Total No. of Questions – [08] Total No. of Printed Pages 02

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MAY 2019/ END-SEM REEXAM

S. Y. B. TECH. (COMPUTER/IT ENGINEERING) (SEMESTER - II)

COURSE NAME:ENGINEERING MATHEMATICS III

COURSE CODE: CSUA22171/ITUA22171

(PATTERN 2017)

Time: [**2 Hours**] [Max. Marks: 50]

(*) Instructions to candidates:

1) **Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data wherever required**

Q.1 A Solve $\frac{d^2y}{dx^2} + y = \cot x$ (by variation of parameters) [6]

OR

B Solve $(2x+1)^2 \frac{d^2y}{dx^2} - 2(2x+1)\frac{dy}{dx} - 12y = 8x$ [6]

Q.2 A Solve the difference equation :
$6f(k+2)-5f(k+1)+f(k)=0$, $k \geq 0$ $f(0) = 0,$ $f(1) = 3$ [6]

OR

B Solve the integral equation : $\int_0^\infty f(x)\cos\lambda x\, dx = \begin{cases} 1-\lambda & 0 \leq \lambda \leq 1 \\ 0 & \lambda \geq 1 \end{cases}$

and hence show that : $\int_0^\infty \frac{\sin^2 z}{z^2} dz = \frac{\pi}{2}$ [6]

Q.3 A Calculate the first four moments about the mean of the given distribution . Also find β_1 and β_2. [6]

x	2.0	2.5	3.0	3.5	4.0	4.5	5.0
f	4	36	60	90	70	40	10

OR

B Obtain regression line for the following data :

X	6	2	10	4	8
y	9	11	5	8	7

[6]

Q.4 A Apply forth order Runge-Kutta method : $\frac{dy}{dx} = 3x + \frac{y}{2}$

y(0)=1 determine y(0.1).Taking h=0.1. [4]

OR

B Solve the equation $\frac{dy}{dx} = x^2 + y$

y(0)=1 determine y at x=0.1 , using Euler's Modified method taking h=0.05. [4]

Q.5 A Show that the vector field $\bar{F} = (2xz^3 + 6y)\bar{i} + (6x - 2yz)\bar{j} + (3x^2z^2 - y^2)\bar{k}$ is irrotational .Hence find corresponding scalar potential φ such that $\bar{f} = \nabla\varphi$ [6]

B Find the directional derivative of $\varphi = e^{2x-y-z}$ at the point P(1,1,1,) in the direction of the tangent to the curve $x = e^{-t}$, $y = 2\sin t + 1$, $z = t - \cos t$ at $t = 0$. [4]

C Evaluate $\int_c \bar{F} \bullet d\bar{r}$ for $\bar{F} = 3x^2\bar{i} + (2xz - y)\bar{j} + z\bar{k}$ along the straight line joining (0,0,0) to (1,2,3) [4]

OR

Q.6 A If the directional derivative of $\varphi = ax^2y + by^2z + cz^2x$ at(1,1,1) has maximum magnitude 15 in the direction parallel to $\frac{x-1}{2} = \frac{y-3}{-2} = \frac{z}{1}$ then find the values of a, b, c . [6]

B Prove that $\frac{\bar{a} \times \bar{r}}{r^n}$ is solenoidal [4]

C Evaluate $\iint_S \bar{f} \bullet d\bar{s}$, where S is the sphere $x^2 + y^2 + z^2 = 9$ and

$\bar{F} = (4x + 3yz^2)\bar{i} - (x^2z^2 + y)\bar{j} + (y^3 + 2z)\bar{k}$ [4]

Q.7 A Evaluate $\oint_c \frac{\sin \pi z^2 + 2z}{(z-1)^2(z-2)} dz$ where c is the contour $|z| = 4$ [6]

B If f(z)=u+iv is analytic , find f(z) , if $u - v = (x-y)(x^2+4xy+y^2)$ [4]

C Find the bilinear transformation which maps the points 1, i, -1 from z- plane on to the points i,0,-i of the w-plane. [4]

OR

Q.8 A Evaluate $\oint_c \frac{z+3}{(z+1)^2(z-2)} dz$ where c is boundary of the square with vertices $\pm 1.5, \pm 1.5i$. [6]

B Determine the analytic function f(z) whose real part is $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$. [4]

C Find the mapping of straight line y=x under the transformation $w = \frac{z-1}{z+1}$ [4]

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