2B3N21338 (Pages : 2) Reg. No:.............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester B.Sc Degree Examination, November 2021

BST3B03 – Statistical Estimation

(2019 Admission onwards)

Time: 2½ hours Max. Marks : 80

SECTION-A

Each question carries 2 Marks.

Maximum Marks that can be scored in this section is 25.

1. Define exponential distribution. Write its distribution function
2. Explain beta distribution of second kind
3. Define chi square distribution
4. What are the properties of F distribution ?
5. What is the difference between estimator and estimate?
6. Define consistent estimator. Given an example.
7. State the regularity condition of Crammer - Rao inequality.
8. Write the confidence interval for population mean in the case of small sample.
9. Define gamma distribution with one and two parameters respectively.
10. Define cauchy distribution.
11. Define standard normal distribution.
12. Define standard error with example.
13. What are the different methods of estimation of parameters?
14. Write the confidence interval for ratio of two population variance.
15. Define student's t- distribution.

SECTION-B

Each question carries 5 Marks.

Maximum Marks that can be scored in this section is 35.

16. A random variable X has a uniform distribution over (-3,3). Find 'K' for which $P(X > K) = 1/3$. Also evaluate $P(|X-2| < 2)$.

17. 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 reset in less than 24 days (ii) not have to be reset in at least 180 days

18. Derive the mean and variance of beta distribution of second kind.

19. If the annual proportion of a component that fails in a certain brand of TV set may be looked upon as a random variable having a beta distribution with m = 2, n = 4. Find the probability that atleast 25% of all that component will fail in the TV set of that brand

20. Derive the mean and variance of gamma distribution.

21. A random sample of size 15 is taken from $N(\mu, \sigma^2)$ has variance 16. Find 'a' and 'b' such that $P(a < \sigma^2 < b) = 0.9$.

22. Obtain the MLE of β in $f(x) = (\beta + 1)x^{\beta}, \quad 0 < x < 1$

23. Derive the confidence interval for population variance.

SECTION-C

(Answer *any two* Questions and each carries 10 marks)

24. Define standard normal distribution. In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution.

25. The income distribution of a group of 10,000 persons was found to be normal with mean Rs. 750 and SD Rs. 50. How many persons in this group have income .

    (i) exceeding Rs. 668 (ii) exceeding Rs. 832 and

    (iii) What is the lowest income among the richest 100

26. Find the MLE for random sampling from a normal population $N(\mu, \sigma^2)$ for

    (i) population mean μ when the population variance σ^2 is known

    (ii) population variance σ^2 when the population mean μ is known

    (iii) population mean μ and population variance σ^2 when both unknown

27. Derive the mean and variance of normal distribution.

(2 x 10 = 20 Marks)

2B3N21340 (Pages : 2) Reg. No:.........................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester B.Sc Degree Examination, November 2021

BAS3C03 – Life Contingencies and Principles of Insurance

(2019 Admission onwards)

Time: 2 hours Max. Marks : 60

PART –A(Short Answers)
(Each question carries *two* marks. Maximum 20 Marks)

1. Derive the formula for premium under fully discrete n-year term insurance.
2. A life insurance company issues annual premium whole life assurance policies with a sum assured of £100,000 payable at the end of the year of death to lives aged exactly 35. Calculate the premium using the principle of equivalence.(Basis: AM92 Select mortality, 4% pa interest)
3. Derive relationship between continuous whole life insurance identities.
4. What do you mean by reserve?
5. What do you understand by valuation of the policy?
6. Write the prospective formula for the benefit reserve at the end of 5 years for a unit benefit 10 year term insurance issued to (45) on a single premium basis.
7. Define hull insurance.
8. What are the perils covered under marine insurance?
9. Define money back policy.
10. Define fractional power utility function.
11. What do you mean by risk seeking investor?
12. What is the shape of the utility function of a risk seeking investor?

PART B

(Each question carries *five* marks. Maximum 30 Marks)

13. Explain fully continuous whole life premium and also find the variance.

14. Prove that $P^{\{m\}}(\bar{A})_x = \frac{d^{(m)}}{\delta}\bar{P}(\bar{A})_x$

15. Obtain the prospective reserve formula for fully discrete whole life insurance.

16. Find the difference between reserves at k for whole life insurance with yearly premium and true m-thly premium.

17. Explain health insurance.

18. Discuss about the LIC ACT of 1956.

19. A decision maker's utility function is given by $u(w) = -e^{-5w}$. The decision maker has two random economic prospects(gains) available. The outcome of the first, denoted by X, has a normal distribution with mean 5 and variance 2. The second prospect denoted by Y, is distributed with normal mean 6 and variance 2.5. Which prospect will be preferred?

