Question bank

Complementary course to BCA Programme

Semester1

Basic statistics and introductory probability theory

Part A

(Each question has two marks)

MODULE 1

1. Define Arithmetic mean.
2. Define Average.
3. What is weighted arithmetic mean?
4. What is median?
5. What is mode?
6. When will you say that mode is ill defined?
7. What is the difference between simple arithmetic mean and weighted arithmetic mean?
8. If mean =30, median=32 find mode.
9. If mean =25, mode=30. What is median ?
10. If median =40, mode =45. Find mean?
11. Write the empirical formula of averages.
12. Find mean of the values 10, 12, 30, 28, 53, 47 .
13. Find median of the values 20, 22, 18, 24, 16, 14, 28
14. Mean of five items is found to be 30. Four values are 10, 15, 30, 35 .
    Find the 5^{th} value.
15. Find mode of the series 20, 25, 15, 30, 38, 40
16. What are partition values?
17. What are quartiles?
18. What are deciles?
19. What are percentiles?
20. Find the range for the series 43, 25, 18, 29, 9, 69, 71
21. What is dispersion?

22. What is standard deviation?

23. What is coefficient of variation?

24. If Mean = 100 and SD=15. Find coefficient of variation.

25. Find SD of the data 4, 7, 2, 6, 9, 11, 12

26. Find Mean if SD=10 and coefficient of variation = 25

27. Find SD if Mean =25 and coefficient of variation = 50

28. What do you mean by Quartile Deviation?

29. What is mean deviation?

30. If a sample of size 22 items has a mean of 15 and another sample of size 18 items have a mean of 20, find the mean of the combined sample.

31. What do you mean by combined mean?

32. Calculate range from the following data.

Income	0-10	10-20	20-30	30-40	40-50
Frequency	7	8	15	7	3

33. Find Q.D. for the following values.

10 25 15 20 12 18 30

34. Find Mean deviation about mean.

15 30 53 47 25 40

35. Find standard deviation for the following values.

43 25 18 29 10 9

36. What do you mean by variance?

37. Find Mean for the following data.

x	:	3	5	8	4	7
y	:	6	4	9	8	1

38. Find median.

Wages	:	10	12	15	18	20	25	30
No. of worker	:	3	5	8	12	13	12	7

39. What are functions of an average?

40. What are the uses of a measure of dispersion?

41. Mean of a series is given to be 30.A constant 5 is added to all elements of the series. What is the mean of the new series?

42. The SD of a series is found to be 10. What will be the SD if 8 is added to all elements of the series.

43. What is stem and leaf chart?

44. What is a histogram?

45. What are ogives?

46. What is a frequency curve?

47. What is coefficient of variation? What are its uses?

48. Point out the uses of graphs.

MODULE 2

49. Write down the regression equation of y on x?

50. Define correlation

51. What do you mean by regression line?

52. What do you mean by probable error?

53. What do you mean by regression analysis?

54. Find bxy if 3x+2y+4=0 is the equation of x on y

55. What is the formula for finding correlation?

56. If r=0.89, PE=0.023, find the value of n

57. What do you mean by no correlation?

58. For the two sets of data given below, draw scatter diagrams and comment on the relationship between variables x and y.

SET 1

X	5	8	2	4	10	6	8
Y	6	10	3	4	12	8	8

SET 2

X	12	7	10	8	4	9	2
Y	4	5	4	8	10	5	8

59. What is mean by linear correlation?

60. Explain the utility of regression analysis
61. Define non linear correlation
62. Where will the two regression lines meet?
63. What is a scatter diagram?
64. What does coefficient of correlation intend to measure?
65. What do you mean by standard error of estimate?
66. What is bivariate distribution?
67. Why there be two regression lies in case of simple regression?
68. Find byx if 2x+4y-5=0 is the equation of y on x
69. Coefficient of correlation between two variable is calculated to be -0.98.find the value of PE (n=10)
70. What is mean by simple correlation?
71. What would be your interpretation if the correlation coefficient is equal to 0.2,0.9 and 0.52
72. Calculate Karl Pearson's correlation coefficient between x and y $\sum x=35$, $\sum x^2=203$, $\sum y=28$, $\sum y^2=140$, $\sum xy=168$
73. What are regression coefficients?
74. Differentiate correlation and regression.
75. What are the uses of correlation?
76. What is mean by line of best fit?
77. What are the properties of regression lines?
78. Explain the term coefficient of correlation.
79. Find the limits within which population correlation coefficient may lie if r=-0.98 and n=10
80. What do you mean by curvilinear correlation?
81. What are regression coefficients?
82. What is mean by limited degree of correlation?
83. How do you measure correlation?
84. What are normal equations?
85. What are the properties of regression coefficients?
86. Find the regression equation of x on y.

87. Distinguish between negative and positive correlation.

88. What is curve fitting?

89. What do you mean if correlation coefficient is 0.8?

90. If r=0.6 and n=64 , find Probable error .

91. Explain various methods of studying correlation.

92. What would be your interpretation if the correlation is zero?

93. What would be your interpretation if the correlation is 1 and -1.

94. What is mean by perfect correlation?

95. Why are regression lines?

96. What is the formula for finding Karl Pearson's correlation coefficient?

MODULE 3

97. Define random experiment with an example.

98. What is sample space? Write the sample space when two coins are tossed.

99. Explain discrete and continuous sample space .

100. Explain the term sample point with example.

101. What are mutually exclusive and exhaustive events?

102. Explain independent and dependent events.

103. Define equally likely events with example.

104. Distinguish between simple and compound event.

105. Distinguish between sure event and impossible event.

106. Three fair coins are tossed at a time. Enumerate the elements of the sample space.

107. Write down the sample space of throwing two coins and a die.

108. A box contains two white and three black balls. Two balls are drawn 1) without replacement 2) with replacement. Write down the sample space in each case.

