B.Tech. 4th Semester (Fire Tech. & Safety) F-Scheme Examination, May–2018

MATHEMATICS–III

Paper–Math-201-F

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

*Note : **Question No. 1 is compulsory.** Attempt total five questions with selecting **one** question from each section. All questions carry equal marks.*

1. (a) Find the finite Fourier sine and cosine transform of

$$f(x) = 2x, \quad 0 < |x| < 4$$

(b) Find the value of b_n in the Fourier series of

$$f(x) = |x| \text{ in } (-\pi, \pi)$$

(c) Express the function f(x) as a Fourier integral,

$$f(x) = \begin{cases} 1 \text{ for } |x| < 1 \\ 0 \text{ for } |x| > 1 \end{cases}$$

(d) Separate into real and imaginary part of $\tan(x+iy)$.

(e) Prove that :

$$\sin(\alpha+n\theta) - e^{i\alpha}\sin n\theta = e^{-in\theta}\sin\alpha$$

(f) Define slack and surplus variables.

(g) If $P(A) = \frac{6}{11}$, $P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{7}{11}$. Find $P(B/A)$.

(h) What is the chance that a leap year should have fifty three Mondays ? 8×2.5

Section–A

2. (a) Expand $f(x) = x\sin x$, $0 < x < 2\pi$, in a Fourier series.

(b) If $f(x) = x, \quad 0 < x < \frac{\pi}{2}$

$$= \pi - x, \quad \frac{\pi}{2} < x < \pi$$

Subject to

$$3x_1 - x_2 + 2x_3 \leq 7 ;$$

$$2x_1 + 4x_2 \geq -12 ;$$

$$-4x_1 + 3x_2 + 8x_3 \leq 10 ;$$

$$x_1, x_2, x_3 \geq 0$$