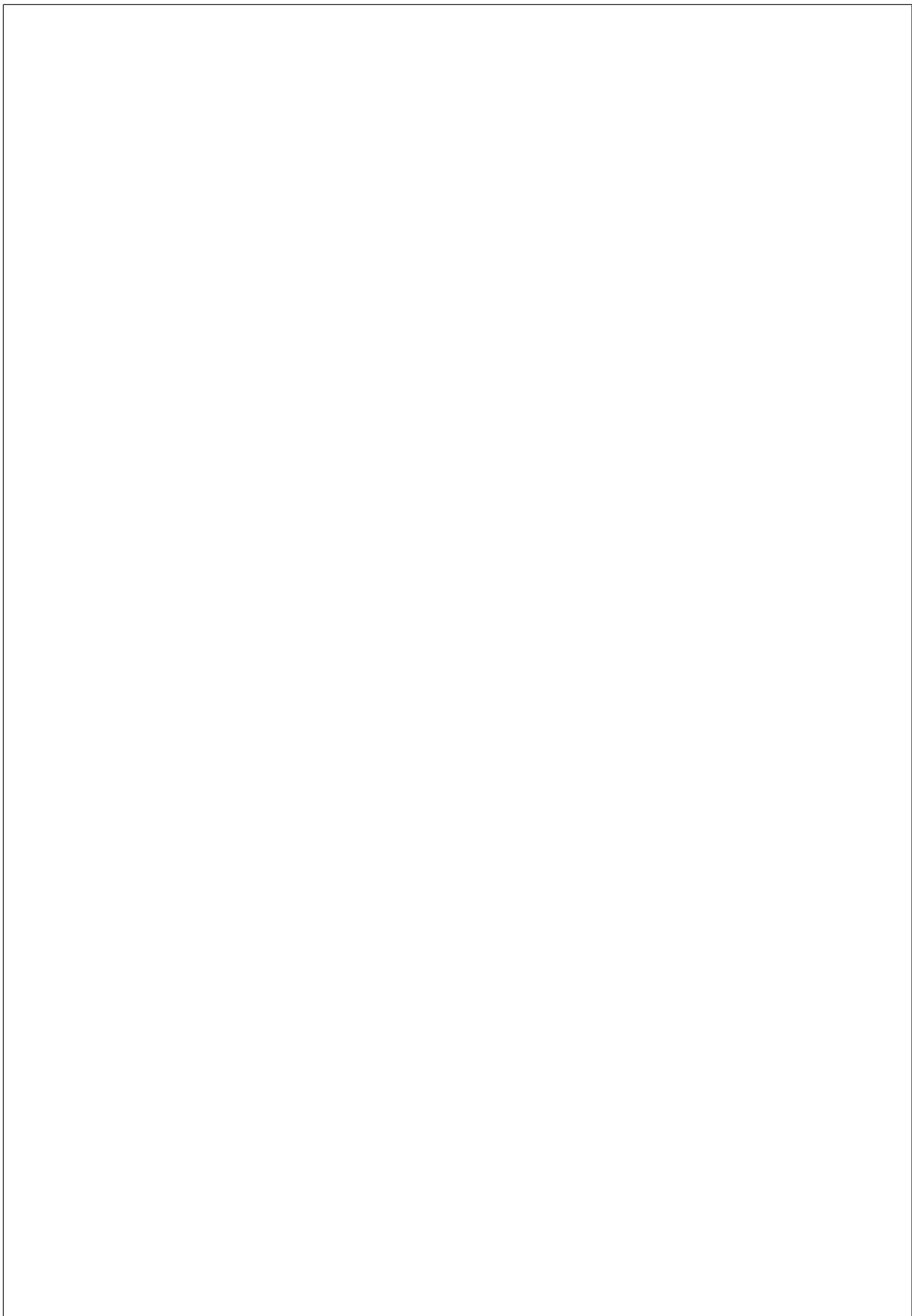# Shaikh Sir's Diploma Classes

Maths-III

Important Types in Maths III

MINIMUM Imp TYPES FOR MATHS III

Types of Problems

No	Type of Problem	Min/max marks	Location in Q.P	
1	Slope ,tangent and normal of curve	6-10	Q1,Q2,Q6	
2	Integration by Partial Fraction	6-10	Q1,Q2,Q4	
3	Area under a curve	8-10	Q1,Q2,Q4	
4	Integration by Substitution	6-10	Q1,Q2,Q3	
5	Maxima and Minima of a function	8	Q2,Q6	
6	Integration of sinx/cosx in den	4	Q4	
7	Properties of Definite Integral	4-8	Q3,Q4	
8	Integration by parts	6-10	Q1,Q3,Q5	
9	Conditional Probability	4	Q5	
10	Binomial Distribution	6	Q1,Q5	
11	Poissons Distribution	4-8	Q5,Q6	
12	Normal Distribution	4	Q6	
13	Radius of curvature	6	Q1,Q2	
14	Simple probability	6-10	Q1,Q5,Q6	
15	To find order and degree of DE	2	Q1	
16	Verify solution of differential equation	2-6	Q1,Q4	
17	Addition and Multiplication theorem of Probability	4	Q5	
	TOTAL COVERAGE WITH OPTIONS	75-85		