109. What is classical definition of probability?

110. What are the properties of probability?

111. What do you mean by statistical regularity?

112. What is frequency ratio?

113. What is relative frequency definition of probability?

114. Define axiomatic approach to probability.

115. What are the axioms of probability?

116. State addition theorem on probability for 1) two events 2) three events.
117. State addition theorem for two events and state its conditions.
118. Define statistical independence.
119. When two events are said to be independent.
120. State multiplication theorem on probability for 1) two events 2) three events.
121. Define conditional probability.
122. State Baye's theorem.
123. What are the advantages of classical definition of probability?
124. What are the limitations of classical definition of probability?
125. What are the advantages of frequency definition of probability?
126. What are the limitations of frequency definition of probability?
127. Find the probability of drawing 1) an ace 2) a card of clubs from a well shuffled deck of cards.
128. From a pack of 52 cards one card is drawn at random. Find the probability that it is either a spade or an ace of club.
129. An integer is chosen at random from the first 100 integers. Find the probability that the integer chosen is divisible by 3 or 5.
130. What is the chance that a leap year would contain 53 Sundays?
131. What is the chance that a non-leap year would contain 53 Sundays?
132. If odds in favour of A solving a problem are 2to 3 and odds against B solving the same problem are 3 to 5. Find the probability for (1) A solving the problem (2) B solving the problem.
133. Two unbiased dice are thrown. Find the probability that the sum of the faces is (1) not less than 10 (2) equal to 10.
134. What is the probability of getting 3 white balls in a draw of 3 balls from a box containing 5 white and 4 black balls?
135. Three cards are drawn from a pack of 52 cards. What is the probability that exactly two are aces?
136. Find the probability of getting a total of 7 or 11 in a single throw with two dice.
137. If $P(A) = 1/13$, $P(B) = 1/4$ and $P(A \cup B) = 4/13$. Find $P(A \cap B)$.
138. If $P(A) = 4/5$, $P(B) = 3/5$. Find $P(A \cap B)$ if A and B are independent.

139. If P (A) = 2/5, P (B) = 3/5 and P (A ∩ B) = 1/20. Examine whether A and B are independent.

140. If P (A) = 0.2, P (B) = 0.3 and A and B are independent. Find P (A/B) and P(B/A).

141. If P (A) = 0.3, P (B) = 0.6 and A and B are independent. Find P (A' ∩ B').

142. Probability that a patient is correctly diagnosed is 0.4. If a patient is correctly diagnosed will survive is 0.8. What is the probability that a patient is correctly diagnosed and survived?

143. A bag contains 80 good and 20 bad oranges. Two oranges are chosen at random without replacement. What is the probability that both are defective?

144. The probability that a boy will get scholarship is 0.9 and a girl will get is 0.8. What is the probability that at least one of them will get the scholarship?

MODULE 4

145. Define Random variable

146. Define probability mass function

147. Define distribution function

148. What are discrete random variables?

149. What are continuous random variables?

150. What are the properties of probability mass functions?

151. What are the properties of probability density functions?

152. What are the properties of distribution functions?

153. Define mathematical expectation

154. Define mean of a random variable

155. Define variance of a random variable

156. Define moment generating function of a random variable

157. What are the properties of expectation?

158. What are the properties of variance?

159. What is cumulative probability function?

160. Can the following function be probability mass functions?

 f (x)= -1/2,1/2,1/2 according as x=2,3 and 4 and zero elsewhere.

161. Can the following function be probability mass functions?

 f (x)= 1/4,1/3, according as x= -1 and 1and zero elsewhere

162. Can the following function be probability mass functions?

$f(x) = 1/3, 1/3, 1/3$ according as $x=-1$,0and 5and zero elsewhere

163. Can the following function be probability mass functions?

$f(x) = -1/5, 4/5$, according as $x=-1$ and 1and zero elsewhere

164. Can a random variable X .have the following probability density

$f(x) = x$, $0<x<1$ and 0 elsewhere

165. The function defined as $f(x) = |x|$, $-1<x<1$ and 0 elsewhere

is a possible probability density function?

166. If $f(x) = X/15$: $x=1,2,3,4,5$ and 0 elsewhere . Find $P(X=1 \text{ or } 2)$

167. A random variable X has the values 0 and 1 with probabilities 1/4 and 3/4 each. Find its mean

168. Find k if $f(x) = k\,x\,e^{-x}$ $0<x<\infty$.and is zero elsewhere is a pdf.

169. If $V(x)=2$ find $V(2x+5)$

170. If X is a random variable having density function

$f(x) = (x+1)/2;\quad 0\leq x\leq 1$. Find E(X).

