S.B. Roll No.....

APPLIED MATHEMATICS-II
2nd Exam/Common/2354/2251/5422/Nov'17

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. Choose the correct answer. **5x1=5**

i. Which one is a measure of dispersion?
a) Mean b) Median c) Mode d) Range

ii. Order of differential equation $(y''')^2 + 2y'' + 3y = x$
a) 1 b) 2 c) 3 d) 4

iii. A square matrix A is singular if $|A|$ is
a) 0 b) 1 c) 2 d) 3

iv. If $x = \sin 3t$, then acceleration at $\frac{\pi}{2}$ is (x stands for displacement at time t)
a) -9 b) -3 c) 3 d) 9

v. The equation of the normal to the curve $y = \sin x$ at (0, 0) is
a) $x = 0$ b) $y = 0$ c) $x + y = 0$ d) $x - y = 0$

Q2. State True or False. **5x1=5**

a. $\lim_{\theta \to 0} \frac{Sin\theta^\circ}{\theta}$ is equal to 1
b. $\int \sin 4x \ dx = \cos 4x$
c. If D≠0, then system has unique solution
d. If the mean of 4, 3, 7, x, 10 is 6 then $x = 6$
e. The integral of $\log x$ w.r.t x is $\frac{1}{x}$

Q3. Fill in the blanks. **5x1=5**

i. $\int e^{mx} \ dx$ is equal to -------.
ii. Area of trapezoid = $\frac{1}{2}$(sum of parallel side) x -------.
iii. If AB is defined then $(AB)^t$ = -------.
iv. Integration is defined as the ------ of differentiation.
v. The differential co-efficient of a constant is ------.

SECTION-B

Q4. Attempt any six questions. **6x5=30**

(i) If = $a(t + \frac{1}{t})$, $y = a(t - \frac{1}{t})$ where "a" is constant. Then prove that $\frac{dy}{dx} = \frac{x}{y}$

(ii) If $kx + y - z = 0$; $x - 2y + z = 3$ and $4x - 3y + z = 5$, and system is inconsistent, then find the value of k.

(iii) Evaluate $\int_0^{\pi/2} \frac{dx}{1+\cot x}$

(iv) If $y = (\sin^{-1} x)^2$, prove that $(1 - x^2)y_2 - xy_1 = 2$

(v) Evaluate $\int cos^4 x \ dx$

(vi) The probability of the horse A winning the race is 1/4 and the probability of horse B winning the race is 1/3, find the probability that one of the horse wins the race.

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(vii) Calculate the median of the following data:-

Class Interval	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	12	15	25	40	42	14	8

(viii) Evaluate $\int x \tan^{-1} x \ dx$

(ix) Find the point on the curve $y = 10 + 2x - x^2$ where the curve has slope unity.

SECTION-C

Q5. Attempt any three questions. **3x10=30**

(i) Solve the following equations by matrix method
$x - y + z = 4,\ x - 2y - 2z = 9,\ 2x + y + 3z = 1$

(ii) Using Simpson's Rule, calculate the approximate value of $\int_0^1 \frac{1}{1+x^2}\ dx$ by dividing the interval 0 to 1 into four equal parts. Hence obtain the value of π correct to four places of decimals.

(iii) Solve the differential equation
$y^2(x^2 - 1)\frac{dy}{dx} - x^2(y^2 - 1) = 0$

(iv) a) Differentiate $e^{\tan x}$ w.r.t $\sin x$.
b) Determine the point of maxima of $f(x) = \sin x + \cos x$ in $0 \leq x \leq \frac{\pi}{2}$

(v) Find S.D and coefficient of variation of following data

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	5	10	20	40	30	20	10	4

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APPLIED MATHEMATICS – II
2nd Exam/Common/2354/2251/5422/May'17

Duration: 3 Hours **M. Marks:75**

SECTION – A

Q1. (A) Choose the correct answer: **5x1=5**

(i) If D ≠ 0, then system has
(a) Infinite Solution (b) Unique Solution (c) Not a Solution (d) None of the above

(ii) $\lim_{x\to 0} \frac{\sin x - x}{x}$ =
(a) 1 (b) -1 (c) 0 (d) ∞

(iii) $\int_0^1 \frac{1}{1+x^2}\, dx$ =
(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) 1 (d) 0

(iv) The order of differential equation $(\frac{d^4y}{dx^4})^2 + 3(\frac{d^2y}{dx^2})^4 + y = 0$ is
(a) 4 (b) 2 (c) 8 (d) 1

(v) If $f(-x) = f(x)$ then the function is
(a) odd (b) even (c) both (d) none

(B) State true or false. **5x1=5**

i. $\int \log x\, dx = \frac{1}{x}$
ii. If A = $\begin{bmatrix} cos\,\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ then $|A| = 1$
iii. The differential coefficient of a constant is one.
iv. Tossing of a coin is an event and the turning up of head and tail is a trial.
v. Median is a measure of central tendency.