These are relatively easy and more weighted important types which give the coverage of 70-80 marks from Question 1 to Question 6.

TYPE 1 :Problems on slope of curve and equation of tangent/normal to curve

A) 2 MARKS PROBLEMS

1) Find the slope of curve $y = 3x - x^2$ at (4,-4)

2) Find the slope of curve $y = x^2 - 4x + 2$ at (7,23)

3) Find the slope of curve $y = x^3 - 24x + 2$ at point (3,-43)

4) Find the point on the curve $y = 3x - x^2$ where the slope is 5.

5) Find the point on the curve $y = x^3 - 24x + 2$ where the slope is 3.

6) Find the point on the curve $y = \sqrt{x}$ where the slope is ⅙.

7) At what point on the curve $y = e^x$ Where the slope of curve is unity.

8) Find the slope of the curve $y = \sqrt{x^3}$ at x=4.

9) Find the slope of the curve $x^2 + y^2 = 25$ at (-3,4).

10) Find the point on the curve $y = 7x - 3x^2$ where the inclination to the tangent is 45^0.

11) Find the inclination of the tangent to the curve $y = e^{2x}$ at $point(1,-3)$.

12) Find the point on the curve $y = 2x^2 - 6x$ where the tangent is parallel to the x axis.

13) Find 'a' if the tangent to the curve $y = x^2 + ax$ at the origin is parallel to the line passing through A(-4,-3) and B(-2,5).

14) At which point on the curve $y = 3x - x^2$, the slope of tangent is -5?

B) 4 MARKS PROBLEMS

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

2) Find the equation of the tangent and normal to the parabola $y^2 = 4x$ at (1,-2).

3) Find the equation of tangent and normal to the curve $x^2 + y^2 = 25$ at (-3,4).

4) Find the equation of tangent and normal to the curve $2x^2 - xy + 3y^2 = 18$ at (3,1).

5)Find the equation of tangent and normal to the curve $13x^3 + 2x^2y + y^3 = 1 \, at (1, -2)$

6) Find the equation of tangent and normal to curve $y = x(2-x) \, at \, (2,0)$.

7) Find the equation of tangents to the curve $y = x^2 - 2x - 3$,where it meets the x-axis.

8) Find the equation of tangent and normal to the curve $y = x^2 - x - 6$ at a point where it crosses x-axis.

9) Find the equation of the tangent to the curve $y = 9x^2 - 12x + 7$ which is parallel to the x axis.

TYPE 2: Integration by Substitution	C) 4 MARKS PROBLEMS WITH LIMIT

A) 2 MARKS PROBLEMS

1) $\int \dfrac{1}{x.\log x} dx$ 　　**2)** $\int 2x.e^{x^2} dx$

3) $\int \dfrac{(2+\log x)^2}{x} dx$ 　　**4)** $\int \dfrac{e^{\tan^{-1}x}}{1+x^2} dx$

5) $\int e^{\tan x}.\sec^2 x.dx$ 　　**7)** $\int \dfrac{\sin^{-1}x}{\sqrt{1+x^2}} dx$ 　**8)**

9) $\int \dfrac{\csc^2(\log x)}{x} dx$ 　**10)** $\int \dfrac{(\tan^{-1}x)^2}{1+x^2} dx$

11) $\int \dfrac{\sec^2(\log x)}{x} dx$ 　**13)** $\int \dfrac{e^x}{e^{2x}-16} dx$

