University of Mumbai

Question Bank

Program: **BE Electronics Engineering**
Curriculum Scheme: Rev 2019 'C' Scheme
Examination: SE Semester IV
Course Code: **ELC401** and Course Name: **Engineering Mathematics IV**
Max. Marks: 80

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	Each Question carry two marks
1.	Find Extremal of $\int_0^1 (y'^2 + 4y)dx$ with y(0) = 0 and y(1) = 1
Option A:	$y = 0$
Option B:	$y = -x^2$
Option C:	$y = x^3$
Option D:	$y = x^2$
2.	If F does not contains x explicitly then Euler ' s equation is given as
Option A:	$F - y' \frac{\partial F}{\partial y'} = C$
Option B:	$\frac{\partial F}{\partial y'} = C$
Option C:	$y' \frac{\partial F}{\partial y'} = C$
Option D:	$F - \frac{\partial F}{\partial y'} = C$
3.	Find the unit vector along $u = (1, -2, 2)$ in R^3
Option A:	$\left(-\frac{1}{3}, -\frac{2}{3}, \frac{2}{3}\right)$
Option B:	$\left(\frac{1}{3}, \frac{2}{3}, \frac{2}{3}\right)$
Option C:	$(1, -2, 2)$
Option D:	$\left(\frac{1}{3}, -\frac{2}{3}, \frac{2}{3}\right)$
4.	If the vectors u = (k-5,2), v = (1,k,2) are orthogonal, find k.
Option A:	0
Option B:	1
Option C:	-1
Option D:	2
5.	If u and v be any two vectors in R^3 then which of the following holds
Option A:	$\|u.v\| = \|\|u\|\|.\|\|v\|\|$
Option B:	$\|u.v\| < \|\|u\|\|.\|\|v\|\|$
Option C:	$\|u.v\| \leq \|\|u\|\|.\|\|v\|\|$
Option D:	$\|u.v\| \geq \|\|u\|\|.\|\|v\|\|$
6.	$V = \{(x, 0) / x \in R\}$ is a vector space with addition and scalar multiplication given by $(x, 0) + (x', 0) = (x + x', 0)$ and $k(x, 0) = (kx, 0)$. Then the additive identity is
Option A:	(1,0)

Option B:	(0,0)
Option C:	(0,1)
Option D:	(1,1)
7.	Evaluate $\int_0^{1+i} z\,dz$ along $y = x$
Option A:	$1 + i$
Option B:	$(1 + i\ )^2$
Option C:	i
Option D:	$2 + i$
8.	Evaluate $\int_C \frac{z+6}{z^2-4}\,dz$, where C is the circle $\|z\| = 1$
Option A:	1
Option B:	-1
Option C:	2
Option D:	0
9.	Find Residue at z = 1 of f(z) = $\frac{z+1}{z(z-2)(z-1)}$
Option A:	2
Option B:	-2
Option C:	1
Option D:	-1
10.	If $f(z)$ is analytic inside and on closed curve C of simply connected region R and if $z = 2$ be any point within C, then $\int_C \frac{f(z)}{z-2}\,dz = ?$
Option A:	$2\pi i f(2)$
Option B:	$2\pi i f(-2)$
Option C:	$2\pi i f(z)$
Option D:	$2\pi i$
11.	A continuous random variable X has the following probability law $f(x) = 4(x - x^3)$, $0 \le x \le 1$. Find mean
Option A:	$mean = \frac{2}{15}$
Option B:	$mean = \frac{1}{12}$
Option C:	$mean = \frac{8}{15}$
Option D:	$mean = \frac{1}{3}$
12.	Which of the following is continuous distribution
Option A:	Binomial Distribution
Option B:	Poisson Distribution
Option C:	Normal Distribution
Option D:	Bernoulli Distribution
13.	If a random variable X follows Poisson distribution such that P(X=1)=2P(X=2), find the mean and variance of the distribution.
Option A:	$mean = 2, variance = 1$
Option B:	$mean = 1, variance = -1$

