Code No.	L – 4024

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2021

CSS

ACTUARIAL SCIENCE

General Instructions

1. The Question Paper is having two Parts — Part 'A' Objective type (60%) & Part 'B' Descriptive type (40%).
2. Objective type questions which carry 1 mark each are to be (✓) 'tick marked' in the response sheets against the appropriate answers provided.
3. 8 questions are to be answered out of 12 questions carrying 5 marks each in Part 'B'.
4. **Negative marking** : 0.25 marks will be deducted for each wrong answer in Part 'A'.

Time : 2 Hours **Max. Marks : 100**

To be filled in by the Candidate									
Register Number	in Figures								
	in words								

PART – A

(Objective Type)

Choose appropriate answer from the options in the questions. **One** mark **each**.

(60 × 1 = 60 marks)

Answer **all** the questions.

1. P and Q are two points observed from the top of a building $10\sqrt{3}\,m$ high. If the angles of depression of the points are complementary and $PQ = 20m$, then the distance of P from the building is

   a) 25 m b) 45 m

   c) 30 m d) 40 m

DO NOT WRITE HERE

---

2. The least value of $2\sin^2\theta + 2\cos^2\theta$ is

   a) 3 b) 5

   c) 1 d) 2

3. A die is thrown. Let A be the event that the number obtained is greater than 3. Let B be the event that the number obtained is less than 5. Then $P(A \cup B)$ is

   a) $3/5$ b) 0

   c) 1 d) $5/2$

4. A focus of an ellipse is at the origin. The directrix is the line $x = 4$ and the eccentricity is $\frac{1}{2}$. Then the length of the semi–major axis is

a) $\frac{4}{3}$ b) $\frac{8}{3}$

c) $\frac{7}{3}$ d) $\frac{5}{3}$

5. A parabola has the origin as its focus and the line $x = 2$ as the directrix. Then the vertex of the parabola is at

a) (0, 2) b) (0, 1)

c) (1,0) d) (2, 0)

6. The point diametrically opposite to the point $P(1, 0)$ on the circle $x^2 + y^2 + 2x + 4y - 3 = 0$ is

a) $(-3, -4)$ b) $(-3, 4)$

c) $(3, 4)$ d) $(-4, -1)$

7. The conjugate of a complex number is $1/i - 1$. Then the complex number is

a) $-1/i - 1$ b) $1/i + 1$

c) $1/i - 1$ d) $-1/i + 1$

8. Let R be the real line. Consider the following subsets of the plane $R \times R$. $S = \{(x, y) : y = x + 1$ and $0 < t =$"$\{(x,$"$>$

a) neither S nor T is an equivalence relation on R

b) both S and T are equivalence relations on R

c) S is an equivalence relation on R but T is not

d) T is an equivalence relation on R but S is not

9. The perpendicular bisector of the line segment joining $P(1,4)$ and $Q(k,3)$ has $y-$intercept -4. Then a possible value of k is

a) 1 b) -4

c) 3 d) 2

10. The mean of the numbers a, b, 8, 5,10 is 6 and the variance is 6.80. Then which one of the following gives possible values of a and b?

a) $a=0, b=7$ b) $a=5, b=2$

c) $a=3, b=4$ d) $a=2, b=4$

11. The line passing through the points $(5,1,a)$ and $(3,b,1)$ crosses the $yz-$plane at the point $(0, 17/2, -13/2)$ Then

a) $a=2, b=8$ b) $a=4, b=6$

c) $a=6, b=4$ d) $a=8, b=2$

12. Let A be a 2×2 matrix with real entries. Let I be the 2×2 identity matrix. Denote by tr

(A), the sum of diagonal entries of A. Assume that $A2=I$.

Statement – 1 : If $A\neq I$ and $A\neq -I$, then $\det A=-1$

Statement – 2 : If $A\neq I$ and $A\neq -I$, then $tr(A)\neq 0$

a) Statement –1 is false, Statement –2 is true

b) Statement –1 is true, Statement –2 is true, Statement –2 is a correct explanation for Statement –1

c) Statement –1 is true, Statement –2 is true; Statement –2 is not a correct explanation for Statement –1

d) Statement –1 is true, Statement –2 is false.