(C) Fill in the blanks. **5x1=5**

i. Derivative of x^6 w.r.t x^3 is ……
ii. A matrix is said to be singular if its ……
iii. The square of …… is called variance.
iv. Arithmetic mean of 10 terms is 7. If each term is decreased by 3, then the new mean is ……
v. Area bounded by the curve, y = 4 x - x^2 and x-axis and the ordinates x=1 and x=3 is ……

SECTION – B

Q2. Attempt any six questions. **6x5=30**

(i) If $x^y = e^{x-y}$ Prove that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$
(ii) Evaluate $\int x\, cos^2 x\, dx$
(iii) Using Cramer's rule find the value of x and y for
$6x - 4y = -24$
$5x - 11y = -43$
(iv) If $y = (\tan^{-1} x)^2$ Prove that $(1 + x^2)^2 y_2 + 2x(1 + x^2) y_1 = 2$
(v) Find the equation of tangent to the curve $y = 9x^2 - 12x + 9$ which is parallel to x- $axis$

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(vi) Find the approximate area under the smooth curve whose ordinates are given below by the method of trapezoidal rule

x	1	2	3	4	5	6	7	8
y	2	2.6	3	3.2	2.8	2	1.5	1

(vii) Evaluate $\int \frac{\cos x \, dx}{2\cos x + \sin x}$

(viii) The students work independently on a problem. The probability that the first will solve it is $\frac{2}{3}$ and probability that the second one will solve is $\frac{2}{9}$. Find the probability that the problem will be solved.

(ix) Solve $(xy^2 + x)\,dx/\,dy = yx^2 - y$

SECTION – C

Q3. Attempt any three questions. **3x10=30**

(i) Solve the following equations by matrix method

$x + y - z = -2$
$2x - y - z = -7$
$4x + y + 2z = 4$

(ii) Find the maximum and minimum values of the function

$2x^3 - 15x^2 + 36x + 10$

(iii) Calculate the standard deviation from the following data

x	25	35	45	55	65	75	85
f	3	61	132	153	140	51	2

(iv) Show that

$$\int_0^{\pi/4} \log(1 + \tan\theta)\, d\theta = \frac{\pi}{8}\log 2$$

(v) Solve

$$x^2 \frac{dy}{dx} = x^2 - 2y^2 + xy$$

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APPLIED MATHEMATICS-II

2nd Exam/Common/2354/2251/5422/Nov'18

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. a) Choose the correct answer. **15x1=15**

i. If A is a non singular matrix, then A^{-1} is

a) $|A|\ adj\ A$ b) $\frac{adj\ A}{|A|}$ c) $(adjA)^T$ d) $\frac{(adj\ A)^T}{|A|}$

ii. $\int_0^1 \frac{1}{1+X^2} dx$=

a) π b) $\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$

iii. $\lim_{x\to 0} \frac{sinx^\circ}{x}$ =

a) 1 b) π c) $\frac{\pi}{180}$ d) -π

iv. Order of differential equation $(y''')^2 + 2y'' + 3y = x$ is

a) 3 b) 4 c) 1 d) 2

v. The differential coefficient of $\sin x^2$ w.r.t $\cos x^2$ is

a) $-\tan x^2$ b) $-\cot x^2$ c) $2x$ d) $-2x$

b) State True or False.

vi. The differential coefficient of a constant is one.

vii. $\int_{-a}^{a} f(x)\,dx = 0$ if $f(x)$ is even.

viii. Mean Deviation = $\frac{5}{4}$ Standard Deviation

ix. Volume of a sphere of radius 'a' is $\frac{4}{3}\pi a^3$

x. $\cos 2A = cos^2A - sin^2A$

c) Fill in the blanks

xi. The angles in trigonometric functions are supposed to be measured in_____.

xii. A square matrix is said to be a diagonal matrix if all its non-diagonal elements are_____.

xiii. $\int \frac{g'(x)}{g(x)}$ is equal to_____.

xiv. Central value of the set of observation is called_____.

xv. The derivative of e^x is equal to_____.

