

Total No. of Questions : 4]

SEAT No. :

PE-520

[Total No. of Pages : 2

[6577]-1

F.E. (Insem.)

ENGINEERING MATHEMATICS - I
(2019 Pattern) (Semester - I) (107001)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates :

- 1) Answer Q1 or Q2 and Q3 or Q4.
- 2) Figures to the right side indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of non-programmable scientific calculator is allowed.
- 5) Assume suitable data, if necessary.

- Q1)** a) Verify Lagrange's mean value theorem for $f(x) = x^3$, $x \in [-2, 2]$. [5]
b) Using Taylor's theorem expand $3x^3 - 2x^2 + x - 4$ in powers of $(x+2)$. [5]
c) Evaluate $\lim_{x \rightarrow 0} (\sin x)^{\tan x}$. [5]

OR

- Q2)** a) Expand $(1+x)^x$ in ascending powers of x , expansion being correct upto fifth power of x . [5]
b) Expand $x^3 + 7x^2 + x - 6$ in ascending powers of $(x-3)$ by using Taylor's theorem. [5]
c) Find values of a and b if [5]

$$\lim_{x \rightarrow 0} \frac{a \cos x - a + bx^2}{x^4} = \frac{1}{12}$$

- Q3)** a) Obtain the Fourier series for the function $f(x) = x$ in $-\pi \leq x \leq \pi$. [5]
b) Obtain a half - range cosine series for the function $f(x) = 4 - x^2$ in $0 < x < 2$. [5]
c) Determine the first two harmonics of the Fourier cosine series for the following values. [5]

x^0	0	30	60	90	120	150
y	0	5224	8097	7850	5499	2626

P.T.O.

OR

- Q4)** a) Find the Fourier series for the function $f(x) = x^2 - 2$, $-2 \leq x \leq 2$. [5]
b) Find half range sine series for the function $f(x) = x$, $0 \leq x \leq \pi$. [5]
c) Obtain the first three terms in the Fourier cosine series for y , where y is given in the following table. [5]

x	0	1	2	3	4	5
y	4	8	15	7	6	2