13. The first two terms of a geometric progression add up to 12. The sum of the third and the fourth terms is 48. If the terms of the geometric progression are alternately positive and negative, then the first term is

a) –2 b) -4

c) –12 d) 8

14. How many real solutions does the equation $x^7 + 14x^5 + 16x^3 + 30x - 560 = 0$ have?

a) 1 b) 4

c) 7 d) 5

15. The statement $p \to (q \to p)$ is equivalent to

a) $p \to (p \to q)$ b) $p \to (p \vee q)$

c) $p \to (p \wedge q)$ d) $p \to (p \leftrightarrow q)$

16. The value of $\cot(\text{cosec}\, -1\frac{5}{3} + \tan -1\frac{2}{3})$ is

a) $\frac{2}{17}$ b) $\frac{6}{17}$

c) $\frac{7}{17}$ d) $\frac{3}{17}$

17. The area of the plane region bounded by the curves $x + 2y^2 = 0$ and $x + 3y^2 = 1$ is equal to $(y^2 = y \text{ square})$

a) $\frac{3}{5}$ b) $\frac{4}{3}$

c) $\frac{7}{3}$ d) 1

18. If $A2 - A + I = 0$, then the inverse of A is

a) $A + I$ b) A^2

c) $A - I$ d) $I - A$

19. Let R = {(3, 3), (6, 6), (9, 9), (12, 12), (6, 12), (3, 9), (3, 12), (3, 6)} relation be a rotation on the set A = {3, 6, 9, I 2} be a relation on the set A = {3, 6, 9, 2}. The relation is

a) reflexive and transitive only b) reflexive only

c) an equivalence relation d) reflexive and symmetric only

20. If in a frequently distribution, the mean and median are 21 and 22 respectively, then its mode is approximately

a) 22.0 b) 20.5

c) 25.5 d) 24.0

21. Let P be the point (1,0) and Q a point on the locus $y^2 = 8x$. The locus of mid point of PQ is

a) $y^2 - 4x + 2 = 0$ b) $y^2 + 4x + 2 = 0$

c) $x^2 + 4y + 2 = 0$ d) $x^2 - 4y + 2 = 0$

22. The system of equations

$\alpha x + y + z = \alpha - 1$

$x + \alpha y + z = \alpha - 1$

$x + y + \alpha z = \alpha - 1$

has no solution, if α is

a) –2 b) either –2 or 1

c) not –2 d) 1

23. The value of α for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assume the least value is

a) 1 b) 0

c) 3 d) 2

24. If roots of the equation $x^2 - bx + c = 0$ be two consecutive integers, then $b2 - 4c$ equals

a) –2 b) 3

c) 2 d) 1

25. If the letters of word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number

a) 601 b) 600

c) 603 d) 602

26. The simple Interest on a certain sum of money at the rate of 4% pa. for 5 years is Rs. 1680. At what rate of interest the same amount of interest can be received on the same sum after 4 years?

a) 5% b) 6%

c) 7% d) 8%

27. The interest on a certain deposit at 4.5% p.a. is Rs. 405 in one year. How much will the additional interest in one year be on the same deposit at 5% pa.?

a) Rs.50 b) Rs.45

c) Rs.40.5 d) Rs.48.5

28. Mr.Govind invested an amount of Rs.13900 divided in two different schemes S1 and S2 at the simple interest rate of 14% pa. and 11% pa. respectively. If the total amount of simple interest earned in two years was Rs.3508. what was the amount invested in Scheme S2?

a) Rs.6,400 b) Rs.6,500

c) Rs.7,200 d) Rs.7,500

29. A sum of money was invested in a bank at 8% simple interest p.a. for 3 years. Instead had it been invested in mutual fund at 8.5% pa. simple interest for 4 years, the earning would have been Rs.500 more. What is the sum invested?