171. Find the mean of a random variable having pdf $f(x) = 3x^2$; $0\leq x\leq 1$.

172. A random variable X has the values 1and 2 with probabilities 1/3 and 2/3 respectively. Find its mean

173. Write down the probability distribution associated with the random experiment of throwing an unbiased die.

174. If $U=ax+b$ find the expectation of U where a and b are constants.

175. If $E(X)=3.5$, find $E(2x+7)$

176. If X and Y are two independent variates and $V(X)=2$ and $V(Y)=3$,find $V(2X+3Y)$

177. Evaluate k if $f(x)=k$, $x=1,2,3,4,5,6$and otherwise 0 is a probability mass function

178. Find E(X) for $P(1)=1/4, P(2)=1/2$and $P(3)=1/4$

179. Find the variance of $aX+b$ if $V(X) = 8$.

180. Show that $f(x) = e^{-x}$ for $X>0$ is a probability density function.

181. If X is a random variable such that $f(x) = 2x$ for $0<X<1$ and $f(x)=0$ other wise. Find E(X)

182. If $f(x) = 2x$ for $0<X<1$ and $f(x) = 0$ otherwise. Find its distribution function.

183. Find the mean of $f(x) = 2(1-x)$ $0\leq x\leq 1$.

184. Examine whether $f(x) = 2(1-x)$ $0\leq x\leq 1$.is a density function.

185. Find the expectation of X if $f(x)=30x^4$ $0 \le x \le 1$.

186. Find the mgf of $f(x)=\theta\, e^{-\theta x}$ $x \ge o$ and zero otherwise

187. Find the mean of X with pdf of $f(x)=x/5$ for $0<x<2$

188. Find the value of k if $f(x)=kx$ for $0<x<1$

189. Let X be a random variable having density function

$$f(x)=1/4 \quad -2 \le x \le 2$$
$$= 0 \text{ otherwise,} \quad \text{Find } E(X)$$

190. Let X be a random variable having density function

$$f(x) = e^{-x} \quad 0<x<\infty.$$
$$= 0 \text{ otherwise,} \quad \text{Find } E(X)$$

191. A random variable X has $E(X) = 2$, $E(X^2) = 8$ Find $V(x)$.

192. Find the mgf of the random variable

X	1/2	-1/2
P(x)	1/2	1/2

Part B

(Each question has five marks)

MODULE 1

193. What are the desirable properties of a good average?

194. Which average is considered to be the best. Why?

195. Find arithmetic mean of the following data.

Size	:	75	100	120	150	200
Frequency	:	5	12	20	14	9

196. Calculate arithmetic mean for the following data:

Marks (less than)	:	10	20	30	40	50	60
No. of students	:	18	35	62	81	95	100

197. Find arithmetic mean of the following frequency distribution:

Class	:	0-10	10-20	20-40	40-60	60-90
f	:	12	17	22	18	11

198. Find average marks obtained by students of three batches taken together.

Batch	Average marks	No. of students
A	75	50
B	60	60
C	55	50

199. Find Mean & Median of the following.

Wages	:	10	12	15	18	20	25	30
No. of workers	:	3	5	8	12	13	12	7

200. Find Median

Class	:	0-2	2-4	4-6	6-8	8-10	10-12
f	:	2	4	6	4	2	6

201. Find Median and Mode

x	:	2	4	6	8	10
f	:	5	7	9	8	11

202. Distinguish between simple and weighted A.M. What are the advantages of taking weight?

203. How will you locate mode graphically?

204. How will you calculate mode for a grouped frequency distribution ?Explain

205. Calculate arithmetic mean for the following data

Marks	:	0-10	10-20	20-30	30-40	40-50
f	:	5	7	15	25	8

206. Calculate median

Class	:	0-10	10-20	20-30	30-40	40-50
f	:	8	12	20	6	4

207. How will you construct median in a) raw data b) ungrouped data c) grouped data.

208. Find median, quartiles, 8^{th} decile of the following series
120, 130, 140, 110, 160, 150, 190, 180, 170, 200

209. Find quartiles and 70^{th} percentile

x	:	5	15	25	35	45	55	65
f	:	8	12	10	8	3	2	7

210. Find SD and variance.

x	:	10-15	15-20	20-25	25-30	30-35
f	:	5	20	47	38	10

211. Find Mean deviation about mean.

11, 3, 0, 7, 2, 6, 4, 7

212. Find the Mean deviation about median.

x	:	3	5	8	4	7	10
f	:	6	4	3	2	8	2

213. How will you find quartile deviation in a grouped data.

214. Find quartile deviation for the following data.

x	:	10	15	20	25	30
f	:	3	12	18	12	3

215. Find Mean deviation about median.

Marks	:	0-10	10-20	20-30	30-40	40-50	50-60	60-70
f	:	6	5	8	15	7	6	3

216. What are the desirable properties of a good measure of dispersion.

217. Which measure of dispersion is considered to be best? Why?

218. The following are marks of 20 students. Construct a stem and leaf chart.

65	35	50	40	38	34	40	80	42	52
84	48	84	40	80	90	25	28	30	95

219. Complete stem and leaf char of the following data.

110	120	100	120	150	160	170	190	210	240
260	230	290	280	290					

220. What is a box plot?

221. Given Arithmetic Mean & Standard Deviation of two series. Find combined mean & combined SD

No. of items	:	20	30
Arithmetic Mean	:	36	85
Standard Deviation	:	11	8

222. Draw histogram of the following data.

Class	:	30-40	40-50	50-60	60-70	70-80
f	:	3	5	12	8	4

223. How do you draw a histogram for a frequency distribution with unequal class intervals.

224. Draw a frequency polygon.

Class	:	0-10	10-20	20-30	30-40	40-50
f	:	10	40	80	60	50

225. What are ogives. How can you draw it. What are the uses of ogives.

226. How can you find median of a frequency distribution using ogives.

227. Draw a less than cumulative frequency curve.

Marks	:	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
f	:	10	32	45	87	117	148	127	90