Option C:	$mean = 1, variance = 2$
Option D:	$mean = 1, variance = 1$
14.	If X and Y are independent random variates with V(X)=3 and V(Y)=2 then V(2X-Y)=?
Option A:	10
Option B:	14
Option C:	8
Option D:	4
15.	If $b_{yx} = -\frac{1}{3}$ and $b_{xy} = -\frac{3}{4}$ are coefficient of regression then find coefficient of correlation r.
Option A:	$r = 0.5$
Option B:	$r = -0.5$
Option C:	$r = 0.25$
Option D:	$r = -0.25$
16.	If the coefficient of correlation between X and Y is r=0 then
Option A:	X and Y are positively correlated
Option B:	X and Y are negatively correlated
Option C:	X and Y are same
Option D:	There is No correlation between X and Y
17.	Find the Karl Pearson's coefficient of correlation for the following data X: 1, 2, 3, 4, 5 Y: 3, 6, 9, 12, 15
Option A:	r=1
Option B:	r=-1
Option C:	r=0
Option D:	r=0.5
18.	The matrix of the Quadratic form $\mathbf{x^2 + 2y^2 - 3z^2 + 2xy - 4xz + 6yz}$
Option A:	$\begin{bmatrix} 1 & 1 & -2 \\ 1 & 2 & 3 \\ -2 & 3 & -3 \end{bmatrix}$
Option B:	$\begin{bmatrix} -1 & 1 & -2 \\ 1 & -2 & 3 \\ -2 & 3 & 3 \end{bmatrix}$
Option C:	$\begin{bmatrix} 1 & -1 & -2 \\ -1 & 2 & -3 \\ -2 & -3 & -3 \end{bmatrix}$
Option D:	$\begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 2 & 3 & -3 \end{bmatrix}$

19.	Find the rank index and signature for the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$
Option A:	rank = 3 , index = 1 and signature = -1
Option B:	rank = 3 , index = 2 and signature = -1
Option C:	rank = 3 , index = 1 and signature = 3
Option D:	rank = 3 , index = 2 and signature = 3
20.	If X is a discrete random variable with the following probability distribution x | 0 | 1 | 2 P(x) | $3a^3$ | 4a-10a^2 | 5a-1 for some a $>$ 0. Find the value of a.
Option A:	c=1
Option B:	c=1/3
Option C:	c=-1
Option D:	c=2

21.	If x is a discrete random variable with the following probability distribution x | 1 | 2 | 3 P(x) | a | 2a | a Find P(X$\leq$ 2).
Option A:	$\frac{1}{4}$
Option B:	$\frac{1}{2}$
Option C:	$\frac{3}{4}$
Option D:	1
22.	Find E(X) if X has the p.d.f f(x) = $\begin{cases} \frac{3}{4}(2x - x^2) & ,0 \leq x \leq 2 \\ 0 & ,otherwise \end{cases}$
Option A:	$\frac{3}{2}$
Option B:	1
Option C:	2
Option D:	$\frac{1}{2}$
23.	If X and Y are independent random variables with means 2,3 and variance 1,2 respectively, find the mean and variance of the random variable Z = 2X - 5Y
Option A:	-11 , 54
Option B:	19 , 54
Option C:	19 , -8
Option D:	-11, -8
24.	Suppose the number of accidents occurring weekly on a particular stretch of a highway follow a Poisson distribution with mean **3** .Calculate the probability that there is at least one accident this week.

