Program: SE

Curriculum Scheme: Revised 2016

Examination: Second Year Semester IV

Course Code: ETS401 **Course Name: Applied Mathematics-IV**

Time: 1 hour Max. Marks: 50

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

Laplace , inv laplace,matrices,lin alg, calculus

Q1.	The eigenvalues and eigenvectors of the following matrix are $\begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}$
Option A:	Eigen values :2,2,2 eigen vector: $\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$
Option B:	Eigen values :2,1,1 eigen vectors: $\begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$
Option C:	Eigen values :2,1,0 eigen vectors: $\begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$
Option D:	Eigen values :1,1,0 eigen vectors: $\begin{pmatrix} 2 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$
Q2.	If $A = \begin{bmatrix} 1 & 8 \\ 2 & 1 \end{bmatrix}$ Find $2A^3 - A^2 - 35A - 44I$
Option A:	$A - 4I$
Option B:	$A + I$
Option C:	$5A + 3I$
Option D:	$15A + 7I$
Q3.	If $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ & B= $\begin{bmatrix} 2 & 0 \\ 1/2 & 2 \end{bmatrix}$ then
Option A:	A and B both are not diagonalisable
Option B:	A and B both are diagonalisable
Option C:	A is diagonalizable but B is not diagonalisable
Option D:	A isnot diagonalizable but B is diagonalisable

Q4.	If $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ then A^{50} is
Option A:	$\begin{bmatrix} 1 & 0 & 0 \\ 25 & 0 & 0 \\ 25 & 0 & 1 \end{bmatrix}$
Option B:	$\begin{bmatrix} 1 & 0 & 0 \\ 25 & 1 & 0 \\ 25 & 0 & 0 \end{bmatrix}$
Option C:	$\begin{bmatrix} 1 & 0 & 0 \\ 25 & 1 & 0 \\ 25 & 0 & 1 \end{bmatrix}$
Option D:	$\begin{bmatrix} 0 & 0 & 0 \\ 25 & 1 & 0 \\ 25 & 0 & 1 \end{bmatrix}$
Q5.	Consider the following statements i)The eigenvalues of Hermitian matrix are real ii)Eigenvalues of skew Hermitian matrix are either purely imaginary or zero iii) Eigen values of unitary matrix are of unit modulus. Then
Option A:	statement i , ii are correct and iii is not correct
Option B:	statement i , is correct and ii, iii are not correct
Option C:	Statement i,ii,iii are not correct
Option D:	Statement i,ii,iii are correct statements.
Q6.	A random variable X has p.d.f. $f(x) = \begin{cases} k(1-x^2), & 0 \le x \le 1 \\ 0, & otherwise \end{cases}$, then P(0.1<x<0.2) is
Option A:	0.1465
Option B:	0.1824
Option C:	0.2812
Option D:	0.1218
Q7.	A discrete random variable X has following probability distribution X: -2, -1, 0, 1, 2, 3 p: 0.2, k, 0.1, 2k, 0.1, 2k Then then mean of X is
Option A:	$\frac{15}{26}$
Option B:	$\frac{16}{25}$
Option C:	$\frac{16}{27}$
Option D:	None of these

Q8.	The p.d.f. of a random variable X is given by $f(x) = kx^2e^{-x};\ \ x \geq 0$ then the variance of X is
Option A:	12
Option B:	9
Option C:	3
Option D:	4
Q9.	If X is a discrete random variable that follows Binomial Distribution with parameters n=12 and p=$\frac{1}{2}$ then E(X)=
Option A:	3
Option B:	12
Option C:	6
Option D:	2
Q10.	If a random variable X follows Poisson Distribution such that P(X=1)=2P(X=2) then P(X=3) is
Option A:	0.6134
Option B:	0.0613
Option C:	0.0512
Option D:	0.5123
Q11.	Evaluate $\int_c \frac{zdz}{(z-1)^2(z-2)}dz$ where $c: \lvert z-2 \rvert = 0.5$
Option A:	$4\pi i$
Option B:	$2\pi i$
Option C:	πi
Option D:	0
Q12.	Evaluate $\int_c \frac{COS\pi Z^2 dz}{(z^2-3Z+2)}dz$ where $c: \lvert z \rvert = 3$
Option A:	$8\pi i$
Option B:	$10\pi i$
Option C:	$4\pi i$
Option D:	0
Q13.	If $f(z)$ is analytic and $f'(z)$ is continuous at all points inside and on a simple closed curve C
Option A:	$\oint f(z)\,dz = 0$
Option B:	$\oint f(z)\,dz \neq 0$