14) $\int \dfrac{\sin x}{\cos^2 x} dx$ 　**16)** $\int e^{e^x} e^x dx$

17) $\int \sec^4 x\, dx$ 　**18)** $\int \dfrac{\sec^2 x}{3+\tan x} dx$

$\int \dfrac{\log x}{x} dx$

B) 4 MARKS PROBLEMS WITHOUT LIMIT

1) Evaluate $\int x^{n-1}.\cos x^n dx$

2) Evaluate $\int \sin^3 x.\cos x\, .dx$

3) Evaluate $\int \dfrac{\cos\sqrt{x}}{\sqrt{x}} dx$

4) Evaluate $\int \dfrac{(\tan^{-1}x)^2}{1+x^2} dx$

5) Evaluate $\int \dfrac{(2+\log x)^2}{x} dx$

6) Evaluate $\int \dfrac{dx}{x.\cos^2(\log x)}$

7) Evaluate $\int \dfrac{\cos x}{(1+\sin x)^{3/2}} dx$

8) Evaluate $\int \dfrac{\cos x}{1+\sin 2x} dx$

9) Evaluate $\int \dfrac{dx}{x.\log x.\log(\log x)}$

10) Evaluate $\int \dfrac{dx}{(3\tan x+1)\cos^2 x}$

11) Evaluate $\int \dfrac{\sec x.\csc x}{\log(\tan x)} dx$

12) Evaluate $\int \dfrac{e^x(1+x)}{\cos^2(x.e^x)} dx$

13) Evaluate $\int \dfrac{e^x(x-1)}{x^2\sin^2(e^x/x)} dx$

C) 4 MARKS PROBLEMS WITH LIMIT

1) $\int\limits_{0}^{\pi/2} \left(\dfrac{\sin x.dx}{(1+\cos x)^3}\right)$

2) $\int\limits_{1}^{e} \left(\dfrac{(\log x)}{(x)}\right)dx$

3) $\int\limits_{0}^{\pi/2} (\sin^3 x.dx)$

4) $\int\limits_{0}^{\pi/2} \left(\dfrac{\cos x.dx}{(4-\sin^2 x)}\right)$

5) $\int\limits_{0}^{4} (x(1-x)^{(3/2)}).dx$

6) $\int\limits_{0}^{\pi/2} \left(\dfrac{dx}{(4\cos^2 x+9\sin^2 x)}\right)$

7) $\int\limits_{0}^{\pi/4} (\sec^4 x.dx)$

8) $\int\limits_{0}^{1} x^2\sqrt{1-x}\, dx$

9) $\int\limits_{0}^{\pi/4} e^{\tan x}.\sec^2 x\, dx$

10) $\int\limits_{0}^{\pi/2} \sin^3 x.\cos^2 x\, dx$

Type 3 Integration by partial Fraction	TYPE 4 : Area Under a Curve , Area Between two Curves
A) 2 MARKS PROBLEMS	

<table>
<tr><td>

1) $\int \dfrac{1}{(x+1)(x+2)}dx$

2) $\int \dfrac{x}{(x+1)(x-2)}dx$

3) $\int \dfrac{x+1}{(x+2)(x+3)}dx$

4) $\int \dfrac{x-4}{(x+1)(x+2)}dx$

5) $\int \dfrac{2x-6}{(x+1)(x+2)}dx$

</td>
<td>

A) 2 MARKS PROBLEMS

1) Find the area enclosed by the curve $y=3x^2$ and the line $x=1, x=3$ and x axis.

2) Find the area under the curve $y=x^2+2x+2$ and the line $x=1, x=0$ and x axis.

3) Find the area enclosed by the curve $y=2x+x^2$ and the line $x=1, x=3$ and x axis.

4) Find the area enclosed by the curve $y=x^3-2x+4$ and the line $x=2, x=3$ and x axis.

</td></tr>
</table>

A) 4 MARKS PROBLEMS

1) $\int \dfrac{dx}{(x+1)(x+2)(x+3)}$

2) $\int \dfrac{3x-2}{(x^2-3x+2)}dx$

3) $\int \dfrac{x^2+6x-8}{x^3-4x}dx$

4) $\int \dfrac{(x^2+1)}{x(x^2-1)}dx$

5) $\int \dfrac{dx}{x^3-x}$

6) $\int \dfrac{x+1}{x(x^2-4)}dx$

7) $\int \dfrac{x^2+1}{(x+1)(x+2)(x-3)}dx$

With Substitution

8) $\int \dfrac{cosx}{(1+sinx)(2+sinx)}dx$

9) $\int \dfrac{sec^2x}{(1+tanx)(2+tanx)}dx$

10) $\int \dfrac{x}{(x^2-1)(x^2+2)}$

11) $\int \dfrac{sinx}{(1+cosx)(2+cosx)}$

12) $\int \dfrac{dx}{cos^2x(3+tanx)(tanx-2)}$

13) $\int \dfrac{dx}{x(1+logx)(2+logx)}$

14) $\int \dfrac{e^x}{e^{2x}+3e^x+2}dx$

5) Find the area enclosed by the curve $y= sinx$ and the ordinates $x=\pi/6$ and $x=\pi/3$.

6) Find the area enclosed by the curve $y=4-x^2$ and the line $x=-2, x=2$ and x axis.