Option A:	0.6 347
Option B:	0.9502
Option C:	0.7275
Option D:	0.8002
25.	The following results were obtained from records of age (x) and systolic blood pressure (y) of a group of 10 men: <table><tr><td></td><td>x</td><td>y</td></tr><tr><td>mean</td><td>53</td><td>142</td></tr><tr><td>variance</td><td>130</td><td>165</td></tr></table> Correlation coefficient = 0.8 Estimate the blood pressure of a man whose age is 45?
Option A:	134.78
Option B:	130.56
Option C:	129.56
Option D:	137.56
26.	A coefficient of correlation is computed to be -0.95 means that
Option A:	The relationship between the two variables is weak
Option B:	The relationship between the two variables is strong and positive.
Option C:	The relationship between the two variables is strong but negative.
Option D:	The correlation coefficient cannot have this value.
27.	If the tangent of the angle made by the line of regression of y on x is 0.6 and $\sigma_x = \frac{1}{2}\sigma_y$ Find the correlation coefficient between x and y.
Option A:	$-$ 2 .5
Option B:	0. 25
Option C:	$-$ 0. 3
Option D:	0. 3
28.	Evaluate $\int_c \frac{7z-1}{(z-3)(z+5)}dz$, where c is the circle $\|z\|$ =1.
Option A:	$2\pi i$
Option B:	0
Option C:	6 πi
Option D:	πi
29.	Find the residue of $f(z) = \frac{z^2}{(z+2)(z-1)^2}$ at z = -2
Option A:	1/9
Option B:	5/9
Option C:	1/3
Option D:	4/9
30.	Identify the type of singularity of the function $f(z) = \frac{sinhz}{z^7}$
Option A:	z = 0 is a pole of order 7 for the given function

Option B:	z = 0 is a pole of order 6 for the given function
Option C:	z = 0 is an essential singularity
Option D:	z = 0 is a pole of order 3 for the given function
31.	Evaluate $\int_C \frac{e^z}{z-1} dz$ where C where c is the circle $\|z\|$ =2.
Option A:	$2\pi i$
Option B:	$2\pi i e^2$
Option C:	$2\pi i$e
Option D:	$\pi i e^2$
32.	Find the value of the integral $\int_0^{1+i}(x^2 - iy)dz$ along the path y = x
Option A:	$\frac{5-i}{6}$
Option B:	$\frac{5+i}{6}$
Option C:	$\frac{1+5i}{6}$
Option D:	$\frac{1-5i}{6}$
33.	Find the vector orthogonal to $(2,1,-2)$ and $(1,2,2)$
Option A:	$(1,-2,1)$
Option B:	$(2,-2,1)$
Option C:	$(1,-1,1)$
Option D:	$(2,2,-1)$
34.	If u = (3, 1, 4, −2) v = (2 , 2, 0,1) then find $\langle u, v\rangle$ and $\|u\|$,$\|v\|$
Option A:	-6 , $\sqrt{30}$, $\sqrt{10}$
Option B:	5 , $\sqrt{2}$, $\sqrt{6}$
Option C:	5 , $\sqrt{30}$, 3
Option D:	6 , $\sqrt{30}$, 3
35	Determine which of the following are subspaces of R^3 W_1={$(a,0,b), a,b \in R$} W_2={$(a,b,1), a,b \in R$}
Option A:	$W_1 and\ W_2$ are the subspaces of R^3
Option B:	W_1 and $W_2\ are$ not the subspaces of R^3
Option C:	$W_1 is\ a\ subapace\ of\ R^3$ but $W_2\ is$ not a subspace of R^3
Option D:	$W_1 is\ not\ a\ subapace\ of\ R^3$ but $W_2\ is$ a subspace of R^3
36.	Write down the matrix of the quadratic form $x_1{}^2 + 2x_2{}^2 - 7x_3{}^2 - 4x_1x_2 + 6x_2x_3 + 8x_3x_1$
Option A:	$\begin{bmatrix} 1 & -2 & 4 \\ -2 & 2 & 3 \\ 4 & 3 & -7 \end{bmatrix}$

