le 2$

$-2x_1 + x_2 - 5x_3 \ge -6$

$4x_1 + x_2 + x_3 \le 6$

$x_1, x_2, x_3 \ge 0$

[Graph Paper]

B.Tech. 3rd Semester (Fire Tech. & Safety)

(Common for all Branches) F Scheme

Examination, December-2019

MATHEMATICS-III

Paper-Math-201-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt **five** questions in total by selecting **one** question from each section. **Question No. 1 is compulsory.***

1. (a) Write Dirichlet's conditions for the uniform convergence of a Fourier series.

(b) Prove that $\lim_{z \to 0} \bar{z}/z$ does not exit.

(c) Define normal and standard normal distribution.

(d) Solve the LPP by the graphical method :

Maximize $z = 2x + 3y$

subject to $x + y \le 30, \quad 3 \le y \le 12$

$x - y \ge 0 \quad 0 \le x \le 20.$

Section-A

2. (a) Express $f(x) = |x|$, $-\pi < x < \pi$,

as Fourier series.

(b) Find the half range sine series of :

$$f(x)=\begin{cases} x & , \quad 0 < x < \dfrac{\pi}{2} \\ \pi - x & , \quad \dfrac{\pi}{2} < x < \pi \end{cases}$$

3. Solve the equation $\dfrac{\partial u}{\partial t} = \dfrac{\partial^2 u}{\partial x^2}$, $x > 0$, $t > 0$

subject to the conditions

(i) $u = 0$, when $x = 0$, $t > 0$

(ii) $u = \begin{cases} 1 & , \quad 0 < x < 1 \\ 0 & , \quad x \geq 1 \end{cases}$ when $t = 0$

(iii) $u(x, t)$ is bounded.

Section-B

4. Show that : $f(z)=\begin{cases} \dfrac{xy^2(x+iy)}{x^2+y^4} & , \quad z \neq 0 \\ 0 & , \quad z = 0 \end{cases}$

is not analytic at $z = 0$, although C – R equations are satisfied at the origin.

(b) Determine the analytic function whose real part is $u = e^{-2xy} \sin(x^2 - y^2)$.

5. (a) Evaluate $\oint_c (z+1)\,dz$ where C is the boundary of the square whose vertices are at the points $z = 0$, $z = 1$, $z = 1+i$ and $z = i$.

(b) Evaluate $\oint_c \dfrac{3z^2 + z}{z^2 - 1}\,dz$

Where C is the circle $|z - 1| = 1$.

Section-C

6. (a) Find the series expansion of :

$$f(z) = \frac{z^2 - 1}{z^2 + 5z + 6} \text{ about } z = 0$$

in the region $2 < |z| < 3$.

(b) Evaluate $\oint_c \dfrac{z}{(z-1)(z-2)^2}\,dz$

Where C is the circle $|z - 2| = \dfrac{1}{2}$.

7. (a) In a lottery, m tickets are drawn at a time out o n tickets numbered from 1 to n. Find the expecte value of the sum of the numbers on the ticke drawn.