7) Find the area enclosed by the curve $y=3x\,(x-2)$ and the line $x=0, x=2$ and x axis.

8) Find the area enclosed by the curve $y=4-x^2$ and x axis.

9) Find the area enclosed by the curve $y= sinx$ and the line $x=0, x=2\pi$ and x axis.

10) Find the area enclosed by the curve $y= cosx$ and the line $x=-\pi/4, x=\pi/4$ and x axis.

11) Find the area above the x axis bounded by $y= sinx$ and the ordinates $x=\pi/6$ and $x=\dfrac{\pi}{3}$

12) find the area contained by the curve $y=1+x^3+2\,sinx$ from $x=0$ to $x=\pi$

B) 4 MARKS PROBLEMS

A) CURVE SYMMETRICAL ABOUT Y AXIS (EQN OF CURVE CONTAINS X2)

1. Find the area of the region bounded by the parabola curve y= x2 and line y=x.

2. Find the area of the region bounded by the parabola y= x2+1 and the line y=2x+1.

3. Find the area of the region bounded between parabola y= x2 and line y=x.

4. Find the area of the region bounded by the parabola y= 4x-x2 and the line y=x.

5.Find the area of the region bounded by the parabola y= x2 and the line 3x-y+4=0

B) CURVE SYMMETRICAL ABOUT X AXIS (EQN OF CURVE CONTAINS Y2)

1. Find the area of the region bounded by the parabola curve y2 =x and line y=x-2.

2. Find the area of the region bounded by the parabola curve y2 =2x and line x-y=4.

3. Find the area of the region bounded by the parabola curve y2=4x and line x+y=3.

C) PROBLEMS ON CIRCLE AND ELLIPSE

1) Find the area of circle having equation $x^2 + y^2 = a^2$ Using Integration.

2) Find the area of circle having equation $x^2 + y^2 = 25$ Using Integration.

3) Find the area of circle having equation $x^2 + y^2 = r^2$ Using Integration.

4) Find the area of Ellipse having equation $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ Using Integration.

5) Find the area of Ellipse having equation $\dfrac{x^2}{36} + \dfrac{y^2}{16} = 1$ Using Integration.

6) Find the area of Ellipse having equation $4x^2 + 9y^2 = 36$ Using Integration.

7) Find the area of Ellipse having equation $25x^2 + 16y^2 = 400$ Using Integration.

TYPE 5 : Maxima and Minima of a function

1.Find the maximum and minimum values of $x^3 - 3x + 4$

2.Find the maximum and minimum values of $x^3 - 9x^2 + 24x$

3.Find the maximum and minimum values of $x^3 + 6x^2 - 15x + 5$

4.Find the maximum and minimum values of $x^3 - 18x^2 + 96x$

5.Find the stationary values of $x^3 - 7x^2 + 11x + 5$.

6.Discuss the maximan and minima of $2x^3 - 9x^2 + 12x + 5$

7.Discuss the Maximum and minimum values of the function $x^3 - x^2 - 5x + 13$

APPLICATIONS OF MAXIMA AND MINIMA

1) Divide 80 into two parts such that their product is maximum.

2) A metal wire 36 cm long is bent to form a rectangle.
Find its dimensions when its area is maximum.

3) A 100 m fence is to be applied to three sides of a rectangle,
find the dimensions of the rectangle so that the area will be maximum.

4) A manufacturer can sell x items at a price of Rs (330-x). The cost of producing x items is Rs.....................................
Determine the number of items to be sold so that the profit is maximum.

TYPE 6 : Integration with std substitution	TYPE 8 : Integration by Parts

TYPE 6 : Integration with std substitution

{Problem containing
$sinx, cos\ x$ or both in the denominator,
Numerator is always dx}

1) $\int \dfrac{dx}{5-4\cos x}$ 2) $\int \dfrac{dx}{1+3\cos x}$

3) $\int \dfrac{dx}{5+4\cos x}$ 4) $\int \dfrac{dx}{1+\sin x+\cos x}$

5) $\int\limits_{0}^{\pi/2} \dfrac{dx}{4+5\cos x}$ 6) $\int\limits_{0}^{\pi} \dfrac{dx}{5+4\cos x}$

TYPE 7 : Problems on Properties of definite integral

a) Algebraic function

1. $\int\limits_{1}^{4} \dfrac{\sqrt{5-x}}{\sqrt{x}+\sqrt{5-x}}dx$ 2. $\int\limits_{0}^{4} \dfrac{\sqrt{5+x}}{\sqrt{5+x}+\sqrt{9-x}}dx$ 3.