a) Rs.4,500 b) Rs.5,000

c) Rs.3,500 d) Rs.5,500

30. A person borrowed Rs.600 @ 3% per annum S.I. and Rs.800 @ 4½ % per annum on the agreement that the whole sum will be returned only when the total interest becomes Rs. 246. The number of years. after which the borrowed sum is to be returned, is

a) 2 years b) 3 years

c) 4 years d) 5 years

31. A sum of Rs. 13000 is divided into three parts such that the simple interests accrued on them for two, three and four years respectively may be equal. Find the amount deposited for 4 years.

a) 5,000 b) 6,000

c) 4,000 d) 3,000

32. A sum of Rs.100 is lent at simple interest of 3% p.a. for the first month, 9% p.a. for the second month 27% p.a. for the third month and so on, What is the total amount of interest earned at the end of the year approximately

a) Rs.7,97,160 b) Rs.7,91,160

c) Rs.65,930 d) Rs.66,430

33. If the simple interest on a sum of money at twelve percent per annum for two years is Rs.3,800, compound interest on the same sum for the same period at the same rate of interest is

a) Rs.4,028 b) Rs.4,100

c) Rs.4,128 d) Rs.4,228

34. A sum of money is borrowed and paid back in two annual installments of Rs.882 each allowing 5% compound interest. The sum borrowed was

a) Rs.1,620 b) Rs.1,640

c) Rs.1,680 d) Rs.1,700

35. Rakesh invested an amount of Rs. 12000 at the rate of 10% simple interest and another amount at the rate of 20% simple interest. The total interest earned at the end of one year on the amount invested became 14 p.c.p.a. Find the total amount invested

a) Rs.20,000 b) Rs.22,000

c) Rs.24,000 d) Rs.25,000

36. If a number is chosen at random from the set $\{1, 2. 3....,100\}$, then the probability that the chosen number is a perfect cube is

a) $1/25$ b) $1/2$

c) $4/13$ d) $1/10$

37. What is the probability of getting at least one six in a single throw of three unbiased dice?

a) 1/6 b) 125/216

c) 91/216 d) 81/216

38. In a simultaneous throw of two dice, what is the probability of getting a doublet?

a) 1/6 b) 1/4

c) 2/3 d) 3/7

39. A bag contains 4 red balls, 5 green balls and 6 white balls. A ball is drawn at random from the box. What is the probability that the ball drawn is either red or green?

a) 2/5 b) 3/5

c) 1/5 d) 7/15

40. When 4 dice are thrown, what is the probability that the same number appears on each of them?

a) 1/36 b) 1/18

c) 1/216 d) 1/5

Directions for questions: 41 to 43: These questions are based on the following data. A box contains 12 mangoes out of which 4 are spoilt. If four mangoes are chosen at random, find the probability that

41. All the four mangoes are spoiled.

a) 1/495 b) 494/495

c) 1/395 d) 394/395

42. Not all the mangoes are spoiled.

a) 1/495 b) 394/395

c) 494/495 d) 1/395

43. Exactly three are not spoiled.

a) $116/495$ b) $224/495$

c) $129/495$ d) $187/495$

44. A number is selected at random from first thirty natural numbers. What is the chance that it is a multiple of either 3 or 13?

a) $17/30$ b) $2/5$

c) $11/30$ d) $4/15$

45. Which of the following set is equivalent to set $A = \{a,b,c,d,e\}$

a) $B = \{1,2,3,4,5\}$ b) $B = \{c,a,b,f\}$

c) $B = \{-1,0,2,4\}$ d) None of these

46. If A and B are two sets, then $(A-B)\cup B$ is

a) A b) B

c) $A \cup B$ d) $A \cap B$

47. If A and B are two sets, then $(A-B)\cap B$ is

a) A b) B

c) $A \cap B$ d) $\{\ \}$

48. If $A \subset B \subset C$, then $(A-B)\cup(B-C)\cup(A-C) =$

a) $A \cap B \cap C$ b) $A \cup B \cup C$

c) $\{\ \}$ d) None of these

49. Find the solution set of the equation $x^2 + x + 2 = 0$ in roster form

a) $\{1, -2\}$ b) $\{\ \}$

c) $\{1,1\}$ d) $\{1\}$

50. Evaluate 50!/ 47!

a) 102500 b) 112584

c) 117600 d) 118450

51. Find the value of ${}^{85}P_3$

a) 565350 b) 595650

c) 535950 d) None of the above

52. Find the value of $\left({}^{20}C_{18}\right) * \left({}^{20}C_{20}\right)$

a) 400 b) 380

c) 360 d) 350

53. How many words with or without meaning, can be formed by using all the letters of the word, 'ORANGE', using each letter exactly once?

