

	<u>QUESTION : CONTINUOUS PROBABILITY DISTRIBUTION</u>
1.	If X is Normal Distribution with mean 70 and standard deviation 5. Find (i) $P(X < 68)$ (ii) $P(X > 75)$ (iii) $P(60 < X < 75)$. Find value of k_1 such that $P(X < k_1) = 0.8$. Also find k_2 such that $P(X > k_2) = 0.6$
2.	If X is Normal Distribution with mean 42 and standard deviation 24. Find i) $P(X > 50)$ (ii) $P(X < 12)$ (iii) $P(30 < X < 54)$. Find value of k_1 such that $P(X < k_1) = 0.9$ Also find k_2 such that $P(X > k_2) = 0.6$
3.	If X is Normal Distribution with mean 172 and standard deviation 5. Find (i) $P(X < 170)$ (ii) $P(X > 180)$ (iii) $P(165.5 < X < 180)$. Find value of k_1 such that $P(X < k_1) = 0.8$. Also find k_2 such that $P(X > k_2) = 0.5$
4.	If X is Normal Distribution with mean 480 and standard deviation 160. Find (i) $P(X < 240)$ (ii) $P(X > 600)$ (iii) $P(400 < X < 600)$. Find value of k_1 such that $P(X < k_1) = 0.8$. Also find k_2 such that $P(X > k_2) = 0.6$
5.	If X is Normal Distribution with mean 68 and standard deviation 4. Find (i) $P(X < 62)$ (ii) $P(X > 72)$ (iii) $P(65 < X < 71)$. Find value of k_1 such that $P(X < k_1) = 0.8$. Also find k_2 such that $P(X > k_2) = 0.6$
6.	If X is Normal Distribution with mean 520 and standard deviation 60. Find print (i) $P(X < 340)$ (ii) $P(X > 600)$ (iii) $P(400 < X < 550)$. Find value of k_1 such that $P(X < k_1) = 0.8$. Also find k_2 such that $P(X > k_2) = 0.5$
7.	If X is Normal Distribution with mean 662 and standard deviation 32. Find (i) $P(X < 650)$ (ii) $P(X > 700)$ (iii) $P(490 < X < 680)$. Find value of k_1 such that $P(X < k_1) = 0.8$. Also find k_2 such that $P(X > k_2) = 0.6$
8.	If X is Normal Distribution with mean 65 and standard deviation 5. Find (i) $P(X < 70)$ (ii) $P(X > 75)$ (iii) $P(40 < X < 60)$. Find value of k_1 such that $P(X < k_1) = 0.8$. Also find k_2 such that $P(X > k_2) = 0.6$
9.	Find-i) $P(x - 14 < 1)$, ii) $P(5 \leq x \leq 18)$, iii) $P(x \leq 12)$ If x is a normal variate with mean 10 and standard deviation 4
10	For a normal variate with mean 2.5 and standard deviation 3.5 find the probability that- i) $P(2 \leq x \leq 4.5)$, ii) $P(-1.5 \leq x \leq 5.5)$
11	A manufacturer knows from his experience that the resistance of resistor he produces is normal with $\mu = 100$ ohms & standard deviation $\sigma = 2$ ohms. What percentage of register will have resistance between 98 ohms & 102 ohms?
12	A normal distribution has mean 5 & standard deviation 3, what is the probability that the deviation from the mean of an item taken at random will be negative?
13	The daily sales of a firm are normally distributed with mean Rs 8000 & variance of Rs 10,000, i) what is the probability that on certain day the sales will be less than RS 8210? ii) What is % of days on which the sales will be between Rs 8100 & Rs8200?
14	The mean height of soldiers is 62.22" with variance 10.8". Find the expected number of soldiers in

