Paper / Subject Code: 51401 / Applied Mathematics-III

Exam Seat No.

SE - IT - SEM III CBCS

[Time: 3 Hours] [Marks:80]

14 NOV 2019

Please check whether you have got the right question paper.

N.B: 1. Q 1 is compulsory.
2. Attempt any three from remaining
3. Rights indicate full marks.

1. a. If A, B, C are subset of universal set V then prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$ **05**

b. If f: R→R is given by y = 2x + 1, prove that f is one to one and onto and find f^{-1} **05**

c. Find L $\{(1 + te^t)^3\}$ **05**

d. Check whether the following function Harmonic or not $3x^2 + sinx + y^2 + 5y + 4$ **05**

2. a. Find k if $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1} \frac{kx}{y}$ is analytic **06**

b. Find L $\{|sin2t|\}$ **06**

c. Let f: R→R f(x) = x^2+2x-1
g: R→R g(x) = $4x^2$+2 **08**

Find (I) f o (gof) (II) go (fog)

3. a. Find Bilinear transformation under which Z=1, -i, -1 from point w =i, 0, -i **06**

b. If A be the set of non-integers and let R be a relation on A×A defined by (a, b) R(c, d) if ad=bc, then prove that R is an equivalence relation. **06**

c. Find (1) L $\left\{\int_0^t e^{-u} \frac{sinu}{u} du\right\}$ **08**

(2) L $\{(1 + 2t + 3t^2 + t^3)H(t - 2)\}$

4. a. Use convolution them and evaluate **06**

$L^{-1}\left\{\frac{(s+5)^2}{(s^2+10s+16)^2}\right\}$

b. Find transitive clouser of following relation defined on A= $\{a, b, c, d, e\}$ by Warshal algorithm R=$\{(a,a)\ (a,b)\ (b,c)\ (c,d)\ (c,c)(d,e)\}$ **06**

c. A man speaks truth 3 times out of 5 when a die is thrown he states that it gave an ace what is probability that this event has actually happened. **08**

5. a. How many four digit numbers can be formed out of the digits 1, 2, 3, 5, 7, 8, 9 if no digit is repeated twice? How many of them will be greater than 3000. 06

   b. Solve using Laplace transform 06

   $\frac{d^2y}{dt^2} + 9y = 18$ given that y (0) = 0 and y $(\frac{\pi}{2})$=0

   c. Evaluate (1) $L^{-1}\left\{\frac{1}{\sqrt{2s+1}}\right\}$ 08

   (2) $L^{-1}\left\{\frac{2s^2-6s+5}{s^3-6s^2+115-6}\right\}$

6. a. Solve $a_n = 5a_{n-1} - 6a_{n-2}$ for $n \geq 2, a_0 = 0, a_1 = 1$ 06

   b. Find orthogonal curves of family of curves e^{-x} Cos y +xy= α, where α is the real constant 06

   c. i. Find the image of rectangular region bounded by x=0, x=3, y=0, y=2 under the transformation w= z+(1+i) 08

   ii. A fair dice is thrown thrice. Find probability that sum of numbers obtained is 10.

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