$\int\limits_{0}^{9} \dfrac{\sqrt{x}}{\sqrt{x}+\sqrt{9-x}}dx$ 4. $\int\limits_{0}^{5} \dfrac{\sqrt[4]{x+4}}{\sqrt[4]{x+4}+\sqrt[4]{9-x}}dx$ 5.

$\int\limits_{4}^{5} \dfrac{\sqrt[3]{5-x}}{\sqrt[3]{x-4}+\sqrt[3]{5-x}}dx$ 6. $\int\limits_{2}^{5} \dfrac{\sqrt{7-x}}{\sqrt{x}+\sqrt{7-x}}dx$

b) Trigonometric function

1. $\int\limits_{0}^{\pi/2} \dfrac{\sqrt{sinx}}{\sqrt{sinx}+\sqrt{cosx}}dx$ 2. $\int\limits_{0}^{\pi/2} \dfrac{\sqrt{\cos^3 x}}{\sqrt{\cos^3 x}+\sqrt{\sin^3 x}}dx$ 3.

$\int\limits_{\pi/6}^{\pi/3} \dfrac{\sqrt[3]{sinx}}{\sqrt[3]{sinx}+\sqrt[3]{cosx}}dx$ 4. $\int\limits_{0}^{\pi/2} \dfrac{dx}{1+\sqrt{tanx}}dx$ 5.

$\int\limits_{\pi/6}^{\pi/3} \dfrac{1}{1+\sqrt{cotx}}dx$ 6. $\int\limits_{\pi/6}^{\pi/3} \dfrac{\sqrt[3]{sinx}}{\sqrt[3]{sinx}+\sqrt[3]{cosx}}dx$

TYPE 8 : Integration by Parts

2 marks

1) $\int sinx.x\ dx$ 2) $\int x.sec^2 x\ dx$

3) $\int x.log\ x\ dx$ 4) $\int x.e^x\ dx$

5) $\int 2^x.x\ dx$ 6) $\int x.cos\ x\ dx$

7) $\int log\ x\ dx$ 8) $\int tan^{-1}x\ dx$

9) $\int cot^{-1}x\ dx$ 10) $\int x^{2.}e^x\ dx$

11) $\int x^{2017}logx\ dx$ 12) $\int\limits_{1}^{e} logx\ dx$

4 Marks

1. $\int x^2.logx\ dx$
2. $\int x^2.e^x\ dx$
3. $\int x^2.sinx\ dx$
4. $\int x^2.cosxx\ dx$
5. $\int x^2.cos2xdx$
6. $\int x^2.sin3x\ dx$
7. $\int x.tan^{-1}x\ dx$
8. $\int x^2.sec^{-1}x\ dx$

By parts with substitution

9. $\int sin(logx)\ dx$
10. $\int sinx.log(cosx)\ dx$
11. $\int \dfrac{x.sin^{-1}x}{\sqrt{1-x^2}}dx$
12. $\int \dfrac{log(logx)}{x}dx$

