Total No. of Questions – [8]

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G.R. No.	

Paper Code- U 218-131 (BE-FS)

MAY 2019/ENDSEM

S. Y. B. TECH. (E&TC ENGINEERING) (SEMESTER - I)

COURSE NAME: **Engineering Mathematics III**

COURSE CODE: ETUA21171

(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 where ever required**

Q.1	A	Solve $(D^2+4)y = \sec 2x$ (by variation of parameters)	6
		OR	
	B	Solve $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 5y = x^2\sin(\log x)$	6
Q.2	A	Using Fourier integral representation, show that $\int_0^\infty \frac{\lambda^3 \sin\lambda x}{\lambda^4+4}\, d\lambda = \frac{\pi}{2} e^{-x}\cos x$, where $x > 0$	6
		OR	
	B	Find $Z^{-1}\left[\frac{z^3}{(z-1)\left(z-\frac{1}{2}\right)^2}\right]$	6
Q.3	A	The first four moments of a distribution about the value 4 are -1.5, 17, -30 and 108. Calculate the first four central moments, mean, standard deviation, coefficient of skewness and kurtosis	6
		OR	
	B	On an average a box containing 10 articles is likely to have 2 defective s. If we consider a consignment of 100 boxes , how many of them are excepted to have 3 or less defectives	6
Q.4	A	Show that $\bar{F} = (6xy+z^3)\bar{i}+(3x^2-z)\bar{j}+(3xz^2-y)\bar{k}$ is irrotational. Find scalar ϕ such that $\bar{F}=\nabla\phi$	4
		OR	

	B	Find the directional derivative of the function $\emptyset = xy + yz^2$ from the point (1,-1,1) towards the point (2,1,2)	4
Q.5	A	Find line integral for a vector point function $\bar{F} = 3x^2\bar{\imath} + (2xz - y)\bar{\jmath} + z\bar{k}$. over the curve $x = 2t^2, y = t, z = 4t^2 - t$. From t=0 to t=1.	6
	B	Evaluate $\iint_S (x^3\bar{i} + y^3\bar{j} + z^3\bar{k}) \bullet d\bar{s}$, where sis the curve of the sphere $x^2 + y^2 + z^2 = 16$.	4
	C	Verify Stokes theorem for : $\bar{F} = xy^2\bar{i} + y\bar{j} + xz^2\bar{k}$ for the surface of the rectangular lamina bounded by x=0 , y=0 ,x=1 ,y=2,z=0.	4
		OR	
Q.6	A	Verify Green's Theorem for $\bar{F} = x\hat{\imath} + y^2\hat{\jmath}$ over the first quadrant of the circle $x^2 + y^2 = a^2$.	6
	B	Using Stoke's Theorem evaluate following line integrals: $\int_C (y\,dx + z\,dy + x\,dz)$ where C is the curve of intersection of $x^2 + y^2 + z^2 = a^2$ and $x + z = a$.	4
	C	Evaluate $\iint_S (y^2z^2\,\bar{\imath} + z^2x^2\,\bar{\jmath} + x^2y^2\,\bar{k}).d\bar{S}$ where S is upper part of the sphere $x^2 + y^2 + z^2 = 9$ above the XOY plane.	4
Q.7	A	Evaluate following integrals using Cauchy-Residue Theorem $\oint_C \frac{z^3-5}{(z+1)^2(z-2)} dz$ where C: $\|z\| = 3$	6
	B	Show that analytic function $f(z) = u + iv$ is constant if modulus of f(z) is constant	4
	C	Find the map of the straight line $2y = x$ under the transformation $w = \frac{2z-1}{2z+1}$	4
		OR	
Q.8	A	Evaluate following integrals using Cauchy-Integral formula. $\int_C \frac{z^2+1}{z-3} dz$ where 1) C is the circle $\|z - 2\| = 2$ 2) C is the circle $\|z\| = 2$	6
	B	Find an analytic function $f(z) = u + iv$ if $u + v = e^x(\cos y - \sin y)$	4
	C	Find the bilinear transformation which maps the points 1,I,2i of the z –plane on to the points -2i, 0,1 of the w – plane	4