Program: FE

Curriculum Scheme: Revised 2016

Examination: First Year Semester I

Course Code: FEC101 **Course Name: Applied Mathematics-I**

Time: 1 hour Max. Marks: 50

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Note to the students:- All the Questions are compulsory and carry equal marks .

Q1.	If $1,\omega,\omega^2$ are cube roots of unity, then ω is given by
Option A:	$sin\left(\frac{2\pi}{3}\right)+icos\left(\frac{2\pi}{3}\right)$
Option B:	$cos\left(\frac{2\pi}{3}\right)+isin\left(\frac{2\pi}{3}\right)$
Option C:	$cos\left(\frac{4\pi}{3}\right)+isin\left(\frac{4\pi}{3}\right)$
Option D:	None of these
Q2.	The number $\frac{(1+i\sqrt{3})^{17}}{(\sqrt{3}-i)^{15}}$ can be written in polar form as
Option A:	$4\left(cos\frac{\pi}{6}+isin\frac{\pi}{6}\right)$
Option B:	$8\left(cos\frac{\pi}{6}+isin\frac{\pi}{6}\right)$
Option C:	$4\left(cos\frac{\pi}{5}+isin\frac{\pi}{5}\right)$
Option D:	None of these
Q3.	The solution of equation $5sinhx-coshx=5$ is
Option A:	$x=log3,log\left(-\frac{1}{2}\right)$
Option B:	$x=log\left(\frac{1}{3}\right),log\left(\frac{1}{2}\right)$
Option C:	$x=log\left(\frac{1}{3}\right),log2$
Option D:	None of these
Q4.	$\log(1+i)=$
Option A:	$log2+i\frac{\pi}{4}$
Option B:	$\frac{1}{2}log2+i\frac{\pi}{4}$
Option C:	$\frac{1}{2}log2+\frac{\pi}{4}$
Option D:	None of these

Q5.	What are the roots of the equation $z^2 - i = 0$?
Option A:	$cos\frac{\pi}{2} + isin\frac{\pi}{2},\ cos\frac{\pi}{4} + isin\frac{\pi}{4}$
Option B:	$1, cos\frac{\pi}{2} + isin\frac{\pi}{2}$
Option C:	$cos\frac{\pi}{2} + isin\frac{\pi}{2},\ cos\frac{5\pi}{4} + isin\frac{5\pi}{4}$
Option D:	None of these
Q6.	$cos5\theta$ can be written in terms of powers of $cos\theta$ as
Option A:	$5cos\theta - 20cos^3\theta + 16cos^5\theta$
Option B:	$cos\theta + 20cos^3\theta + 16cos^5\theta$
Option C:	$5cos\theta + 16cos^3\theta + 20cos^5\theta$
Option D:	None of these
Q7.	The solution of the following system $x - y + z = 0, x + 2y + z = 0, 2x + y + 3z = 0$ is
Option A:	$x = 2, y = 1, Z = 0$
Option B:	$x = 0, y = 1, Z = 2$
Option C:	$x = 3, y = 0, Z = 0$
Option D:	$x = 0, y = 0, Z = 0$
Q8.	If $A = \begin{bmatrix} 3 & 2 & 5 & 7 & 12 \\ 1 & 1 & 2 & 3 & 5 \\ 3 & 3 & 6 & 9 & 15 \end{bmatrix}$ then $rank(A) =$
Option A:	2
Option B:	3
Option C:	0
Option D:	4
Q9.	If $A = \frac{1}{3}\begin{bmatrix} -2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & -2 & 2 \end{bmatrix}$ is orthogonal then A^{-1}=
Option A:	$\frac{1}{9}\begin{bmatrix} -2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & -2 & 2 \end{bmatrix}$
Option B:	$\frac{1}{3}\begin{bmatrix} 0 & 5 & 2 \\ 2 & 2 & 1 \\ 1 & 8 & 2 \end{bmatrix}$
Option C:	$\frac{1}{3}\begin{bmatrix} -2 & 2 & 1 \\ 1 & 2 & -2 \\ 2 & 1 & 2 \end{bmatrix}$

Option D:	$\frac{1}{3}\begin{bmatrix} -2 & 1 & 0 \\ 2 & 2 & 1 \\ 0 & -2 & 2 \end{bmatrix}$
Q10.	Find a,b,c if $A = \frac{1}{9}\begin{bmatrix} -8 & 4 & a \\ 1 & 4 & b \\ 4 & 7 & c \end{bmatrix}$ is orthogonal
Option A:	a=1, b=-8,c=4
Option B:	a=0, b=5,c=4
Option C:	a=-8, b=1,c=4
Option D:	a=1, b=4,c=0
Q11.	Find the value of P for which the matrix A will have rank =1 , where $A = \begin{bmatrix} 3 & p & p \\ p & 3 & p \\ p & p & 3 \end{bmatrix}$
Option A:	P=0
Option B:	P=1
Option C:	P=27
Option D:	P=3
Q12.	The solution of $x + y + z = 3, x + 2y + 3z = 4,$ $x + 4y + 9z = 6$ is
Option A:	$x = 2, y = 1, Z = 0$
Option B:	$x = 0, y = 1, Z = 2$
Option C:	$x = 3, y = 0, Z = 0$
Option D:	$x = 1, y = 1, Z = 1$
Q13.	1. If $z = \tan^{-1}\frac{y}{x}$ find $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2}$
Option A:	0
Option B:	$\frac{4xy}{(x^2 + y^2)^2}$
Option C:	$\frac{-4xy}{(x^2 + y^2)^2}$
Option D:	None of these
Q14.	If $z = \log(u + v)$ $u = e^{x+y}; v = x + y$ Find, $\frac{\partial z}{\partial x}$
Option A:	$\frac{u-1}{u+v}$
Option B:	$\frac{u+1}{u+v}$