TYPE 9 : Problems on Formulas of Probability	TYPE 10 : Problems on Binomial distribution
PROBLEMS ON FORMULA'S 1) P(AB) = P(A) . P(B/A) (2) P(AB) = P(B) . P(A/B) (3)P(AB)=P(A)+P(B)-P(AB) (4) P(A'B')=1-P(A U B)	**2 MARKS PROBLEM IN QUESTION 1**
	1) An unbiased coin is tossed 20 times. Find the probability of getting at least one head.
1) If P(A) = ⅔ , P(B')= ¾ and P(A/B) =⅘ find P(A ∩ B) and P(B/A)	2) An unbiased coin is tossed 5 times. Find the probability of getting(exactly) 3 heads.
2) If P(A) = ½ , P(B)= ⅔ and P(A/B) =⅘ find P(A ∩ B) and P(B/A)	*3)An unbiased coin is tossed 6 times. Find the probability of getting 2 heads.(exactly 2 heads)*
3) If A and B are two events such that P(A)=0.8, P(B) = 0.6 and P(A ∩ B)=0.5 Find 1. P(A/B) 2. P(B/A) 3. P (A U B)	
4) If P(A) = 1/2,, P(B') = 2/3, P(A ∪ B) =2/3 . Find P(A'∩ B') and P(A /B) .	4) A cubic die is thrown 8 times find the probability that an ace {ONE} will be shown exactly two times.
5) if P(A)=0.46, P(B')=0.66 , P(A U B) =0.51, Find P(A ∩ B), P(B/A) ,P(A/B) ,P(A'∩ B')	*5)A cubic die is thrown 4 times. What is the probability of obtaining at least one six. (at least once score is six)*
PROBLEMS ON COMPLEX PROBABILITY	6)A cubic die is thrown 4 times, find the probability of getting all odd numbers.
1) A problem is given to The three Students Sumit, Amit and Akbar whose chances of solving the problem are ½, ⅓, and ¼ respectively. If they attempt to solve a problem independently, find the probability that a) The problem is solved by each of them b) The problem is not solved by any of them c) the problem is solved by at least one of them.	
	4 MARKS PROBLEM IN Q 5 OR 6
	1) If 20% of the bolts produced by a a machine are defective, determine the probability that out of 4 Bolts drawn 1) Exactly one is defective 2) At most two are defective 3) At least one is defective.
2) The probability that A can shoot the target is 5/7 and the probability that B can shoot at the same target is ⅗. A and B shot independently. Find the probability that a) the target is shot by each of them b) The target is not shot at all c) the target is shot (by at least one of them).	*2) If 10% bolts produced by a machine are defective, calculate the probability that out of a sample selected at random of 10 bolts, not more than one bolt will be defective. (ans :0.6513)*
3) A husband and wife appeared in an interview for the two vacancies in an office. The probability of husbands selsection is 1/7 and that of wife's selection is ⅕ . find the probability that a) Both of them are selected b) only one of them is selected. c) None of them is selected d) At least one of them is selected..	3) In a sampling of a large number of parts produced by a machine, the mean number of defectives in a sample of 20 is 2. Out of such 500 samples how many samples would you expect to contain at least two defective? (ans: 304 samples)
	4) 25 % of electric bulbs produced by a certain factory are known to be defective. if 6 bulbs are selected at random from the products of the factory, what is the probability that it contains1) No defective2) Exactly one defective and 3) At least one defective...
4)The probability of A winning prize is ⅙ and B winning 1s ⅛. what is the probability that 1) Neither shourld win 2) At least one should win.	5)An unbiased coin is tossed 6 times. find the probability of getting 1) 2 heads 2) At least 4 heads.

6) A person fires 10 shots at the target. The probability that any shot will hit the target is ⅗ . find the probability that 1) The target is hit exactly 5 times 2) At least three shots hit the target.	TYPE 11 : Problems on Poissons distribution
	2 MARKS PROBLEMS
	1)For a Poisson's distribution p(3)=P(2) , Find the value of average m and P(4).
7) If the chance that out of 10 telephone lines , one of the line is buysy at any instant is 0.2. Find the probability that 1) 5 lines will be busy 2) All 10 lines are busy..	2) If a random variable has a Poisson distribution such that p(2)=p(3) Find p(5).
	4 MARKS PROBLEMS
8) The overall percentage of failures in a certain examination is 30. What is the probability that out of a group of five candidates, at least three pass the examination ? (ans : 0.83692)	1) If 5% of the electric bulbs manufactured by a company are defective, Use poissons distribution to find the probability that in a sample of 100 bulbs a) None is defective and b) Five bulbs are defective. $(6.73 \times 10^{-3}, 0.175)$
	2) A machine produces 10% defective components, if 200 components are choosen from the produce of this machine, Using Poissons distribution find the probability that, 1) 2 defective 2)At least one defect.
	3) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals at least three (more than two) will get a bad reaction.. (ans : 0.3235)
	4) Using the Poissons distribution, find the probability that the ace of spades will be drawn from a pack of well shuffled cards at least once in 104 consecutive trials.. (ans: 0.8646)
	5) Using the poissons distribution find the probability that the king of diamonds will be drawn from a pack of well shuffled cards at least once in 156 consecutive trials. (ans:0.9502)
	6) In a certain factory producing cycle tyres there is a small chance 1 in 500 for any tyre to be defective. the tyres are supplied in lots of 20. Using poissons distribution calculate the approximate number of lots containing no defective, one defective and two defectiv tyres respectively in a consignment of 20000 tyres.. (Ans :19216,768,16)
	7)In a certain factory turning out blades, there is a small chance of 1/500 for any blade to be efective. the blades are supplied in packets of 10. Use poisson's distrbution to calculate the approximate number of packets containing no defective, one defective and two

defective blades in a consignment of 10000 packets.   (Ans :9802,196,2)

8) Fit a Poissons distribution to set of observations

x	0	1	2	3	4
f	122	60	15	2	1

9) Fit a Poisson's distribution to set of observations

x	20	30	40	50	60	70
f	8	12	20	10	6	4

TYPE 12 : Problems on Normal Distribution

1) A sample of 100 dry battery cells is tested to find the length of life produced the following results