SECTION-B

Q2. Attempt any six questions. **6x5=30**

a. In a class of 30 students with roll no. 1 to 30, a student is picked up at random to answer a question. Find the probability that the roll number of selected students is either a multiple of 4 or 7.

b. If $y = e^{x+y}$, prove that $\frac{dy}{dx} = \frac{y}{1-y}$

c. Calculate by Simpson's rule an approximate value of $\int_{-3}^{3} x^4\,dx$ by taking seven equidistant ordinates.

d. Find the equation of the tangent to the curve $y = x^2$, whose slope is $\frac{1}{2}$.

e. Evaluate $\int \frac{dx}{5+4\cos x}$

f. Find the area bounded by the curve $y = \log x$ between the x-axis and the ordinates $x = 2\ and\ x = 3$.

g. If $y = \tan^{-1} x$, prove that $(1 + x^2)y_2 + 2xy_1 = 0$

h. Solve the equations by Crammer's rule

i. $5x + 2y = 3$

j. $3x + 2y = 5$

k. Evaluate $\int_1^3 \frac{\cos(\log x)}{x}\,dx$

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SECTION-C

Q3. Attempt any three questions. **3x10=30**

i. Solve the following equations by matrix method
$3x + y + 2z = 3$
$2x - 3y - z = -3$
$x + 2y + z = 4$

ii. Find the maximum and minimum values of the function $x^3 - 6x^2 + 9x + 15$

iii. Find the standard deviation from the following data

Wages	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	12	18	35	42	50	45	20	8

iv. Solve the differential equation
$y^2(x^2 - 1)\frac{dy}{dx} - x^2(y^2 - 1) = 0$

v. Integrate $x^2 sin^2 x\, dx$

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APPLIED MATHEMATICS-II

2nd Exam/Common/2354/2251/5422/May'18

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. Choose the correct answer **5x1=5**

i) If a square matrix A has two identical rows or columns, then det A =

a) 0 b) 1 c) -1 d) none

ii) $\frac{d}{dx}(\tan^{-1}(\cot x))$ =

a) $-cosec^2 x$ b) -1 c) $sin^2 x$ d) 1

iii) $\int \log x \, dx$ is equal to

a) $\frac{1}{2}(\log x)^2$ b) $\frac{1}{x}$ c) $x log\, x - x$ d) $2 \log x$

iv) If $x = a\, cos^3 t, y = a\, sin^3 t$, then $\frac{dy}{dx}$ is equal to

a) $\cot t$ b) $\cos t$ c) $cosec\, t$ d) $-\tan t$

v) Degree of $(\frac{d^2y}{dx^2})^2 = (1 + \frac{dy}{dx})^3$ is

a) 2 b) 3 c) 1 d) 4

Q2. State True or False. **5x1=5**

a. $\frac{d}{dx}(x \sin x) = x \cos x$

b. If $D = D_1 = D_2 = D_3 = 0$, system has infinite solution.

c. $\frac{d}{dx}(\frac{1}{x}) = \log x$

d. If tangent is parallel to x -axis, then slope of curve is zero.

e. $\int e^{mx} dx = me^{mx}$

Q3. Fill in the blanks. **5x1=5**

i. If S = cos2t, then velocity is .....

ii. The anti derivative of x^n is ..... .

iii. $\int_{-a}^{a} f(x) dx = 0$ is an ..... function.

iv. Relationship between mean, median, and mode is ..... .

v. The probability of an impossible event is ..... .

SECTION-B

Q4. Attempt any six questions. **6x5=30**

i) Solve by means of determinants the following equations

$3x + 2y = 7$

$11x - 4y = 3$

ii) The velocity of a body moving in a straight line at different times is given below

t (sec)	0	1	2	3	4	5
v (m/sec)	4	3.98	3.87	3.55	2.83	0.61

Evaluate the distance in 5 sec.

iii) Evaluate $\int_0^{\pi/6} Cos^5 3x \, dx$

iv) Solve $3e^x \tan y \, dx + (1+e^x) Sec^2 y \, dy = 0$

v) Find the equation of the normal to the curve $y = 6x^2 - 5x + 3$ at (1,4)

vi) If $y = \tan(x + y)$, prove that $\frac{dy}{dx} = -\frac{1+y^2}{y^2}$.

vii) Find $\frac{d^4y}{dx^4}$ if $y = x^3 \log x$

viii) Evaluate $\int \frac{e^x}{e^{2x}+6e^x+5} dx$.