Option B:	$\begin{bmatrix} 1 & -4 & 8 \\ -4 & 2 & 6 \\ 8 & 6 & -7 \end{bmatrix}$
Option C:	$\begin{bmatrix} 1 & 2 & 4 \\ 2 & 2 & 3 \\ 4 & 3 & -7 \end{bmatrix}$
Option D:	$\begin{bmatrix} 1 & 4 & 8 \\ 4 & 2 & 6 \\ 8 & 6 & 7 \end{bmatrix}$
37.	Find the rank , signature, index of the transformed quadratic form $3{y_1}^2 + \frac{2}{3}{y_2}^2 - \frac{39}{2}{y_3}^2$.
Option A:	rank = 3, signature =2, index =1
Option B:	rank = 3, signature =1, index =2.
Option C:	rank = 2, signature =3, index =1.
Option D:	rank = 2, signatur e=1, index =3.
38.	A necessary condition for I = $\int_{x_1}^{x_2} f(x, y, y^{\mid}, y^{\mid\mid})dx$ to be an extremal is that
Option A:	$\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y^{\mid}}\right) + \frac{d^2}{dx^2}\left(\frac{\partial f}{\partial y^{\mid\mid}}\right) = 0$
Option B:	$\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y^{\mid}}\right) = 0$
Option C:	$\frac{\partial f}{\partial y} + \frac{d}{dx}\left(\frac{\partial f}{\partial y^{\mid}}\right) = 0$
Option D:	$\frac{\partial f}{\partial y} + \frac{d}{dx}\left(\frac{\partial f}{\partial y^{\mid}}\right) + \frac{d^2}{dx^2}\left(\frac{\partial f}{\partial y^{\mid\mid}}\right) = 0$
39.	The functional I=$\int_a^b (y^{\mid 2} + 12xy)dx$ has the following extremal with c_1 and c_2 as arbitrary constants.
Option A:	$c_1x^3 + c_2x$
Option B:	$x^2 + c_1x + c_2$
Option C:	$c_1x + c_2$
Option D:	$x^3 + c_1x + c_2$
40.	The extremal of the functional I=$\int_a^b (16y^2 - y^{\mid\mid 2} + x^2)dx$ is
Option A:	y = $c_1 cos2x + c_2 sin2x$
Option B:	y = $c_1e^{2x} + c_2e^{-2x}$
Option C:	y = $c_1e^{2x} + c_2e^{-2x} + c_3 cos2x + c_4 sin2x$
Option D:	y = $c_1e^{x} + c_2e^{-x} + c_3 cosx + c_4 sinx$

41.	Find the residue of $f(z) = \frac{z^2}{(z-1)^2(z+2)}$ at a point z = -2
Option A:	$\frac{1}{9}$
Option B:	$\frac{2}{9}$

Option C:	$\frac{5}{9}$
Option D:	$\frac{4}{9}$
42.	Find the rank index and signature for the given matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$
Option A:	rank = 3 , index = 2 and signature = 3
Option B:	rank = 3 , index = 2 and signature = -1
Option C:	rank = 3 , index = 1 and signature = 3
Option D:	rank = 3 , index = 1 and signature = -1
43.	The regression lines of a sample are x + 6y = 6 and 3x + 2y = 10. Find the sample means?
Option A:	x = 1/3 and y = 1/2
Option B:	x = 3 and y = 1/2
Option C:	x = 3 and y = 1
Option D:	x = 3 and y = 2
44.	If all the eigen values of a 3 x 3 matrix are negative then the quadratic form is
Option A:	Indefinite
Option B:	Positive definite
Option C:	Negative definite
Option D:	Semi - Negative definite
45.	Find the zeros of the function $f(z)=(z-1)^4(z+2)^3$
Option A:	Zero of order 2 at z = 1
Option B:	Zero of order 4 at z = 1
Option C:	Simple zero at z = 0.
Option D:	Simple zero at z = 1.
46.	Which of the law fails for this set $\{(x,y)/\, x,y\in\Re\}$ where addition is defined as $(x_1,y_1)+(x_2,y_2)=(\lvert x_1+x_2\rvert,\lvert y_1+y_2\rvert)$ and scalar multiplication is $k(x_1,y_1)=(kx_1,ky_1)$?
Option A:	Closure law
Option B:	Commutative law for addition
Option C:	Associative law for addition
Option D:	Existence for additive identity