*   Mean = 12 Hours   , Standard deviation = 3 Hours*

*   Assuming that the data are normally distributed, what percentage of battery cells are expected to have life a) More than 15 Hours b) less than 6 hours c) Between 10 Hours and 14 Hours*

given SNV area between z= 0 to z= 1 =0.3413,
*   between 0 to 0.67   = 0.2487*
*   between 0 to 2   = 0.4772 ,*
*   between 0 to 2.5   =0.4938.*

(Ans: 0.1587,0.0228,0.4974)

2) A factory Manufactured 2000 electric bulbs with average life of 2040 hours and standard deviation of 60 hours..Assuming normal distribution find the number of bulbs having life
1) More than 2150 hous
2) less than 1960 Hours
{area under normal curve
from z=0 to z=1.83   is 0.4667
**   z=0 to z= 1.33   is 0.4082 }**

3)The life time of certain type of battery has mean life of 400 hours and standard deviation of 50 Hours. Assuming the distribution of life time to be normal find
1) Percentage of batteries which have lfe time of more than 350 hours
2) the percentage of which have life between 300 to 500 hours
{area under normal curve
* from z=0 to z=1   is   0.3413*
*   z=0 to z= 2   is 0.4742 }*

4)The sizes of 10000 items normally distributed with mean 20 cms and standard deviation 4 cms. find the probability that an item selected at random will have size between
1) 18 cms to 23 cms
2) above 26 cms
{area under normal curve
** from A(0.5)   is   0.1915**
**   A(0.75) is 0.2734**
**   A(1.5)   is 0.4332 }**
{ans : 0.4649, 0.0668 }

TYPE 13: To find radius of curvature	TYPE 14 :Problem on simple probability
2 MARKS PROBLEMS	1) Three fair coins are tossed simultaneously. Find the probability of getting at least two heads.
1) *Find the radius of curvature of the curve* $y = x^3 + 3x^2 + 2$ *at* $(1,2)$	
2) *Find the radius of curvature of curve* $y = 2x^3$ *at* $(2,8)$	2) *Two coins are tossed, find the probability of getting at least one head.*
3) *Find the radius of curvature of curve* $y = x^2$ *at* $x = 1/2$	3)Two unbiased dice are thrown, find the probability that sum of scores will be, a) greater than 9, b) sum is prime number c) sum is even number.
4)*Find the radius of curvature of the curve* $y = log(sinx)$ *at* $x = \pi/2$.	
5) *Find the radius of curvature of the curve* $y^2 = 4x$ *at* $(2, 2\sqrt{2})$	4)*In a single throw of two dice find the probability that P(sum greater than 8)*
6) *Find the radius of curvature of the curve* $y = 2x^3 - x + 3$ *at* $x = 1$	5)From tickets marked 1 to 20. One ticket is drawn at random, find the probability that number on ticket is multiple of 3 or 5.
7) *Find the radius of curvature of the curve* $y = x^3$ *at* $(2,8)$	
8) *Find the radius of curvature of* $y = e^x$ *at* (0,1).	6)*From a pack of 52 cards one card is drawn at random, find the probability of getting king.*
4 MARKS PROBLEMS	7)One card is drawn from 52 well shuffled cards, find the probability that it will be a face card.
1. *Show that the radius of curvature of curve* $x^2 + y^2 = r^2$ *is constant at any point.*	
2) *Find the radius of curvature of the curve* $y^2 = 4ax$ *at* $(a, 2a)$	8)*An urn contains 10 black and 10 white balls. Find the probability of drawing two balls of same colour..*
3) *A telegraph wire hangs in the form of a curve* $y = a.log(sec(x/a))$ *where a is constant. Show that the curvature at any point is* $\frac{1}{a}cos(\frac{x}{a})$	10)An urn contains 6 white, 4 red and 9 black balls. If 3 balls are drawn at random, find the probability that none is red ball.
4) *Find the radius of curvature of the curve* $16x^2 - 25y^2 = 400$ *at point* $(5,0)$	11)*From a class of 12 students,5 boys and rest are girls. Find the probability that a student selected is a girl.*
5) *Find the radius of curvature for the curve* $y=2sinx-sin2x$ *at* $x = \pi/2$.	12)Find the probability that if a card is drawn from an ordinary pack is diamond.
	13)*Two fair dice are thrown simultaneously, find the probability that the sum of scores is 12.*
	14) One card is drawn from a pack of 52 cards, find the probability that it is a face card.
	15) *Two cards are drawn at random from a well shuffled pack of 52 cards. Find the probability that tht two cards drawn are a king and a queen of same UNIT(suit).*