228. Draw a frequency curve for the following:

Class	:	30-40	40-50	50-60	60-70	70-80
f	:	3	5	12	8	4

MODULE 2

229. Find regression line of y on x for the given set of data

x	8	4	12	6	10
y	7	9	3	6	5

230. Find the correlation coefficient for the given set of values

X	3	1	4	7	8	9	2	6	5
Y	4	2	3	6	5	8	1	7	9

231. What is a scatter diagram? From the scatter diagram how do you infer the nature of relationship between the variables.

232. What notes on Karl Pearson's coefficient of correlation

233. How to identify the two regression equations. Explain

234. What are the limitations of regression analysis ? Explain

235. Explain merits and demerits of correlation coefficient.

236. Sum of the product of the derivations of the variable x and y from their respective means is 1320, sum of the squares of deviations of x and y variables from their respective means are 628 and 3720.find the coefficient of correlation.

237. Find Karl Pearson co-efficient of correlation and P.E.

X	46	68	72	75	80	70	93	100
Y	64	50	39	48	52	46	40	30

238. Calculate the Karl Pearson's coefficient of correlation from the following data

X	43	44	46	40	44	42	45	42	38	40	42	57
Y	29	31	19	18	27	27	29	41	30	26	18	19

239. Calculate correlation coefficient.

X	1	6	3	9	5	2	7	10	8	4
Y	6	8	3	2	7	10	5	9	4	1

240. What are Simple ,multiple and partial correlation

241. Distinguish between correlation and regression

242. Describe a method for studying Correlation .

243. Find the regression equation of y on x

X :	2	4	6	8	10

Y :	5	7	9	8	11

244. What are the usefulness of the study of regression
245. In a correlation analysis, the values of the Karl Pearson's coefficient of a correlation and its probable error were found to be 0.90 and 0.04 respectively. Find the value of "n".
246. Establish correlation between the following pair of series and find out the probable error. Also interpret.

X	19	20	22	24	27	29	30	33	35
Y	85	80	78	75	72	70	65	62	60

247. Calculate Karl Pearson's coefficient of correlation.

Price:	11	12	13	14	15	16	17	18	19	20
Demand:	30	29	29	25	24	24	24	21	18	15

Also comment on the result obtained.

248. Explain the principle of least square's.
249. What are the uses of correlation in business?
250. Explain different kinds of correlation with example.
251. What are the properties of regression coefficients?
252. From the following data, find the regression equation of y on x.

x:	2	3	4	5	6
y:	3	5	4	8	9

253. How to get Mean of X and Y from the regression equation? Explain with example.
254. If r=0.917 and P.E=0.34, find n.
255. Find out the coefficient of correlation between price and sales from the following data. Also find P.E.

Price	100	90	85	92	90	84	88	90	93	95

Sales	600	610	700	630	670	800	800	750	700	680

256. The data given below is the price and demand for a particular commodity over a period of five years. Compute the correlation coefficient between price and demand.

price	7	8	9	6	5
Demand	8	6	7	9	10

257. Find correlation coefficient between X and Y from the table

X :	2	4	6	8	10
Y :	5	7	9	8	11

258. Explain how will you fit a straight line of the form Y=a+bX
259. Explain the method of drawing regression lines.
260. Explain how will you fit a straight line?
261. From the data given below fit a straight line of the form Y=a+bx.

x	2	3	7	8	10
y	10	9	11	8	12

262. Comment on the following results.

For a bivariate distribution,

Coefficient of regression of y on x is 4.2 and coefficient of regression of x on y is 0.50 bxy=-.82 and bxy=.25

263. Explain how will you fit an exponential curve?
264. Find Karl Pearson's co-efficient of correlation between the values of x and y given below.

x	78	89	96	69	59	79	68	61
y	125	137	156	112	107	136	123	108

MODULE 3

265. Define (1) Random experiment (2) Sample point (3) Sample space (4) Event

266. Explain with suitable example (1) mutually exclusive (2) independent (3) exhaustive and (4) equally likely events.

267. Explain (1) sure event (2) impossible event and (3) uncertain events with one example each

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268. What is sample space? Write down the sample space when a coin is tossed until head appears

269. Explain (1) statistical regularity (2) frequency approach to probability and state two limitations of this approach

270. State and prove addition theorem for two events.

271. State addition theorem for two events and deduce it for three events.

272. State and prove multiplication for two events and deduce it for three events.

273. Define axiomatic approach to probability and state two of its limitations.

274. Explain the meaning of pair wise and mutual independence of three events.

275. If A and B are independent then show that (1) A and B' are independent (2) A' and B are independent (3) A' and B' are independent

276. Explain classical definition of probability and state their defects.

277. State Baye's theorem and state its importance.

278. State (i) Total probability law (ii) Baye's theorem

279. If $P(A) = 0.3$ $P(B) = 0.2$, $P(A \cap B) = 0.1$ find the probabilities of

1. At least one of the events occurs.
2. Exactly one of the events occurs.
3. None of the events occur.

280. (a)State addition theory of probability for three events.

b) Suppose A, B, C are events such that $P(A) = P(B) = P(C) = 1/4$ and $P(A \cap B) = P(C \cap B) = 0$ and $P(A \cap C) = 1/8$. Evaluate $P(A \cup B \cup C)$.