	a regiment of 1000 whose height will be more than 6 feet.
15	Assuming that the diameters of 1000 brass plugs taken consecutively from a normal distribution with mean 0.7517 cm. & standard deviation 0.0020 cm. How many plugs are likely to be rejected if the approved diameter is 0.752 ± 0.004
16	The marks of 1000 students of a university are found to be normally distributed with mean 70 & standard deviation 5. Estimate the numbers of student whose marks will be i) between 60 & 75, ii) more than 75, iii) less than 68.
17	The life of army shoes is normally distributed with mean 8 months & standard deviation 2 months. If 5000 pairs were issued, how many pairs would be expected to need replacement after 12 months?
18	In an intelligence test administered to 1000 students the average was 42 & standard deviation was 24. Find the numbers of students i) exceeding 50, ii) between 30 & 54, iii) the least score of top 100 students.
19	The height of 1000 soldiers in a regiment are distributed normally with mean 172 cm and standard deviation 5 cm. how many soldiers have height > 180 cm.
20	The income distribution of workers in a certain factory was found to be normal with mean of Rs.500 & standard deviation equal to Rs.50. There were 228 persons above Rs 600. How many persons were there in all?
21	If the actual amount of coffee which a filling machine puts into 6 ounce jars is a random variable having normal distribution with standard deviation 0.05 ounce and if only 3% of the jars are contain less than 6 ounce of coffee what must be the mean fill of these jars?
22	The customer account (A/c) at a certain departmental store have an average balance of Rs.480 and S.D. of Rs.160. Determine i) what proportion of A/c is over 600. ii) What proportion of A/c is between Rs. 400 and Rs. 600 and below 240?
23	In an examination marks obtained by students in Mathematics, Physics and Chemistry are normally distributed with means 51, 53 and 46 with standard deviation 15, 12, 16 respectively. Find the probability of securing total marks (i) 180 or above, (ii) 90 or below.
24	If the height of 500 students is normally distributed with mean 68 inches and standard deviation 4 inches. Find the expected number of students having heights: i) greater than 72 inches, ii) less than 62 inches, iii) between 65 & 71 inches
25	In a distribution exactly normal 7% of items are under 35 & 89% are under 63. What are the mean & standard deviation.
26	The distribution of marks in a certain examination was found to be normal with 23% of the candidates scoring above 60 marks & 21% candidates scoring below 40. Find the mean & standard deviation of the distribution
27	The probability that the marks of a student chosen at random will exceed 50 (out of 100) is 0.25. Find in two different ways, the probability that out of 100 students of this group 25 to 30 will have marks more than 50.
28	The incomes of a group of 10,000 persons were found to be normally distributed with mean Rs.520 and S.D. Rs.60. Find i) the number of persons having incomes between Rs. 400 and Rs.550, ii) the lowest income of the richest 500.
29	The mean yield for one acre plot is 662 Kg with S.D. 32 Kg. Assuming normal distribution how many one acre plots in a batch of 1000 plots would expect to have yield i) over 700 Kg, ii) below 650 Kg, iii) What is lowest yield of the best 100 plots?
30	If X_1 and X_2 are two independent random variates with means 30 and 25 and variances 16 and 12 and if $Y = 3X_1 - 2X_2$, find $P(60 \leq Y \leq 80)$
31	The marks obtained by students in a certain examination follow a normal distribution with a mean 45 and standard deviation 10. If 1000 students appeared at an examination. Calculate the number of students scoring i) less than 40 marks, ii) more than 60 marks
32	The marks obtained by number of students in a certain subject are approximately normally distributed with mean 65 and SD 5. If 3 students are selected at random from this group, what is the probability that at least one of them would have scored above 75%.
33	In a large institution 2.28% of employees receive income below Rs 4500 and 15.87% of employees

	receive income above 7500 p.m. assuming the income follows normal distribution. Find the mean and S.D. of the distribution
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36	Of a large group of men 5% are under 60 inches in height & 40% are between 60 & 65 inches. Assuming a normal distribution, find the mean & standard deviation of the distribution
37	In an examination marks obtained by students in Mathematics, Physics and Chemistry are normally distributed with means 51, 53 and 46 with standard deviation 15, 12, 16 respectively. Find the probability of securing total marks (i) 180 or above, (ii) 90 or below.
38	A geneticist working for a seed company develops a new carrot for growing in heavy clay soil. After measuring 5000 of these carrots it can be said that carrot length X is normally distributed with mean $\mu = 11.5 \text{ cm}$ & $\sigma = 1.15 \text{ cm}$. What is the probability that X will take on a value in the interval $10 \leq x \leq 13$?
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40	Monthly salary in an organization is normally distributed with mean Rs 3000/ and standard deviation of Rs 250/. What should be the minimum salary of a worker in this organization , so that he belongs to top 5% workers.
41	Uniform Distribution
42	If X is Uniform Distribution over the range (20,40). Find (i) $P(X < 33)$ (ii) $P(X < 24.5)$ (iii) $P(32.2 < X < 35.5)$
43	. If X is Uniform Distribution over the range (11,20). Find (i) $P(X < 15.3)$ (ii) $P(X > 13.4)$ (iii) $P(17.2 < X < 19.5)$
44	Suppose that for a certain company , the conference time, X has a uniform distribution over interval (0,5)hrs (1) what is pdf of X (2) . Find the probability that any conference lasts atleast 3hrs (3) Find the probability that any conference lasts for atleast 2hrs ,but does not exceed more than 3.5 hrs
45	X is Uniform Distribution over the range (a,b) such that mean is $15/2$ and variance is $25/12$. (i) Find value of a, b (ii) Find $P(5 < X < 7)$
46	On a route from railway station to college ,every 20 minutes ,ther is a bus .A student arrives at bus stop and waits for a bus. His waiting time till bus arrives is uniform over the interval (0,20) On one fine day what is probability that his waiting time is (i) less than 5 minutes (ii) between 7 minutes to 15 minutes (iii) more than 10 minutes
47	X is Uniform Distribution over the range (a,a+1) , find value of a , such that $P(0.25 < X < a) = 0.25$
48	Two numbers are chosen independently and at random from the interval (0, 1). What is the probability that the two numbers differs by more than $1/3$
49	X is Uniform Distribution with mean 1 and variance $4/3$ Find $P(X < 0)$
50	X is Uniform Distribution over the range (2,b) such that $P(3 < X < 6) = 0.3$,find mean and variance of X