47.	If the actual amount of coffee which a filling machine puts into 7 ounce jars is a random variable having normal distribution with standard deviation 0.05 ounce and if only 4% of the of the jars are to contain less than 7 ounce of coffee what must be the mean fill of these jars?
Option A:	m = 6.06
Option B:	m = 6.09
Option C:	m = 7
Option D:	m = 7.09
48.	Find the extremals for $\int_{x_1}^{x_2} \frac{(y')^2}{2x}\,dx$
Option A:	$y = \frac{c}{4}x^2 + c'$
Option B:	$y = \frac{c}{2}x^2 + c'$
Option C:	$y = \frac{c}{6}x^3 + c'$
Option D:	$y = \frac{c}{3}x^3 + c'$
49.	Expand $f(z) = e^{-z}$ as a Taylor's series around $z = -1$ only first three terms.
Option A:	$e^{-z} = e^{-1}\left[1 + \frac{(z+1)}{1!} + \frac{(z+1)^2}{2!}\right]$
Option B:	$e^{-z} = e^{-1}\left[1 + \frac{(z+1)}{1!} - \frac{(z+1)^2}{2!}\right]$
Option C:	$e^{-z} = e^{-1}\left[1 - \frac{(z+1)}{1!} + \frac{(z+1)^2}{2!}\right]$
Option D:	$e^{-z} = e^{-1}\left[1 - \frac{(z+1)}{1!} - \frac{(z+1)^2}{2!}\right]$
50.	What is the additive inverse for a vector space V = $\{(1, x)/\, x \in \Re\}$ with operations $(1,x)+(1,x') = (1, x+x')$ and $k(1,x) = (1, kx)$
Option A:	$(-1, -x)$
Option B:	$(1, x)$
Option C:	$(1, -x)$
Option D:	$(-1, x)$
51.	Evaluate $\int_0^{1+i} (x^2 + iy)(dz)$ along the path y = 0 where x varies from 0 to 1.
Option A:	$\frac{1}{4}$

Option B:	$\frac{3}{4}$
Option C:	$\frac{1}{3}$
Option D:	$\frac{2}{3}$
52.	For $F = 2xy - (y'')^2$ the Euler's equation $\frac{\partial F}{\partial y} - \frac{d}{dx}\left(\frac{\partial F}{\partial y'}\right) + \frac{d^2}{dx^2}\left(\frac{\partial F}{\partial y''}\right) = 0$ reduces to
Option A:	$\frac{d^4y}{dx^4} = x^2$
Option B:	$\frac{d^3y}{dx^3} = x$
Option C:	$\frac{d^4y}{dx^4} = x$
Option D:	$\frac{d^3y}{dx^3} = x^2$
53.	The probability distribution of a random variable X is given by

X	-2	-1	0	1	2	3
P(X = x)	0.1	k	0.2	2k	0.3	k

Option A:	k = 0.25
Option B:	k = 0.15
Option C:	k = 0.1
Option D:	k = -0.1
54.	Which of the following fails to satisfy the conditions of subspace for the set $W = \{(a,1,1)/\, a \in R\}$
Option A:	Closed under usual component wise addition and scalar multiplication
Option B:	Closed under scalar multiplication
Option C:	Associative law
Option D:	Commutative law
55.	Find the Spearman's Rank correlation coefficient where column of d^2 are 4, 0, 1, 1, 9, 9, 1, 1, 4, 36.
Option A:	R = -0.36
Option B:	R = 0.06
Option C:	R = -0.6
Option D:	R = 0.6
56.	Evaluate using Cauchy's Integral formula $\oint_C \frac{dz}{z^3(z+4)}$ where C is the circle $\lvert z \rvert = 2$.