a) 700 b) 720

c) 750 d) 800

54. There are 28 stations between Ernakulam and Chennai. How many second class tickets have to be printed, so that a passenger can travel from one station to any other station?

a) 800 b) 820

c) 850 d) 870

55. IRDA stands for

a) Insurance Regulatory and Development Authority

b) Industrial Development and Development Authority

c) Insurance Restructuring and Development Authority

d) Insurance Refinancing and Development Authority

56. ———— is the price paid by the insured for the risk undertaken by the insurer.

a) wages

b) premium

c) salary

d) compensation

57. ———— schemes are intended to insure a group of individual together.

a) insurance

b) wages

c) salary

d) group insurance

58. In the case of motor insurance policy Form A is commonly known as

a) Act policy

b) Package policy

c) Act and Package policy

d) liability policy

59. In the case of motor insurance policy Form B is commonly known as

a) Liability policy

b) Act policy

c) Package policy

d) Act and Package policy

60. When a particular property is insured with two insurers it is called

a) property insurance

b) double insurance

c) single insurance

d) particular insurance

ANSWER SHEET — PART – A

1	A	B	C	D	E	21	A	B	C	D	E	41	A	B	C	D	E
2	A	B	C	D	E	22	A	B	C	D	E	42	A	B	C	D	E
3	A	B	C	D	E	23	A	B	C	D	E	43	A	B	C	D	E
4	A	B	C	D	E	24	A	B	C	D	E	44	A	B	C	D	E
5	A	B	C	D	E	25	A	B	C	D	E	45	A	B	C	D	E
6	A	B	C	D	E	26	A	B	C	D	E	46	A	B	C	D	E
7	A	B	C	D	E	27	A	B	C	D	E	47	A	B	C	D	E
8	A	B	C	D	E	28	A	B	C	D	E	48	A	B	C	D	E
9	A	B	C	D	E	29	A	B	C	D	E	49	A	B	C	D	E
10	A	B	C	D	E	30	A	B	C	D	E	50	A	B	C	D	E
11	A	B	C	D	E	31	A	B	C	D	E	51	A	B	C	D	E
12	A	B	C	D	E	32	A	B	C	D	E	52	A	B	C	D	E
13	A	B	C	D	E	33	A	B	C	D	E	53	A	B	C	D	E
14	A	B	C	D	E	34	A	B	C	D	E	54	A	B	C	D	E
15	A	B	C	D	E	35	A	B	C	D	E	55	A	B	C	D	E
16	A	B	C	D	E	36	A	B	C	D	E	56	A	B	C	D	E
17	A	B	C	D	E	37	A	B	C	D	E	57	A	B	C	D	E
18	A	B	C	D	E	38	A	B	C	D	E	58	A	B	C	D	E
19	A	B	C	D	E	39	A	B	C	D	E	59	A	B	C	D	E
20	A	B	C	D	E	40	A	B	C	D	E	60	A	B	C	D	E

ACTUARIAL SCIENCE

PART – B

(Descriptive Type)

Answer **any eight** questions. **(8 × 5 = 40 Marks)**

1. Explain the Role of Insurance in Developed Countries.

2. Explain life assurance contracts.

3. State and Prove Bayes theorem.

4. What is the main source of economy in India?

5. What are the consequences of overpopulation?

6. Explain Insurance Sector in India.

7. Explain General Insurance and it's any four types.

8. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & -1 \\ 0 & -1 & -2 \end{bmatrix}$ Find the value of $A^4 - A^3 - 4A^2 + 41$.

9. State and prove addition theorem on any two events.

10. Define any three measures of central tendency .

11. Define Premium, Sum assured. Surrender and Bonus.

12. Explain GST in Insurance.

———————