PART –C

Answer any one question and carries 10 Marks.

20. a) Explain Premium under n-year endowment insurance.

    b) Calculate the annual premium for a term assurance with a term of 10 years to a male aged 30, with a sum assured of Rs.500000, assuming AM92 ultimate mortality and interest of 4% p.a. Assume that the death benefit is payable at the end of the year of death.

21. Calculate ${}_{20}V_{45}$ given that P_{45}=0.014, $P_{45:\overset{1}{\overline{20|}}}$=0.022 and $P_{45:\overline{20|}}$=0.030

(1 x 10 = 10 Marks)

2B3N21311 (Pages : 2) Reg. No:.........................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester B.Sc Degree Examination, November 2021

BMT3C03 - Mathematics – 3

(2019 Admission onwards)

Time: 2 hours Max. Marks : 60

Section A
All questions can be attended.
Each question carries 2 marks.

1. Find the vector function that describes the curve C of intersection of the plane $y = 2x$ and the paraboloid $z = 9 - x^2 - y^2$.
2. Define Tangential and Normal Components of Acceleration.
3. If $z = u^2v^3w^4$ and $u = t^2, v = 5t\text{- }8, w = t^3 - t$. Find dz/dt.
4. Find the directional derivative of $f(x, y) = 2x^2y^3 + 6xy$ at (1, 1) in the direction of a unit vectorwhose angle with the positive x-axis is $\pi /6$.
5. State Stoke's theorem.
6. Compute all the roots of $8^{\frac{1}{3}}$ and sketch these roots on an appropriate circle centered at origin.
7. Find the circulation and net flux for the flow $f(z) = 2\,z$ where C is the circle $|z| = 1$.
8. Show that the function $f(z) = 4z - 6\bar{z} + 3$ is not analytic at any point.
9. Find the first partial derivatives of $z = \frac{4\sqrt{x}}{3y^2+1}$.
10. Compute $\nabla f(x, y)\ for\ f(x, y) = 5y - x^3y^2$.
11. Find the directional derivative of the function $f(x, y) = 5x^3y^6$ at the point (1,1) in the direction $\theta = \frac{\pi}{6}$.
12. Find the level curve of $f(x, y) = -x^2 + y^2$ passing through (2, 3). Graph the gradient at the point.

(Ceiling 20 Marks)

Section B

All questions can be attended.
Each question carries 5 marks

13. A projectile is launched from ground level with an initial speed $V_0 = 768$ ft/s at an angle of elevation $\theta = 30^0$. Find

(a) the vector function and parametric equations of the projectile's trajectory,

(b) the maximum altitude attained,

(c) the range of the projectile, and

(d) the impact speed.

14. Verify that the given function $u = \cos at . \sin x$ satisfies Wave equation, $a^2 \frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}$.

15. Define length of a space curve. Find the length of the space curve traced by the vector function $r(t) = a\cos t\, \mathbf{i} + a\sin t\, \mathbf{j} + at\mathbf{k}, 0 \leq t \leq 2\pi$.

16. Determine whether the vector field $F(x,y) = (x^2 - 2y^3)i + (x + 5y)j$ is conservative.

17. State and prove Cauchy's inequality.

18. Show that $\cos\left(\frac{\pi}{2} + i\ln 2\right) = -\frac{3}{4}$

19. Show that $f(z) = e^{\bar{z}}$ is nowhere analytic.

(Ceiling 30 Marks)

Section C

Answer any One question. Each question carries 10 marks

20. (a) Find parametric equations for the normal line to the surface .

$z = \frac{1}{2}x^2 + \frac{1}{2}y^2 - z + 4$ at the point (1, -1, 5).

(b) Find the points on the surface $x^2 + y^2 + z^2 = 7$ at which the gradient is parallel to the plane $2x + 4y + 6z = 1$.

21. (a) Show that the line integral $\int_C (y + yz)dx + (x + 3z^3 + xz)dy + (9yz^2 + xy - 1)dz$ is independent of the path C between (1, 1, 1) to (2, 1, 4).

(b) Evaluate $\int_{(1,1,2)}^{(2,1,4)} F.dr$