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ix) A card is drawn from a well shuffled pack of playing cards. What is the probability that it is either a spade or an ace?

SECTION-C

Q5. Attempt any three questions. **3x10=30**

i) Find the maximum or minimum values of the function $2x^3 - 21x^2 + 36x - 20$

ii) a) Evaluate $\int \frac{\cos x}{\cos 3x}$

b) Differentiate $Sin^n x^n$ w.r.tx.

iii) Solve the following equations by matrix method

$10x + 10y - z = -2$

$x + 5y + 2z = 0$

$x - 5y - z = 4$

iv) Evaluate $\int \frac{(x^2+4)}{(x^2+1)(x^2+3)} dx$

v) Calculate the median and standard deviation from the following data

Class Interval	1-10	11-20	21-30	31-40	41-50	51-60
Frequency	3	16	26	31	16	8

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APPLIED MATHEMATICS-II

2nd Exam/Common/2354/2251/5422/May'19

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. a) Choose the correct answer. **15x1=15**

i. $\frac{d}{dx}\left(e^x\right)=$ a) $e^x \log a$ b) $a^x \log_a^e$ c) e^x d) 1

ii. $\int_0^1 \frac{1}{1+x^2}dx =$ a) $\frac{\pi}{2}$ b) $\frac{\pi}{4}$ c) 1 d) 0

iii. $\frac{d}{dx}\left(Tan^{-1}x\right)=$ a) $\frac{1}{1+x^2}$ b) $-\frac{1}{1+x^2}$ c) $\frac{1}{x}$ d) $\tan^{-1} x$

iv. $\frac{d}{dx}\left(\log x\right)=$ a) e^x b) x c) $\frac{1}{x}$ d) $\frac{x^2}{2}$

v. If $A=\begin{bmatrix}2 & -1\\ 4 & 4\end{bmatrix}$, then |A|= a) – 4 b) 4 c) 8 d) 12

b) State True or False.

vi. If $y=\sqrt{x}$, then $\frac{dy}{dx}=1/\sqrt{x}$

vii. $\frac{d}{dx}\left(Sin^{-1}x+Cos^{-1}x\right)=0$.

viii. For tangent parallel to y-axis, $\frac{dy}{dx}=0$

ix. The determinant of a singular matrix is zero

x. If $y=\log\left(\sin x\right)$, then $\frac{dy}{dx}=\cot x$

c) Fill in the blanks.

xi. If $\frac{x^n-2^n}{n-2}=80$, then $n=$ _____

xii. Matrix $A=\begin{bmatrix}K & 4\\ 3 & 4\end{bmatrix}$ is singular if K=_____

xiii. Mean, median and mode are measures of_____

xiv. The probability of a Sure event is_____

xv. $\int \sec x\,dx =$ _____

SECTION-B

Q2. Attempt any six questions. **6x5=30**

a. Prove that $\begin{vmatrix}x+a & x & x\\ x & x+a & x\\ x & x & x+a\end{vmatrix}=a^2(3x+a)$

b. Calculate by Simpson's rule an approximate value of $\int_{-3}^{3} x^4\,dx$, by taking seven equidistant and ordinates.

c. A card is drawn at random from a well shuffled pack of cards. Find the probability of its being a club or a king.

d. Solve the differential equation $\left(1+x^2\right)dy=\left(1+y^2\right)dx$

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e. Evaluate $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$

f. If $x = at^2$, $y = 2at$, find $\frac{dy}{dx}$

g. Find maximum and minimum value of the function $y = x^3 - 6x^2 + 9x - 8$.

h. Find derivative of $y = \log\left(x + \sqrt{x^2 - a^2}\right)$

i. Find equation of the tangent to the curve $y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at (1, 3)

SECTION-C

Attempt any three questions. **3x10=30**

Q3. Find standard Deviation of fallowing data.