51	A box to be constructed so that its height is 10 inches and its base is X inches by X inches. If X has a uniform distribution over the interval (1, 6), then what is the expected volume of the box in cubic inches?
52	Exponential distribution
53	If X is Exponential Distribution with mean 500. Find (i) $P(X < 220)$ (ii) $P(X > 380)$ (iii) $P(180 < X < 355)$. Find value of k such that $P(X < k) = 0.8$.
54	If X is Exponential Distribution with mean 130. Find (i) $P(X < 120)$ (ii) $P(X > 75.4)$ (iii) $P(105 < X < 135)$. Find value of k such that $P(X < k) = 0.8$.
55	If X is Exponential Distribution with mean 120. Find (i) $P(X < 120)$ (ii) $P(X > 85.4)$ (iii) $P(125 < X < 145)$. Find value of k such that $P(X < k) = 0.8$.
56	The amount of time that a watch will run without having to be reset is a random variable having an exponential distribution with mean 120 days. Find the probability that such a watch will (i) have to be set in less than 24 days (ii) not have to reset in at least 180 days.
57	The mileage which car owners get with a certain kind of radial tire is a random variable having an exponential distribution with mean 40,000km. Find the probability that one of these tires will last (i) atleast 20,000km (ii) atmost 20,000km
58	The time (in hours) required to repair a machine is exponentially distributed with parameter $\lambda = 0.5$. Find the probability that the repair time exceeds 2 Hrs
59	If X is exponentially distributed prove that the probability that X exceeds it's expected value is less than 0.5
60	If X is exponentially distributed prove that $P((x > s + t) / (x > s)) = P(x > t)$ for any $s, t > 0$
61	The daily consumption of milk in excess of 20 klitres in a town is approximately exponentially distributed with parameter $1/3000$. The town has daily stock of 35 kL. Find the probability that of 2 days selected at random the stock is sufficient for both days.
62	Joint Probability
63	Three balls are drawn at random without replacement from a box containing 2 white, 3 red and 4 black balls. If X denotes the number of white balls drawn and Y denotes the number of red balls drawn find joint probability distribution.
64	The joint probability distribution function of (X,Y) is given by $p(x,y) = k(2x+3y)$, $x=0,1,2$ & $y=1,2,3$. Find all the marginal and conditional probability distributions also find the probability distribution of $X+Y$.
65	The joint probability distribution function of (X,Y) is given by $f(x,y) = \frac{x^2}{8} + xy^2$ $0 \leq x \leq 2$, $0 \leq y \leq 1$ Compute $P(X > 1)$, $P(Y < 0.5)$, $P(X > 1 Y < 0.5)$, $P(Y < 0.5 X > 1)$, $P(X < Y)$, $P(X + Y \leq 1)$
66	The joint probability distribution function of (X,Y) is given by $f(x,y) = e^{-(x+y)}$ $0 \leq x$, $0 \leq y$ Compute $P(X > 1)$, $P(Y < 1)$, $P(X < Y X < 2Y)$

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Given $f_{xy}(x, y) = cx(x - y), 0 < x < 2, -x < y < x$ & 0 elsewhere
(1) Evaluate c (2) find $f_x(x)$ (3) find $f_y(y)$ (4) find $f_{y/x}(y/x)$

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The joint probability distribution function of (X,Y) is given by

X	Y					
	1	2	3	4	5	6
0	0	0	1/32	2/32	2/32	3/32
1	1/6	1/6	1/8	1/8	1/8	1/8
2	1/32	1/32	1/64	1/64	0	2/64

$P(X \leq 1), P(Y \leq 3), P(X \leq 1 | Y \leq 3)P(Y \leq 3 | X \leq 1), P(X < Y), P(X + Y \leq 4)$

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The joint probability distribution function of (X,Y) is given by $f(x,y) = kxye^{-(x^2+y^2)}$ $x>0, y>0$
Find value of k & prove that X & Y are independent

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The joint probability distribution function of (X,Y) is given by

X	Y		
	1	2	3
0	3K	6K	9K
1	5K	8K	11K
2	7K	10K	13K

Find value of k , Find all the marginal and conditional probability distributions