Option C:	$\oint f(z)\,dz = 1$
Option D:	$\oint f(z)\,dz = 2\pi i$
Q14.	The singularities of $f(z) = \frac{(z+3)dz}{(z-1)(z-2)}$ are
Option A:	Z=0,2
Option B:	Z=2,-3
Option C:	Z=1,-3
Option D:	Z=1,2
Q15.	The residue of $f(z) = \frac{(1+e^z)}{sinz+zcosz}$ at pole z=0 is
Option A:	0
Option B:	$4\pi i$
Option C:	1
Option D:	-1
Q16.	Calculate the rank correlation co-efficient from the following data: X : 15 , 20 , 28 , 12 , 40 , 60 , 20 , 80 Y : 40 , 30 , 50 , 30 , 20 , 10 , 30 , 60
Option A:	0.5429
Option B:	0.33
Option C:	0.2546
Option D:	0
Q17.	The normal equation for regression line y on x, by using least square method
Option A:	$\sum y = na + b\sum x$ $\sum xy = a\sum x + b\sum x^2$
Option B:	$\sum x = na + b\sum x$ $\sum xy = a\sum x + b\sum x^2$
Option C:	$\sum x = na + b\sum x$ $\sum y = a\sum x + b\sum x^2$
Option D:	none of these

Q18.	The sign of β_{XY} and β_{YX} which are two regression co-efficient , they have
Option A:	Same sign
Option B:	Opposite sign
Option C:	Either same or opposite sign
Option D:	Nothing can be said
Q19.	The lines of regression interest at the point
Option A:	(X, Y)
Option B:	$(\bar{X}, \bar{Y})$
Option C:	$(0,0)$
Option D:	$(1,1)$
Q20.	The Regression Co-efficient y on x
Option A:	$b_{yx} = \frac{\sigma_x}{\sigma_y}$
Option B:	$b_{yx} = r\frac{\sigma_x}{\sigma_y}$
Option C:	$b_{yx} = r\frac{\sigma_y}{\sigma_x}$
Option D:	none of these
Q21.	IF u=(3,4,-2) V=(4,-2,1) W=(1,-3,4) then ||2u-3v+4w|| ^2 is
Option A:	81
Option B:	89
Option C:	11
Option D:	13
Q22.	Find a vector orthonormal to both u=(-6,4,2),v=(3,1,5)
Option A:	(1,-2,-1)
Option B:	(1,2,1)
Option C:	(1,2,-1)
Option D:	(-1,2,-1)
Q23.	What can you say about the vector ||u+v||=||u-v||
Option A:	They are orthogonal
Option B:	They are orthonormal
Option C:	They are not orthogonal
Option D:	They are orthogonal but not orthonormal

Q24.	The Extremal of $\int_{X1}^{X2} \frac{y'^2}{x^2} dx$
Option A:	y=c1(x)^3+c2
Option B:	y=c1(x)^2+c2x+c3
Option C:	y=c1x+c2
Option D:	y=c1(x)^4+c2
Q25.	In a distribution exactly normal 7% of items are under 35 and 89% of the items are under 63 . Find the probability that an item selected at random lies between 45 and 56.
Option A:	0.4038
Option B:	0.2038
Option C:	0.8038
Option D:	0.1138