Wage	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Freq.	12	18	35	42	50	45	20	8

Q4. Solve the system of equations, using matrix method (By finding inverse)

$x + y + z = 3$

$x + 2y + 3z = 4$

$x + 4y + 9z = 6$

Q5. Differentiate the following function $y = x^x + (Sin\, x)^x$

Q6. a) Use Cramer's rules to find the value of x and y

$2x - y = 1 \quad 7x - 2y = -7$

b) Evaluate $\int Cos^3 x\, dx$

Q7. If $x = a(\theta - \sin\theta);\ y = a(1 + \cos\theta)$, find $\frac{d^2y}{dx^2}$ at $\theta = \pi/2$

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APPLIED MATHEMATICS-II

2nd Exam/Civil/Mech./ Electrical/ECE/IT/CSE/Auto/Mechatronics/0553/May'19

(FOR 2018 BATCH)

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. a) Choose the correct answer. **15x1=15**

i. $\lim_{\theta\to 0} \sin\frac{2\theta}{\theta}$ is equal to a) 0 b) 1 c) $\frac{1}{2}$ d) 2

ii. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos x dx$ is equal to a) – 1 b) 0 c) 1 d) 2

iii. The deviation of $x^2 \log x$ is equal to
a) X (1 - 2 log x) b) $\frac{(1-2\ \log x)}{x}$ c) x(1 + 2 log x) d) $\frac{(1+2\ \log x)}{x}$

iv. Order of differential equation $(y''')^2 + 2y'' + 3y = x$ is
a) 1 b) 2 c) 3 d) 4

v. The equation of the normal to the curve y = sin x at (0, 0) is
a) x = 0 b) y = 0 c) x+y = 0 d) x-y=0

b) State True or False.

vi. $\int_{-a}^{a} f(x)\,dx = 0$ If f(x) is odd.

vii. $\lim_{x\to 0} \frac{\tan 2x}{\tan 3x} = \frac{2}{3}$.

viii. $\int e^{-mx}\,dx = \frac{e^{-mx}}{m}$.

ix. $\frac{d}{dx}(x\sin x) = x\cos x$.

x. Every LPP admits an optimal solution.

c) Fill in the blanks.

xi. Derivative of x^{10} w.r.t x^5 is _____

xii. Area of the region bounded by the curve of $y = x-x^2$ between x = 0 and x = 1 is _____

xiii. Anti derivative of $x\sin x$ w.r.t x is _____

xiv. $\int_0^{\frac{\pi}{2}} \cos 2x dx$ is equal to _____

xv. If y = log x ,then $\frac{d^2x}{dy^2}$ is equal to _____

SECTION-B

Q2. Attempt any six questions. **6x5=30**

a. If x = a(θ + sin θ) and y = a(1- cos θ) ,find $\frac{dy}{dx}$.

b. If $y = e^{m\sin^{-1}x}$ prove that $(1 - x^2)\,y2 - xy_1 = m^2y$.

c. Find the equation of the normal to the curve $y = 6x^2 - 5x + 3$ at (1,4).

d. Solve the differential equation, ydx – xdy = xydx .

e. Evaluate $\int_0^{\pi} \cos^2\frac{x}{2}\,dx$.

f. Integrate $x^2\cot^{-1}x$.

g. Find the area of the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ between x = 0 & x = a .

h. Evaluate $\int \frac{dx}{1+3\sin^2 x}$.

i. If the side of a square is increasing at the rate of 1m per min., find the rate of increase of its area, when the side of square is 5m.

SECTION-C

Q3. Attempt any three questions. **3x10=30**

i. Find the maximum and minimum or extreme values of $2x^3-15x^2+36x+10$.

ii. Differentiate $x^{\sin x}$ w.r.t$(\sin x)^x$.

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iii. Minimize and Maximize z = 5x + 10y subject to the constraints x + 2y ≤120, x + y ≥ 60, x -2y ≥ 0, x, y ≥ 0.

iv. Differentiate y = cos x by first principle.

v. Find the approximate area under the curve whose ordinates are given below by the method of trapezoidal rule.

x	0	1	2	3	4	5
y	0	2.5	3	4.5	5	7.5

vi. Evaluate :

a. $\int \sin^{-1} x$.

b. $\int_1^3 \frac{\cos(\log x)\, dx}{x}$.

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APPLIED MATHEMATICS-II

2nd Exam/Common/2354/2251/5422/Sep'2020

Duration: 1.15 Hrs. **M.Marks:25**

SECTION-A

Q1. Attempt any three questions. **3x5=15**

a. Using Crammer's rule find the values of x & y for the system of equations
$3x + 2y = 7;\ 11x - 4y = 3$

b. Find the equation of tangent to the curve
$y^2 = 16x$ at (4,8)

c. A bag contains 6 white, 4 black & 2 blue balls. Find the chance of getting either a black or a blue ball in a single draw.

d. If $y = \tan^{-1} x$, prove that $(1 + x^2)y_2 + 2xy_1 = 0$

e. Evaluate $\int_0^{\frac{\pi}{2}} cos^8 x\, dx$.

f. Evaluate $\int tan^4 x\, dx$

g. If $\sin y = x \sin(a + y)$ prove that $\frac{dy}{dx} = \frac{sin^2(a+y)}{\sin a}$

h. Solve the differential equation $y\, dx - x\, dy = xy\, dx$.

i. Find the area bounded by the curve $y = \log x$ between the $x - axis$ and the ordinates $x3\ and\ x = 4$.