Option A:	$-\frac{\pi i}{16}$
Option B:	$\frac{\pi i}{16}$
Option C:	$-\frac{\pi i}{32}$
Option D:	$\frac{\pi i}{32}$
57.	If X is a Poisson variate such that P(X = 1) = P(X = 3), find m
Option A:	m = 2
Option B:	m = $\sqrt{3}$
Option C:	m = $\sqrt{6}$
Option D:	m = 6
58.	Which of the vectors are orthogonal in $S = \{v_1 = (0,2,0,-2), v_2 = (1,0,3,0), v_3 = (1,2,3,4)\}$
Option A:	v_1 and v_3
Option B:	v_2 and v_3
Option C:	v_1, v_2 and v_3
Option D:	v_1 and v_2
59.	Use Gram-Schmidt process to transform the orthogonal set $\{u_1, u_2\}$ into an orthonormal set $\{v_1, v_2\}$ where $u_1 = (1,0,0), u_2 = (3, 7, -2)$. Find $\frac{v_2}{\|v_2\|}$
Option A:	$\frac{v_2}{\|v_2\|} = \left(0, \frac{7}{\sqrt{53}}, \frac{2}{\sqrt{53}}\right)$
Option B:	$\frac{v_2}{\|v_2\|} = \left(0, -\frac{7}{\sqrt{53}}, \frac{2}{\sqrt{53}}\right)$
Option C:	$\frac{v_2}{\|v_2\|} = \left(0, \frac{7}{\sqrt{53}}, -\frac{2}{\sqrt{53}}\right)$
Option D:	$\frac{v_2}{\|v_2\|} = \left(0, -\frac{7}{\sqrt{53}}, -\frac{2}{\sqrt{53}}\right)$
60.	Find the $E(X^2)$ for the following probability distribution

X	1	3	4	5
P(X = x)	0.4	0.1	0.2	0.3

Option A:	$E(X^2) = 9$
Option B:	$E(X^2) = 19$
Option C:	$E(X^2)) = 12$
Option D:	$E(X^2) = 7.5$

	Each question carry five marks
1	Evaluate $\int_c \frac{1}{z^3(z+3)}\,dz$, where C is the circle $\|z\| = 2$
2	Find Rank correlation coefficient for the following data x : 10 12 18 22 15 40 y : 12 18 25 25 50 25
3	A hospital switch board receives an average of 4 emergency calls in a 10 minutes interval. What is the probability of getting at least 3 emergency calls.
4	Find the orthonormal basis of R^3 by applying Gram Schmidt process where $S = \{(0,3,1),(1,2,0)\}$
5	Reduce the quadratic form $2x^2 + y^2 - 3z^2 - 8yz - 4zx + 12xy$ to canonical form and find the rank, index, signature and class value.
6	Find Extremal of the following $\int_{x_1}^{x_2} \frac{\sqrt{(1+y'^2)}}{x}\,dx$
7	Fit a Poisson distribution for the following distribution . x: 0 1 2 3 4 Total f: 43 40 25 10 2 120
8	Obtain the rank correlation coefficient for the following data X: 68 64 75 50 64 80 75 40 55 64 Y: 62 58 68 45 81 60 68 48 50 70
9	Obtain two distinct Laurent's series of $f(z) = \frac{2z-3}{z^2-4z+3}$ about z = 4 indicating the region of convergence
10	Construct an orthonormal basis of R^3 *using* Gram-Schmidt process to S = $\{(1,0,0),(3,7,-2),(0,4,1)\}$
11	Reduce the symmetric matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ to the diagonal form using congruent transformation and interpret the result in terms of quadratic forms
12	Find the curve on which the functional $\int_a^b \sqrt{1+y'^2}\,dx$ is extremum.
13	Evaluate the given complex integral $\int_0^{3+i} (\bar{z})^2\,dz$ along a parabola $x = 3y^2$.
14	Fit a second degree curve to the following data. **x**: 0 1 2 3 4 **y**: 1 1.8 2.3 5.5 6.3
15	Given the following probability function of a discrete random variable X. **X**: 0 1 2 3 4 5 6 7 **P(X)**: 0 c 2c 2c 3c c^2 $2c^2$ $7c^2+c$ (i) Find c (ii) Mean (iii) Variance (iv) P(X ≤ 6)
16	Find all vectors in $\Re^3$ of Euclidean norm 1 that are orthogonal to the vectors

