

35007 : Mathematics & Statistics : I-T-7

P. Pages : 2

Time : Three Hours



AW - 2262

Max. Marks : 80

- Notes :
1. All question carry equal marks.
 2. Answer **any eight** question.
 3. Use of slide rule logarithmic tables, Steam tables, Mollier's Chart, Drawing instrument, Thermodynamic table for moist air, Psychrometric Charts and Refrigeration charts is permitted. Use of simple calculator is permitted.
 4. Use of pen Blue/Black ink/refill only for writing the answer book.

1. Solve the following **any two**.

i) Evaluate $\lim_{x \rightarrow 0} \frac{a^x + b^x + c^x - 3}{x}$ 5

ii) Evaluate $\lim_{x \rightarrow 0} \frac{3 \sin x - \sin 3x}{x^3}$ 5

iii) Evaluate $\lim_{x \rightarrow \pi/6} \frac{\cot^2 x - 3}{2 - \operatorname{cosec} x}$ 5

2. Solve the following.

i) If $f(x) = \frac{1 - \cos kx}{x^2}$ for $x \neq 0$ 5
 $= 8$ for $x = 0$

Is continuous at $x = 0$ then find K

ii) If $f(x) = \frac{1 - \cos x}{x \tan x}$ for $x \neq 0$ 5
 $= \frac{1}{2}$ for $x = 0$

Then discuss the continuity at $x = 0$

3. Solve the following

i) Find derivative of $\cos x$ w. r. t. x by first principle of derivatives. 5

ii) If $y = x^x + a^x + x^a + a^a$ find $\frac{dy}{dx}$ 5

4. Solve the following

i) If $y = (\sin x)^x$ find $\frac{dy}{dx}$ 5

ii) If $x = a \sin^3 t$ $y = a \cos^3 t$ find $\frac{dy}{dx}$ 5

5. Divide 100 into two parts such that the sum of their reciprocals is minimum. www.FirstRanker.com www.FirstRanker.com 10
6. Solve the following any two. 10
- i) Evaluate $\int \frac{\sec^2(\log x)}{x} dx$
- ii) Evaluate $\int_0^2 x e^x dx$
- ii) Prove that $\int_0^{\pi/2} \frac{1}{1 + \cot x} dx = \pi/4$
7. Solve the following. 5
- i) Find the order & degree of D. E.
 $\sqrt[3]{\frac{d^2 y}{dx^2}} = \sqrt{\frac{dy}{dx}}$ 5
- ii) Form a differential equation by eliminating the arbitrary constants A & B from
 $y = A e^{3x} + B e^{-3x}$ 5
8. Solve the following. 5
- i) Find $L[e^{-2t} t^3]$ 5
- ii) Find $L[t \cos 3t]$ 5
9. Solve the following. 6
- i) Find mean mode & median from the following data.
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|------------|------|-------|-------|-------|-------|
| Class: | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
| Frequency: | 8 | 15 | 22 | 15 | 8 |
- ii) Write short note on following. 4
- a) Histogram b) Pi diagram
10. Find the coefficient of correlation between X & Y from the following data. 10
- | | |
|-----|-----|
| (X) | (Y) |
| 7 | 3 |
| 8 | 6 |
| 9 | 8 |
| 10 | 9 |
| 11 | 11 |
| 12 | 12 |
| 13 | 14 |
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