SECTION-B

Q2. Attempt any one question. **1x10=10**

i. Solve the equations by matrix method
$3x + 4y + 2z = 8;\quad 2y - 3z = 3;\quad x - 2y + 6z = -2$

ii. Use trapezoidal rule to evaluate $\int_0^1 x^2 dx$ taking 10 equal intervals.

iii. Find the maximum and minimum values of the function $f(x) = x^4 - 6x^2 + 8x + 11$.

iv. Find the mean and median from the following data

Class interval	0 - 7	7 - 14	14 - 21	21 - 28	28 - 35	35 - 42	42 - 49
Frequency	19	25	36	72	51	43	28

v. a) If $y = e^{x+y}$, show that $\frac{dy}{dx} = \frac{y}{1-y}$.

b) Evaluate $\int x \log x\, dx$.

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APPLIED MATHEMATICS-II

2nd Exam/Common/2354/2251/5422/Jun'2021

Duration: 1.15Hrs. **M.Marks:25**

SECTION-A

Q1. Attempt any three questions. **3x5=15**

a. If x = a(θ + sin θ) and y = a(1- cos θ) ,find $\frac{dy}{dx}$.

b. If y = $\tan^{-1} x$, prove that $(1+x^2)\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} = 0$

c. Find the equation of the tangent and normal to the curve $y^2 = 16x$ at (4,8).

d. Solve $e^y (dy + dx) = xe^y dx$

e. Evaluate $\int_0^{\pi/2} \cos^2 x \, dx$.

f. A bag contains 6 white, 5 black and 4 blue balls. Find the chance of getting either a white or a blue ball in single draw.

g. Find the area between the parabola $y = 4x^2$, y-axis and two abscissa y = 1 and y = 4.

SECTION-B

Q2. Attempt any one question. **1x10=10**

i. Differentiate $(\sin x)^{\tan x}$ w.r.t. x.

ii. Compute the mean and standard deviation for the following data:

x	25	35	45	55	65	75	85
f	3	61	132	153	140	51	2

iii. Find the maximum and minimum or extreme values of $2x^3-15x^2+36x+10$

iv. Solve with the help of matrices

x +y +z = 3

x + 2y +3z = 4

x + 4y + 9z = 6

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APPLIED MATHEMATICS-II
2nd Exam/Common/0553/Jun'2021
(For 2018 Batch Onwards)

Duration: 1.15Hrs. **M.Marks:25**

SECTION-A

Q1. Attempt any three questions. **3x5=15**

a. Evaluate $\lim_{x\to 0} \frac{\cos 5x - \cos 11x}{\cos 3x - \cos 7x}$
b. Find the equation of the tangent to the curve $y = x^2 + 7x + 1$ which makes an angle of 45° with X-axis.
c. Evaluate $\int \frac{dx}{x(x+1)}$
d. If $y = (\sin^{-1} x)^2$, prove that $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 2$.
e. Find the area of the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ between $x = 0$ and $x = a$.
f. Evaluate $\int_0^{\sqrt{3}} \frac{e^{m\tan^{-1}x}}{1+x^2}\, dx$
g. Solve the differential equation $sec^2 y\frac{dy}{dx} + 2x\tan y = x^3$.

SECTION-B

Q2. Attempt any one question. **1x10=10**

i. (a) Show that $\int_0^{\frac{\pi}{2}} \frac{1}{a^2 sin^2 x + b^2 cos^2 x}\, dx = \frac{\pi}{2ab}$

(b) Evaluate $\int_0^{\pi} |\cos x|\, dx$.

ii. Differentiate $x^{\sin x}$ w.r.t. $(\sin x)^x$.
iii. Find the maximum and minimum values of the function $y = 2x^3 - 21x^2 + 36x - 20$.
iv. Solve the following linear programming problem graphically
Maximize $z = 3x + 2y$, subject to the constraints

$$x + 2y \leq 10$$
$$3x + y \leq 15$$
$$x, y \geq 0$$