281. Given P A) = P (B) = P(C) = 0.4, P (AB) = P (AC) = P(BC) = 0.2 and

P (ABC) = 0.1.

(1) At least one of them.

(2) Exactly one of them

(3) Exactly two of them

282. Probabilities that a husband and wife will be alive 20 years from now is given by 0.8 and 0.9 respectively. Find the probability that in 20 years (1) both will alive (2) neither will alive and (3) at least one will alive.

283. A box contains 3 red and 7 white balls. One ball is drawn at random and in its place a ball of other colour is put it in the box. Now one ball is drawn at random from the box. Find the probability that it is red.

284. An urn 'A' contains 2 white and 4 black balls. Another urn 'B' contains 5 white and 4 black balls. A ball is transferred from the urn 'A' to urn 'B'. Then a ball is drawn from urn B. Find the probability that it will be white.

285. Urn A contains 4 white and 3 red ball and urn B contains 2 white 5 red balls. One of the urn is to be chosen at random and a ball is to be selected from the chosen urn. What is the probability of selecting a white ball.

286. Three persons A, B, and C are simultaneously shooting target. Probability of A hitting a target is ¼ that of B is ½ and that of C is 2/3.

Find the probability of (1) exactly one of them will hit the target (2) at least one of them will hit the target.

287. One bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. If one of the ball is drawn from each bag. Find the probability that (1) both are white (2) both are black (3) one is white and the other is black.

288. The odds in favour of three political candidates A,B, C in an election are respectively 3 to 5, 2 to 7 and 5 to 9. Find the probability that (1) all win (2) none wins (3) at least two of them win in the election. (Assume they contest in different states)

289. A bag contains 5 white and 3 black balls. Another bag contains 4 white and 7 black balls. A ball is randomly drawn from one of the bags and found to be black. What is the probability that it is come from the first bag.

290. Three men working independently attempt to decode a secret message. If their individual probabilities of success are 0.2, 0.4 and 0.5. What is the probability that the message is decoded?

291. A bag contains 6 white and 4 black balls. Two draw of 2 balls are successively made. Find the probability of getting 2 white balls in the first draw and 2 black balls in the second draw where balls drawn at first draw were replaced.

292. A subcommittee of 6 members is to be formed out of a group of 7 men and 4 ladies. Calculate the probability that the sub-committee will consists of (1) two ladies and (2) at least two ladies.

293. Let X and Y be the two possible events of an experiment where,

$$P(X) = 0.5, P(X \cup Y) = 0.9 \text{ and } P(Y) = p$$

(a) For what values of p are X and Y mutually exclusive

(b) For what value of p X and Y are independent.

294. Distinguish between mutually exclusive and independent events.

(ii) A speaks truth in 60% cases and B in 70% cases. In what percentage of cases are they likely to contradict each other in stating the same fact?

295. A problem in statistics is given to students A, B, C whose chances of solving are 1/2 , 1/3, and ¼ respectively. What is the probability that the problem (i) will be solved (ii) will not be solved.

296. A machine part is produced by three factories X, Y, and Z. Their proportional production is 25, 35 and 40 percent respectively. Also, the percentage defectives manufactured by three factories are respectively 5, 4 and 3. A part is taken at random and is found to be defective. Find the probability that the selected part found to be defective belongs to factory Y

297. A and B throw alternatively with a pair of ordinary dice. A wins if he throws 6 before B throws 7, B wins if he throws 7 before A throws 6. What is the probability of A winning the game if A begins the game.

298. The following are the contents of two bags; 2 white and 3 black balls; 3 white and 3 black balls. One bag was chosen at random and one ball was selected at random from it and it was found to be white ball. What is the probability that the ball so drawn come from the first bag?

299. From a group of 8 children 5 boys and 3 girls, 3 children are selected at random. Calculate the probability that the selected group contains (i) no girl (ii) only one girl (iii) one particular girl (iv) at least one girl.

MODULE 4

300. Distinguish between probability mass functions and distribution functions
301. State the properties of probability mass functions and distribution functions
302. Distinguish between discrete and continuous random variables. Give examples
303. Define mathematical expectation of a random variable. What are its properties?
304. Define variance. State its important properties
305. Define moment generating function of a random variable. What are its important properties?

306. Define random variable and Distribution function. What are the properties of distribution function?

307. An unbiased die is thrown. Sketch the graph of its mass function and distribution function.
308. If $f(x)=k(1-x);0<x<1$

$=0$ otherwise . Find the mean

309. A random variable X has the following probability function

x	0	1	2	otherwise
f(x)	k	2k	3k	0

Find k and $P(x<2)$

310. A discrete random variable X has the following probability function:

X	0	1	2	3	4	5	6	7	8
P(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

Find the value of a and $P(x<3)$

311. Given the following probability distribution

X	0	1	2	3	4	5	6	7
P(x)	0	c	2c	2c	3c	c^2	$2c^2$	$7c^2+c$

Find the value of k. Determine the distribution function of X

312. The following is a probability mass function of X.

X	0	1	3	7	13
P(x)	1/8	α	1/6	1/4	β

Find α and β if $P(X^2=4X-3) = 1/2$

313. A random variable X has the density unction $f(x)=c/(1+x^2)$;$-\infty<x<\infty$,Find the value of the constant c

314. The distribution function of a random variable X is given by

$F(x) = 1-e^{-x}$ $0\leq x<\infty$ .Find the pdf and determine $P(2<x\leq 4)$

315. The distribution function of a random variable is

$F(x) = (3x^2-x^3)/4$ in the range $0\leq x\leq 2$.Find the pdf

316. Find the distribution function from the pdf

$f(x)=1/(1+x^2)$ $0\leq x\leq\infty$. Hence evaluate $P(X\geq 2)$

317. A discrete random variable X has the following probability function:

X	0	1	2	3	4	5	6	7	8
P(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

Find the value of a and obtain its distribution function.