	$a=(1,-1,1)$ and $b=(-1,0,1)$.
17	Reduce the quadratic form $x^2+2y^2-7z^2-4xy+8zx$ to canonical form by congruent transformations.
18	Find the extremals of $\int_{x_1}^{x_2}\left(y^2+y'^2+6y\sin x\right)dx$
19	Obtain Laurent 's series for $\frac{2}{(z-2)(z-3)}$ $in\ the\ region: 2<\|z\|<3$
20	Fit a straight line for the following data X: 3 4 5 6 7 8 y: 8 6 5 7 6 4 Also estimate y when x=2.
21	The sizes of 10,000 items are normally distributed with mean 20 cms and standard deviation 4 cm. Find the probability that an item selected at random will have size above 25 cm (Area for S.N.V.Z from z = 0 to z = 1.25 is 0.3944)
22	Check whether W={(a,b,c)/ b=a+c, a,b,c, $\in R$ } is a subspace of R^3
23	Obtain the linear transformation of the quadratic form $2x_1{}^2+2x_2{}^2+3x_3{}^2+2x_1x_2-4x_1x_3-4x_2x_3$ under $x_1=y_1-y_2+2y_3$, $x_2=2y_2+2y_3$, $x_3=3y_3$.
24	Use Rayleigh Ritz Method to solve boundary value problem $I=\int_0^1(2xy-y^2)dx$ given y(0)=0 and y(1) =0
25	In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5 Assuming the distribution to be normal ,find (i)how many students score between 12 and 15 ? (ii) how many score above 18? (iii) how many score below 8?
26	In a partially destroyed laboratory, record of an analysis of correlation data, the following results only are legible: $\sigma_x=3$. Regression equations: 8X−10Y = −66, 40X−18Y=214. What are: (i) the mean values X and Y, (ii) the correlation coefficient between X and Y, (iii) the standard deviation of Y
27	Evaluate $\oint_C \frac{sin\pi z^2+cos\pi z^2}{(z-2)(z-3)}dz$ where C is the circle $\|z\|=4$..
28	Let V be a set of positive real numbers with addition and scalar multiplication defined as $x+y=xy$ and $cx=x^c$ .Show that Vis a vector space under this addition and scalar multiplication.
29	Reduce the following quadratic form into canonical form. Q: $x_1{}^2+2x_2{}^2+3x_3{}^2-2x_1x_3+2x_2x_3+2x_2x_1$
30	Using Rayleigh -Ritz method , solve the boundary value problem I=$\int_0^1(y'^2-y^2-2xy)dx$ with y(0)=0 and y(1)=0.
31	Evaluate using Cauchy's Residue Theorem, where C is a curve $\|z-1\|=3$ for $\int_C \frac{2z+1}{(z-1)^2(z-3)}dz$

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<tr><td>32</td><td>Two judges X, Y ranked 8 candidates as follows. Find the Karl Pearson's coefficient of correlation.
<table>
<tr><td>Candidates</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td></tr>
<tr><td>First judge X</td><td>5</td><td>2</td><td>8</td><td>1</td><td>4</td><td>6</td><td>3</td><td>7</td></tr>
<tr><td>Second judge Y</td><td>4</td><td>5</td><td>7</td><td>3</td><td>2</td><td>8</td><td>1</td><td>6</td></tr>
</table></td></tr>
<tr><td>33</td><td>The average selling price of house in a city is ₹ 50,000 with standard deviation of ₹ 10,000. Assuming the distribution of selling price to be normal find (i) the percentage of houses that sell for more than ₹ 55,000, (ii) the percentage of houses selling between ₹ 45,000 and ₹ 60,000. (Area between t = 0 and t = 1 is 0.3413and between t = 0 and t = 0.5 is 0.1915.</td></tr>
<tr><td>34</td><td>Construct an orthonormal basis of $\Re^3$ using Gram-Schmidt's process to $S=\{(4,0,3),(-1,0,6),(2,9,11)\}$.</td></tr>
<tr><td>35</td><td>Reduce the quadratic form $x^2-2y^2+3z^2-4yz+6zx$ to canonical form and find the rank, index, signature and class value.</td></tr>
<tr><td>36</td><td>Using Rayleigh Ritz's method to find an approximate solution for the extremal $\int_0^1 (y'^2-y-xy)dx$ with $y(0)=2,\ y(1)=1$.</td></tr>
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