TYPE 15 :To find order and degree of Differential equation	TYPE 17:Addition and Multiplication theorem of probability
Find order & degree of following D.E	
1] $x^2 \cdot \dfrac{d^2y}{dx^2} + x \cdot [\dfrac{dy}{dx}]^3 = my$	**Problems on addition rule of probability (Evernt A "OR" Event B type Problems)**
2] $\dfrac{d^2y}{dx^2} = \sqrt{y + (\dfrac{dy}{dx})^2}$	**1) One card is drawn from 52 Well Shuffled cards. Find the probability that**
3] $y = x \cdot \dfrac{dy}{dx} + \dfrac{2}{dy/dx}$	**i) The card is king or Ace ii) The card is club or spade..**
4] $y \cdot \dfrac{d^2y}{dx^2} + x \cdot \dfrac{dy}{dx} = 0$	**2) Two cards are drawn at random, find the probability that both cards are club or both cards are diamond cards..**
5] $(\dfrac{d^2y}{dx^2})^3 + 3x \cdot (\dfrac{dy}{dx})^4 = 0$	**3) Two cards are drawn at random find the probability that**
6] $\sqrt[3]{\dfrac{d^2y}{dx^2}} = \dfrac{dy}{dx}$	**1) Both cards are face cards or both are ace**
	2) Both cards are king or both are ace.
7] $2 \cdot \dfrac{d^2y}{dx^2} + (\dfrac{dy}{dx})^3 = 0$	**4) An urn contains 10 Black and 8 white balls, find the probability that two balls drawn are of same colour.**
8] $[1 + (\dfrac{dy}{dx})^2]^{3/2} = k \cdot \dfrac{d^2y}{dx^2}$	
9] $[k + (\dfrac{dy}{dx})^2]^{3/2} = \dfrac{d^3y}{dx^3}$	**5) In a college hostel there are 75 students out of which 15 students like to drink tea, 40 students like to drink coffee and 20 students like neither tea nor coffee. Find the probability that two students came to canteen will order same drink.**
10) $\dfrac{d^3y}{dx^3} = [k + (\dfrac{dy}{dx})^2]^{3/2}$	
11) $\sqrt[3]{\dfrac{d^2 y}{dx^2}} = \sqrt[4]{\dfrac{d^3 y}{dx^3}}$	**6) A box contains 10 red and 7 white balls .Find the probability that two balls drawn are of same colour.**
TYPE 16:Verify the solution of differential equation	**Problems involving negative probability and the term "AT LEAST".**
1] **Verify that** $y = \log x$ **is solution of** $x \cdot \dfrac{d^2 y}{dx^2} + \dfrac{dy}{dx} = 0$	**7) An urn contains 10 red and 5 white balls. Two balls are drawn at random find the probability that they are not of the same colour.**
2] **Verify that** $y = \cos x$ **is solution of** $\dfrac{d^2 y}{dx^2} + y = 0$	
3] **Show that** $y = ae^x + b \cdot e^{-x}$ **is solution of** $\dfrac{d^2 y}{dx^2} - y = 0$	**8) An urn contains 6 white ,4 red and 9 black balls,3 balls are drawn at random find the probability that at least one of them is white.**
4] **Show that** $y = \sin(\log x)$ **is a solution of** $x^2 \dfrac{d^2 y}{dx^2} + x \cdot \dfrac{dy}{dx} + y = 0$	**9) An urn contains 5 white, 8 red &6 black balls,3 balls are drawn at random find the probability that at least one of them will be black.**
5] **Show that** $y = e^x - e^{-x}$ $y = e^x - e^{-x}$ **is solution of** $\dfrac{d^2 y}{dx^2} - y = 0$	**10) Five men in a company out of 20 are graduates if 3 of them are picked up find**

probability that at least one of them is graduate.

11)A box contains 10 radio valves out of which 4 are defective. find the probability that out of two valves chosen at least one will be defective.

IMP 12) A room has three electric lamps . From a collection of 15 bulbs out of which 10 are good ,3 bulbs are selected and put in the lamps find the probability that room will be lighted. (by at least one of bulb)

Problems on Multiplication rule of probability { Event A "And" Event B type Problems}

1) Two cards are drawn in succession from a pack of 52 cards find the probability that one is king and other is queen if,
i. First card is replace back .
ii. First card is not replace back.

2) Find the probability drawing 2 white balls in succession from a bag containing 5 red and 7 white balls if,
i) First ball is not replaced.
ii) First ball is replaced back.

3) A box contain 4 defective (bad) & 6 good items two items are drawn one by one with replacing if find the probability that both items are good.

4) From a pack of 52 cards two cards are drawn in succession find the probability that both cards are Ace if .
i. Ist cards is not replaced back.
ii. Ist cards is replaced back.

5) From a pack of cards two cards are drawn in succession. Find the probability that Ist card is face card. And 2nd card is Ace