318. A continuous random variable X has the p.d.f

$f(x)=Ax^2$ $0\leq x\leq 10$.

Determine A and find $P(2<x<5)$

319. Find the distribution function of a continuous random variable X whose density function is

$f(x) = x$ $0<x<1$

$= 2-x$ $1\leq x\leq 2$

$=0$ else where.

320. A random variable X has the following pdf

$f(x)= kx(2-x)$ $0\leq x\leq 2$

= 0 elsewhere

Find k and determine the distribution function

321. For a random variable, f (x)= x/2 $0 \le x \le 2$

= 0 elsewhere

Find a if P(x<a/x>a/2) =1/2

322. For the pdf $f(x) = 2e^{-2x}$ $0<x<\infty$, obtain the distribution function

323. For the pdf f(x) = 6x (1-x) $0 \le x \le 1$,find the mean and variance.

324. Find the mean and variance of $f(x)=ke^{-x}$ $0<x<\infty$

325. Find the expectation of the number on a die when thrown.

326. Two unbiased dice are thrown .Find the expected values of the sum of numbers of points on them.

327. A coin is tossed until ahead appears. What is the expectation of the number of tosses required?

328. If f(x) = |x| for |x|<C and zero elsewhere. Determine C to make f(x) a pdf

329. Find c if $f(x) = c\,(1/3)^{x+1}$ is a pdf. Also find P(1<x<4)

330. Find the mean and variance of the following distribution

X	0	1	2	3
P(x)	1/12	1/4	1/3	1/3

331. Let X have the density function f(x)=1/(b-a) $a \le x \le b$

=0 otherwise

Find its mean and moment generating function

332. Let X have the density function f(x)=1/2a $-a \le x \le a$

=0 otherwise

Find its mean and variance

333. For a random variable, f (x)= x/2 $0 \le x \le 2$

= 0 elsewhere. Obtain its mgf.

334. Find the variance of $f(x) = x \quad 0<x<1$

$= 2-x \quad 1 \le x \le 2$

$= 0$ elsewhere.

335. If $f(x) = Ae^{-x/5}$: $x>0$

$= 0$ otherwise. is a pdf. Find the value of A

336. If $f(x) = Ae^{-x3}$: $x>0$

$= 0$ otherwise. is a pdf. Find the value of A

Part C

Each question has 15 marks.

MODULE 1

337. Find Mean, Median and Mode of the following data:

Age	:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. ofperson	:	15	30	53	75	100	110	115	12

338. Find SD and coefficient of variation.

Class	:	10-15	15-20	20-25	25-30	30-35
f	:	5	20	47	38	10

339. Find Quartiles, D7 and P60 for the following:

Class	:	0-10	10-20	20-30	30-40	40-50
f	:	28	46	54	42	30

340. From the following two series find which one is more variable.

Series 1	:	5	10	15	20	25	30
Series 2	:	8	4	5	2	7	20

341. Find Median, Quartile deviation D3 & P80 graphically.

Class	:	0-10	10-20	20-30	30-40	40-50	50-60
f	:	2	8	12	20	10	8

342. Find Mean deviation about median.

Class	:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f	:	18	16	15	12	10	5	2	2

343. The scores of two batsmen A and B in eight innings during a certain match are as follows. Examine which of the batsmen is consistent in scoring. Who is more efficient batsman?

Batsman A	:	10	12	80	70	60	100	0	4
Batsman B	:	8	9	7	10	5	9	10	8

344. Find Mean and Median for the following data and obtain mode empirically.

Marks	10-19	20-29	30-39	40-49	50-59	60-69
f	20	45	26	3	1	15

345. Find Q1, Q3, D6, P2 for the following data.

Marks	< 10	<20	<30	< 40	<50	< 60	<70	<80
No. ofstudents	5	30	70	140	230	270	290	300

346. Find Mean and Median

Marks	>10	> 20	> 30	> 40	> 50	> 60	>70
f	200	193	175	152	128	72	35

347. An analysis of monthly wages paid to workers in two companies A & B gives the following results.

	Company A	Company B
No. of workers	586	648
Average monthly wages	52.5	47.5
Variance	110	113

(a) Which of the companies pays out larger amount as monthly wages?

(b) In which company there in greater variability in individual wages?

(c) Find mean and S.D. of wages of all workers taken together.

