Total No. of Questions – [08]

Total No. of Printed Pages 02

G.R. No.	

comp: U 228-121 (RE-FS)
paper code: IT: U228-141 (RE-FS)

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 $x^3\dfrac{d^3y}{dx^3}+2x^2\dfrac{d^2y}{dx^2}+2y=10\left(x+\dfrac{1}{x}\right)$ [6]

OR

b) Solve simultaneously the following differential equations;

$\dfrac{dx}{dt}+y=e^t$

$\dfrac{dy}{dt}-x=e^{-t}$ [6]

Q.2) a) Using Z Transform obtain f(k) ,given that f(k+2)+3f(k+1)+2f(k)=0, $k\geq 0$ and f(0)=0,f(1)=1 . [6]

OR

b) Solve the integral equation ;

$\int_0^\infty f(x)\cos\lambda x\,dx=\begin{cases}1-\lambda & 0\leq\lambda\leq 1\\ 0 & \lambda\geq 1\end{cases}$ & hence show that $\int_0^\infty \dfrac{\sin^2 t}{t^2}dt=\dfrac{\pi}{2}$ [6]

Q.3) a) For the following distribution ,find(i) First four moments about the mean(ii) β_1 & β_2 [6]

x	2	2.5	3	3.5	4	4.5	5
f	5	38	65	92	70	40	10

OR

b) The regression equation equations are 8x-10y+66=0 and 40x-18y=214. The value of variance of x is 9. Find; 1)The mean values of x and y. 2) The correlation coefficient between x and y. 3) The Standard Deviation of y. [6]

Q.4) a) *Apply Runge – Kutta* Fourth order method to find an approximate value of y when x=0.2, given that $\frac{dy}{dx}$=xy+ y^2 and y=1 when x=0, by taking h=0.2. [4]

OR

b) *Solve the following equations by Gauss Seidal method:*

10x+y+z=12;

2x+10y+z=13 ;

2x+2y+10z=14 perform three iterations. [4]

Q.5) a) Show that vector field $\overline{F} = \left(ye^{xy}\cos z\right)\overline{i} + \left(xe^{xy}\cos z\right)\overline{j} - \left(e^{xy}\sin z\right)\overline{k}$ is irrotational. Hence find corresponding scalar field ϕ such that $\overline{F} = \nabla\phi$. [6]

b) Find the directional derivative of the function $\phi = xy^2 + yz^3$ at (2,-1,1) along the line 2(x-2)=(y+1)=(z-1) [4]

c) Using Green's theorem evaluate $\int_C \overline{F}\cdot d\overline{r}$ where $\overline{F} = x^2\overline{i} + xy\,\overline{j}$ over the curve $y = x^2$, and then $y = x$ [4]

OR

Q.6) a) Show that vector field $f(r)\overline{r}$ is always irrotational and determine f(r) such that the field $f(r)\overline{r}$ is solenoidal. [6]

b) Show that $\nabla^4\left(r^2\log r\right) = \dfrac{6}{r^2}$ [4]

c) Evaluate $\int_C \overline{F}\cdot d\overline{r}$, for $\overline{F} = (2x + y)\overline{i} + (3y - x)\overline{j}$ where 'C' is the straight line joining (0,0) and (3,2) [4]

Q.7) a) Show that the function $u = x^4 - 6x^2y^2 + y^4$ is harmonic, Find harmonic conjugate 'v' of u such that f(z)=u +iv is analytic function, hence determine analytic function f(z) in terms of z. [6]

b) Evaluate $\oint_C \dfrac{z+2}{z^2+1}dz$, where 'C' is the contour $|z - i| = \dfrac{1}{2}$ [4]

c) Find the Bilinear transformation which maps the points 1 , i, -1 of the Z- plane on to the points i , 0, -i of the W- plane. [4]

OR

Q.8) a) Apply Residue Theorem to evaluate $\oint_C \dfrac{z^2+2z}{(z+1)^3(z^2-9)}dz$, where 'C' is the circle |z-3|=5. [6]

b) If f(z)=u+iv is analytic function ,find f(z) if $u + v = e^{-x}(\cos y - \sin y)$ [4]

c) Find the map of the straight line y=x under the transformation $w = \dfrac{z-1}{z+1}$ [4]

##END##