Option C:	$\frac{u-1}{u-v}$
Option D:	None of these
Q15.	If $u=\frac{f(\theta)}{r}$ $where\ x=r\cos\theta, y=r\sin\theta$ find $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=-u$
Option A:	$2u$
Option B:	u
Option C:	$-u$
Option D:	None of these
Q16.	1. If $u=\frac{1}{\sqrt{x^2+y^2+z^2}};x^2+y^2+z^2\neq 0$ Find the value of $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}+\frac{\partial^2 u}{\partial z^2}$
Option A:	0
Option B:	$\frac{1}{(x^2+y^2+z^2)^{\frac{3}{2}}}$
Option C:	6
Option D:	-6
Q17.	If $u=\frac{e^{x+y+z}}{e^x+e^y+e^z}$ Find $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}$
Option A:	0
Option B:	$\frac{u}{2}$
Option C:	$-2u$
Option D:	$2u$
Q18.	Find $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}$ for $u=(8x^2+y^2)(\log x-\log y)$
Option A:	0
Option B:	1
Option C:	$-2u$
Option D:	$2u$
Q19.	Find the n^{th} derivative of $y=\frac{x}{1+3x+2x^2}$
Option A:	0

Option B:	$(-1)^n n!\left[\frac{1}{(x-2)^{n+1}}-\frac{1}{(x-1)^{n+1}}\right]$
Option C:	$(-1)^n n!\left[\frac{1}{(x-2)^{n+1}}+\frac{1}{(x-1)^{n+1}}\right]$
Option D:	None of these
Q20.	The expansion of e^{sinx} is
Option A:	$1+x+\frac{x^2}{2}+\frac{x^4}{8}+\cdots$
Option B:	$1+x+\frac{x^2}{2}-\frac{x^4}{8}+\cdots$
Option C:	$1+x-\frac{x^2}{2}+\frac{x^4}{8}+\cdots$
Option D:	$1+x+\frac{x^3}{6}-\frac{x^5}{10}+\cdots$
Q21.	Expansion of function $f(x)$ is
Option A:	$1+\frac{x}{1!}f'(0)+\frac{x^2}{2!}f''(0)+\cdots+\frac{x^n}{n!}f^n(0)$
Option B:	$f(0)+\frac{x}{1!}f'(0)+\frac{x^2}{2!}f''(0)+\cdots+\frac{x^n}{n!}f^n(0)$
Option C:	$f(0)-\frac{x}{1!}f'(0)+\frac{x^2}{2!}f''(0)-\cdots+(-1)^n\frac{x^n}{n!}f^n(0)$
Option D:	$f(1)+\frac{x}{1!}f'(0)+\frac{x^2}{2!}f''(0)+\cdots+\frac{x^n}{n!}f^n(0)$
Q22.	Expansion of $f(x)=\log(1+e^x)$ is
Option A:	$\log(2)+\frac{x}{2}+\frac{x^2}{8}-\frac{x^4}{192}+\cdots$
Option B:	$\log(2)+\frac{x}{2}+\frac{x^2}{8}+\frac{x^4}{192}+\cdots$
Option C:	$\log(2)+\frac{x}{2}+\frac{x^3}{8}-\frac{x^5}{192}+\cdots$
Option D:	$\log(2)+\frac{x}{2}+\frac{x^3}{8}+\frac{x^5}{192}+\cdots$
Q23.	Which of the following system of linear equations has a strictly diagonally dominant co-efficient matrix?
Option A:	5x+2y+2z=7 3x+1y+5z=6 2x+8y+3z=5
Option B:	5x+1y+2z=6 1x+1y+8z=1 1x+6y+3z=7

Option C:	5x+1y+2z=7 1x+6y+3z=6 1x+1y+8z=5
Option D:	2x-4y+49z=49 43x+2y+25z=23 3x+53y+3z=91
Q24.	Solve the following equation by gauss seidel Method upto 2 iterations and find the value of z. 27x+6y-z=85 6x+15y+2z=72 x+y+54z=110
Option A:	1.88
Option B:	1.22
Option C:	0
Option D:	1.92
Q25.	Solve the system of equation by Jacobi's iteration method (take three iterations) 10x+y+z=12 x+10y+z=12 x+y+10z=12
Option A:	x = 1 ,y =1 ,z = 1
Option B:	x = 1 ,y = 2 ,z = 1
Option C:	x = 1 ,y = 1 ,z = 2
Option D:	x = 2 ,y = 2 ,z = 2