348. Find Mean, Variance and Coefficient of variation for the following data.

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f	12	10	13	15	20	18	12

349. Draw the ogive curves and hence find median.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f	10	15	25	18	13	8	5	6

350. Find the Quartile deviation and inter quartile range for the following

Class	10-19	20-29	30-39	40-49	50-59	59-69

f	5	8	17	29	35	31

351. Find the most appropriate average from the following data.

Income	40-50	50-60	60-70	70-80	80-90	Above 90
No. of people	20	5	8	10	7	3

352. Find quartiles, third decile and 56th percentile.

Class	1-3	3-5	5-7	7-9	9-11	11-13	13-15
f	6	53	85	56	21	20	4

MODULE 2

353. Explain the following methods to conduct regression analysis

(a) scatter diagram method (b) least square method

354. In a correlation analysis of 13 pairs of observations of x and y, the following values are obtained. Sum of the deviations of x and y values are -117 and -260; sum of the squares of deviations of x and y values are 1313 and 6580; sum of the products of deviations of x and y values is 2827. Find coefficient of correlation.

355. Calculate the coefficient of correlation from the following data

ROLL NO	1	2	3	4	5	6	7	8	9	10
Marks in maths	45	56	39	54	45	40	56	60	30	35
Marks in law	40	56	30	44	36	32	45	42	20	36

356. Calculate Karl Pearson coefficient of correlation between price of items and demand of items as given below. Also comment about the result.

Price	13	14	16	10	14	12	15	12	8	12	27
Demand	9	8	14	6	5	7	4	9	6	5	2

357. In a partially destroyed record of an analysis of correlation data the following results only are eligible

Variance of x=9 : Regression equations:8x-10y+66=0,40x-18y=214

Find (i) the mean values of x and y (ii) the coefficient of correlation

(iii) Standard deviation of y

358. The following data shows the maximum and minimum temperature on a certain day at 10 important cities throughout India

Maxi.temp	29	23	25	15	27	29	24	31	32	35
Mini.temp	8	3	7	5	8	19	10	7	5	8

1. Fit regression lines of x on y and y on x
2. Estimate the maximum temperature when the minimum temperature is 12
3. Estimate the minimum temperature when the maximum temperature is 40

359. Calculate the coefficient of correlation from the following data

X :	48	33	40	9	16	16	65	24	16	57
Y :	13	13	24	6	15	4	20	9	6	19

360. Calculate the coefficient of correlation between x and y and the mean value of x and y if given the following data

Variance of x=9, regression equations 2x+3y-70=0,3x+2y-80=0

361. Fit a straight line to the following data:

X	1	6	3	9	5	2	7	10	8	4
Y	6	8	3	2	7	10	5	9	4	1

362. From the following results, estimate the yield of crops when the rainfall is 22cms and the rainfall when the yield is 600kgs.

	Yield in Kgs (Y)	Rainfall in cms (X)
Mean	508.4	26.7
S.D.	36.8	4.6

Coefficient of correlation between yield and rainfall is 0.52

363. Obtain the 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

364. From the following data obtain the regression equation. Also find the coefficient of correlation.

X:	60	62	65	70	72	48	53	73	65	82
Y:	68	60	62	80	85	40	52	62	60	81

365. Explain least square principle in curve fitting and how will you fit a straight line using this method

366. Price index number of wheat (x) and cereals(y) at twelve successive seasons (quarters) are given below.

x	87	84	88	102	101	84	72	84	83	98	97	100
y	88	79	83	97	96	90	82	84	88	100	80	102

1.Fit a line of regression of Y on X.

2. Suggest what value of Y will be when X is expected to be 110?

367. The marks of 11 students in two tests are given below. Calculate the coefficient of

Correlation

3368

Test 1	80	45	55	58	55	60	45	68	70	45	85
Test 2	82	56	50	43	56	62	64	65	70	64	90

Establish correlation between the following pair of series and find out PE .Also Interpret the result.

x	17	19	20	22	24	27	29	30	33	35
y	87	85	80	78	75	72	70	65	62	60

MODULE 3

369 State and prove Baye's theorem.

370 State Baye's theorem.

Three identical boxes contain two balls each. One has both red, one has one red and one black, and the third has two black balls. A person chooses a box at random and takes out a ball. If the ball is red find the probability that the other ball is also red.

371 What is total probability law?

Three contents of two urns I and II are as follows, 1 white, 2 black and 3 red balls; 4 white, 5 black and 3 red balls. One urn is chosen at random and two balls are drawn. They happened to be white and red. What is the probability that they come from urn II.

372 Explain (i) addition theorem (ii) multiplication theorem (iii) Baye's formula

373 State Baye's theorem.

There are three urns having the following composition of black and white balls (i) 7 white and 3 black balls (ii) 4 white and 6 black balls (iii) 2 white and 8 black balls. One of these urns is chosen at random with probabilities 0.20, 0.60, and 0.20 respectively.

From the chosen urn two balls are drawn at random without replacement. Calculate the probability that both these balls are white.

374 State Baye's theorem.

The probability that a doctor will diagnose a particular disease correctly is 0.6. the probability that a patient will die by his treatment after correct diagnosis is 0.4 and the probability of death by wrong diagnosis is 0.7. A patient of the doctor who had the disease died. What is the probability that his disease was not correctly diagnosed?

375 State Baye's theorem.

A factory produces a certain types of outputs by three types of machine. The respective daily productions are: Machine I: 3000 units, Machine II: 2500 units, Machine III: 4500 units. Past experience shows that 1% of the output produced by Machine I is defective. The corresponding fraction defective for the other two machines respectively are 1.2% and 2%. An item is drawn at random from the day's production run and is found to be defective. What is the probability that it comes from the output of (a) Machine I (b) Machine II

376. (a)Explain statistical regularity. How it leads to the frequency approach of probability.

b) A three digit number is formed with the figures 0, 1, 2, 3, 4, duplication of the figures not being allowed. Find the probability that (1) the numbers even (2) the numbers is divisible by 5.

