



K20U 1305

Reg. No. :

Name :

III Semester B.Sc. Degree (CBCSS – Sup./Imp.) Examination,
November 2020

(2014 – '18 Admns)

CORE COURSE IN STATISTICS

3B03 STA : Probability Distributions

Time : 3 Hours

Max. Marks : 48

PART – A

(Short Answer – Answer **all** the **6** questions)

1. Find the m.g.f. of a degenerate random variable.
2. What is the p.m.f. of a multinomial distribution ?
3. If the random variable X has the uniform density with p.d.f. $f(x) = \frac{1}{\theta}, 0 < x < \theta$, then find the mean of the distribution.
4. Define a Log Normal distribution.
5. If X follows Gamma distribution with parameters α and β then what is the distribution of X if $\alpha = 1$?
6. Define convergence in probability. (6×1=6)

PART – B

(Short Essay – Answer **any** **7** questions)

7. If the probability that a new born child is a boy is 0.6, find the probability that in a family of 5 children there are exactly 3 boys.
8. If a random variable has a Poisson distribution such that $P(1) = P(2)$, find the mean of the distribution.
9. Find the characteristic function of Geometric distribution.
10. Derive m.g.f. of Negative Binomial distribution.
11. Define Bivariate Normal distribution.
12. Write any four properties of Normal distribution.

P.T.O.



13. If the probability that an applicant for a driver's license will pass the road test on any given trial is 0.8, what is the probability that he will finally pass the test on the fourth trial ?
14. Height of a student is Normally distributed with mean 165 cm and standard deviation 5 cm. Find the probability that height of a student is more than 177 cm.
15. State Bernoulli's weak law of large numbers. (7×2=14)

PART – C

(Essay – Answer **any 4** questions)

16. Define Binomial Distribution. Find its mean and variance.
17. State and prove additive property of Poisson distribution.
18. Show that Exponential distribution possesses lack of memory property.
19. Derive Beta distribution of first kind from Beta distribution of second kind.
20. Prove that for Normal distribution, the quartile deviation, mean deviation and standard deviation are approximately 10 : 12 : 15.
21. State and prove Tchebychev's inequality. (4×4=16)

PART – D

(Long Essay – Answer **any 2** questions)

22. When X follows Binomial distribution with parameters n and p, show that $\mu_{r+1} = pq[nr \mu_{r-1} + (d\mu_r/dp)]$ and hence find third central moment μ_3 .
23. A taxi cab company has 12 Ambassadors and 8 Fiats. If 5 of these taxi cabs are in the workshop for repairs and an Ambassador is as likely to be in for repairs as a Fiat. What is the probability that
 - i) Three of them are Ambassadors and two are Fiat.
 - ii) At least three of them are Ambassadors.
 - iii) All the five are of the same make.
24. In a Normal distribution, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution ?
25. In certain experiments, the error made in finding the density of a substance is a random variable having the Uniform density with $\alpha = -0.025$ and $\beta = 0.025$. What is the probability that such an error will be
 - i) Between 0 and 0.03
 - ii) Between -0.012 and 0.012
 - iii) Between -0.05 and 0.05 . (2×6=12)