GOVERNMENT COLLEGE OF ENGINEERING, JALGAON
(An Autonomous Institute of Government of Maharashtra)
National Highway No.6, JALGAON – 425 002

Phone No.: 0257-2281522　　　　　　　　　　　　Fax No.: 0257-2281319
Website : www.gcoej.ac.in　　　　　　　　　　　　E-mail : princoej@redifmail.com

Name of Examination : **Winter 2020** - (Preview)

Course Code & Course Name : **SH226U - Engineering Mathematics**

Generated At : **19-04-2022 11:08:15**

Maximum Marks : **60**　　　　　　　　Duration : **3 Hrs**

Edit　Print　View Answer Key　Close　**Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. *All questions are compulsory.*
2. *Illustrate your answer with suitable figures/sketches wherever necessary.*
3. *Assume suitable additional data; if required.*
4. *Use of logarithmic table, drawing instruments and non programmable calculators is allowed.*
5. *Figures to the right indicate full marks.*

---

1)　Solve the all Questions

a) Solve $(3x+2)^2 \frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 3x^2 + 4x + 1$　　　[5]

b) Solve by using method of variation of parameters　　　[5]
$$\left(D^2 - 6D + 9\right)y = \frac{e^{3x}}{x^2}$$

c) Solve $\left(D^2 - 4D + 4\right)y = e^x \cos^2 x$　　　[4]

2)　Solve any three questions

a) Find the Fourier transform of $f\left(x\right) = \begin{cases} a^2 - x^2 & , \ |x| \le a \\ 0 & , \ |x| > a \end{cases}$　　　[4]

b) Evaluate $\int_0^\infty \left[\frac{e^{-at} - e^{-bt}}{t}\right] dt$　　　[4]

c) Apply Convolution theorem to evaluate $L^{-1}\left[\frac{s}{(s^2+a^2)^2}\right]$　　　[4]

d) Solve $y'' + y' = t^2 + 2t$, $given \ y(0) = 4$, $y'(0) = -2$, $U\sin g \ Laplace \ transform.$　　　[4]

3)　Solve any three questions

a) If $\overline{F} = y^2 \ \vec{i} + xy \ \vec{j} + xz \ \overline{k}$ then evaluate $\int_c \overline{F} . \ d\bar{r}$,　　　[4]
where C is bounding curve of the hemisphere $x^2 + y^2 + z^2 = 9$, $z > 0$
oriented in the positive direction by using Stoke's theorem.

b) Using Divergence theorem ,evaluate $\int_S \int \overline{F} . \ \widehat{n} \ ds$,　　　[4]
where $\overline{F} = 4xz \ \vec{i} - y^2 \ \vec{j} + yz \ \overline{k}$ and S is the surface of the cube bounded by
the planes $x = 0$, $x = 2$, $y = 0$, $y = 2$, $z = 0$, $z = 2$

c) Show that $\overline{F} = \left(y \sin z - \sin x\right) \vec{i} + \left(x \sin z + 2yz\right) \vec{j} + \left(x \ y \ \cos z + y^2\right) \overline{k}$　　　[4]
is irrotational, Find ϕ such that $\overline{F} = \nabla \ \phi$

d) Find the D.D. of $\phi = x^2yz + 4xz^2$ at $(1, -2, 1)$ in the direction of $2 \ \vec{i} - \vec{j} - 2 \ \overline{k}$　　　[4]

4)　Solve any three questions

a) In a certain test 2000 students appeared in subject of economics.　　　[4]
Average marks obtained were 50% with S.D. 5% .
How many students are expected to obtain more than 60% marks,
supposing that marks are distributed normally?

b) Discuss the kurtosis of the following data　　　[4]

x	1	2	3	4	5	6	7	8	9	10
f	1	6	13	25	30	22	9	5	2	3

c) The two regression equations of the variables x & y are　　　[4]
$x = 19.13 - 0.87 \ y$, $y = 11.64 - 0.50 \ x$ Find $\bar{x}$, $\bar{y}$, r.

d) Find the best fitting regression equation of the type $y = a \ x^b$ to the following data　　　[4]

x	1	2	3	4	5	6
y	2	16	54	128	250	432

5)　Solve any two questions

a) Find the bilinear transformation which maps the points $z = 1$, i , -1 onto　　　[5]
the points $w = 0$, 1 , ∞ respectively.

b) Evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5 - 4\cos\theta} \ d\theta$　　　[5]

c) Apply Cauchy's residue theorem, to evaluate　　　[5]
$\oint_c \frac{1 - \cos 2 \ (z-3)}{(z-3)^3} \ dz$,
where C is the circle $|z - 3| = 1$

Auto Generated by SsOES v6.2