377. (a) Explain frequency definition and classical definition of probability.

(b) A, B and C in order toss a coin. The first one to throw a head wins. What are their respective chances of winning?

378. (a) When are two events said to be independent in the probability sense.

b) State and prove multiplication theorem for three events A, B and C.

c) Distinguish between pair wise independence and mutual independence for three events.

379 .(a) Distinguish between discrete and continuous sample space

b) A die is tossed. If it shows an even number a coin is tossed and if it shows an odd number, another die is tossed. Write down the sample space.

(c) Define frequency definition of probability. Write down the advantages and limitations of frequency definition of probability.

380 (a) State Baye's theorem.

b) Two urns A and B contain respectively 2 white and 1 black ball and 1 white and 5 black ball. One ball in transferred from urn B to urn A and then one ball is drawn from urn A. It turns out to be black. What is the probability that the transferred ball was black?

381 (a) Define conditional probability and multiplication for two events.

b) A man can hit a target 3 times in 5 shots: B- 2 times in 5 shots, C- 3 times in 4 shots. They fire volley. What is the probability that (1) exactly 2 shots hit (2) only one hit (c) all shots hit (4) none hits.

382 (a) Explain conditional probability and independence of events.

b) The chance that a female work in chemical factory will contact an occupational disease is 0.04 and that for a female worker is 0.06. Out of 1000 workers in a factory 200 are females. One worker is selected at random and is found to be contacted disease. What is the probability that the worker is a female?

383 (a) Explain conditional probability and total probability law.

(b) A and B are consisting for the post of a chairman in the company. The probability for their winning is 0.6 and 0.4 respectively. If A wins, the probability of introducing a new product is 0.8 and if B wins the corresponding probability is 0.3. Find the probability that product will be introduced.

384 Define the terms with suitable example

1. Sample space
2. Mutually exclusive events
3. Exhaustive events
4. Statistical regularity

5. Axiomatic approach to probability.

6. Independent and dependent events

MODULE 4

385 Define a random variable. What are the different types of random variables? Explain with examples.

386 Define probability density function. Find C if $P(x)=C(2/3)^x$ $x=1,2,3\ldots\ldots\ldots$is a probability density function. Also find $P(1<x<3)$and $P(x\geq 3)$.

387 What are the properties of probability density function? A continuous random variable X has pdf $f(x)=3x^2$ $0\leq x\leq 1$. Find two numbers a and b such that

$P(x\leq a)=P(x\geq a)$ and $P(X\geq b)=0.05$

388 Define probability density function. What are its properties? A continuous random variable X has pdf

$$f(x)=Ae^{-x/3} \quad :x>0$$
$$=0 \quad \text{otherwise}$$

(a)Find A

(b)Show that for any two positive numbers and t, $P(X> t+ s/X>t)=P(X>s)$

389 A random variable X has the following probability function:

$$f(x) = k \quad \text{for } x=0$$
$$=2k \quad \text{for } x=1$$
$$=3k \quad \text{for } x=2$$
$$=0 \quad \text{otherwise.}$$

1. Determine the value of k

2. Find $P(x<2), P(x\leq 2)$
3. Write down the distribution function of X

390 Let X be a continuous random variable with pdf

$$f(x) = \begin{cases} ax & 0\leq x\leq 1 \\ a & 1\leq x\leq 2 \\ -ax+3a & 2\leq x\leq 3 \\ 0 & \text{otherwise.} \end{cases}$$

(a) Determine the constant a

(b) Compute $P(X\leq 1.5)$

391 Let X be a continuous random variable with pdf

$$f(x) = \begin{cases} x/2 & 0<x\leq 1 \\ (3-x)/4 & 1<x\leq 2 \\ 1/4 & 2<x\leq 3 \\ (4-x)/4 & 3<x\leq 4 \\ 0 & \text{otherwise.} \end{cases}$$

(a) Compute (a) $P(x\geq 3)$

(b) $P(|x|<1.5)$

(c) Distribution function

392 Find the mean ,variance and moment generating function of

$f(x)=ae^{-ax}$, $a>0, x>0$

393 Define moment generating function (mgf). If $f(x)=1/n$,$x=1,2,3,\ldots$ and zero elsewhere. Find the mgf of X

394 Define expectation of a random variable .Mention its properties

If $f(x)=(3/4)x(2-x)$ $0\leq x\leq 2$ and zero elsewhere is a pdf. Find E(X)

395 Find the mean, variance and mgf of X if its pdf is $f(x)=1/\theta$ $0<x<\theta$.

396 Find the mean ,variance and moment generating function of

$$f(x)=e^{-x} \quad x\geq 0$$
$$=0 \text{ otherwise}$$

397 Define expectation ,variance and moment generating function by stating their properties

398 For $f(x)=cxe^{-x}$, $x>0$.find c, Find mean and variance

399 Find mean and variance and mgf of

$$f(x)=\theta e^{-\theta x} \quad x\geq o$$
$$=0 \text{ otherwise}$$

400 Find mean and variance of

$$f(x)=1/3e^{-x/3} \quad x\geq o$$
$$=0 \text{ otherwise}$$