Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2025

CSS

ACTUARIAL SCIENCE

For office use only

General Instructions

1. The Question Paper is having 100 Objective Questions, each carrying one mark.

2. The answers are to be (✓) 'tick marked' **only** in the "**Response Sheet**" provided.

3. **Negative marking** : **0.25 marks** will be deducted for each wrong answer .

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

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

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Choose appropriate answer from the options in the questions.

(100 × 1 = 100 marks)

1. The solution set of $x^2 - 4 \leq 0$ is

   A. $x \leq -2$ or $x \geq 2$

   B. $-2 \leq x \leq 2$

   C. $x \leq 2$

   D. $x \geq 2$

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2. The negation of the statement "All students are intelligent" is :

   A. No students are intelligent
   B. Some students are not intelligent
   C. None of the students are intelligent
   D. None of the above

3. If $A = \begin{bmatrix} 1 & 5 \\ 0 & 2 \end{bmatrix}$ then

   A. $A^2 - 3A + 2I = 0$ B. $A^2 - 2A + 2I = 0$

   C. $A^2 - 5A + I = 0$ D. $2A^2 - A + I = 0$

4. The rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}$

   A. 1   B. 2

   C. 3   D. 0

5. The series $\sum\limits_{n=1}^{\infty} \dfrac{1}{n(n+1)}$

   A. 1   B. 2

   C. ln2   D. Diverges

6. If $z = e^{i\theta}$ then $z^2 + \dfrac{1}{z^2}$ is

   A. $\cos\theta$ B. $\cos 2\theta$

   C. $2\cos 2\theta$ D. $2\sin\theta$

7. The polynomial $x^2 + 1$ is :
   A. Reducible over real numbers
   B. Reducible over complex numbers
   C. Irreducible over complex numbers
   D. Nothing can be said

8. Which of the following sets is countable?
   A. The real numbers $\mathbb{R}$ B. The set of irrational numbers
   C. The set of all finite subsets of $\mathbb{N}$ D. The power set of $\mathbb{N}$

9. The remainder when 108^{13} is divided by 5 is
   A. 1   B. 2

   C. 3   D. 0

10. The volume of the solid obtained by rotating $y = x^2$, from $x = 0$ to $x = 1$, about the x-axis is :

    A. $\dfrac{\pi}{5}$ B. $\dfrac{\pi}{3}$

    C. 5   D. 3

11. A function *f* is not Riemann integrable on [0, 1] if :

    A. It is continuous at every irrational point and discontinuous at every rational point

    B. It is monotonic

    C. It is piecewise linear

    D. It is bounded and continuous

12. If *S* is a set consisting of all sequences of 0's and 1's then

    A. *S* is countable

    B. *S* is uncountable

    C. *S* is finite

    D. None of the above

13. Which of the following is true for a bounded sequence?

    A. Every bounded sequence converges

    B. A bounded sequence must have a convergent subsequence

    C. A bounded sequence is always convergent

    D. A bounded sequence is always divergent convergent

14. The Harmonic series is :

    A. diverges

    B. converges

    C. neither converge nor diverge

    D. nothing can be said

15. Which of the following sequences is Cauchy?

    A. $x_n = (-1)^n$

    B. $x_n = n$

    C. $x_n = \sin(n)$

    D. $x_n = \dfrac{1}{n}$

16. If a sequence (x_n) is convergent, then :

    A. It is always Cauchy

    B. It may or may not be Cauchy

    C. It is not necessarily Cauchy

    D. It cannot be Cauchy

17. The residue of $f(z) = \dfrac{1}{z^2 + 1}$ at $z = i$ is :

    A. $\dfrac{-1}{2i}$

    B. $\dfrac{i}{2}$

    C. 0

    D. $-\dfrac{i}{2}$

18. The integral $\displaystyle\int_{|z|=2} \dfrac{e^z}{z^2} \, dz$ is equal to :

    A. 0

    B. $2\pi i$

    C. $4\pi i$

    D. $-2\pi i$

19. Evaluate the integral $\displaystyle\int_0^{2\pi} \dfrac{d\theta}{5 - 4\cos\theta}$

    A. 2π

    B. $\dfrac{2\pi}{3}$

    C. $\dfrac{3\pi}{2}$

    D. 3π

20. Evaluate $\displaystyle\int_{-\infty}^{\infty} \dfrac{x^2}{x^4 + 1} \, dx$

    A. 2π

    B. $\dfrac{2\pi}{\sqrt{3}}$

    C. $\sqrt{2\pi}$

    D. $\dfrac{\pi}{\sqrt{2}}$

21. Solve the differential equation $(2xy + y^2)\, dx + (x^2 + 2xy)\, dy = 0$

    A. $x^2 y + xy^2 = C$

    B. $x^2 + y^2 = Cx$

    C. $xy = C$

    D. $x^2 y^2 = Cx$

22. The order and degree of the equation $\left(\dfrac{d^2 y}{dx^2}\right)^3 + \left(\dfrac{dy}{dx}\right)^2 = 0$ are :

    A. 2, 3

    B. 2, 2

    C. 3, 2

    D. 3, 3

23. Let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be defined by $T(x, y) = (x + 2, y - 3)$ Which of the following is true about T?

   A.   T is a linear transformation

   B.   T is not a linear transformation because it does not preserve scalar multiplication

   C.   Kernal of $T = \{(2, -3)\}$

   D.   T is not a linear transformation because it does not preserve addition

24. Let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be a linear transformation such that T(1, 0) = (1, 1), T(0, 1) = (−1, 1). Then T(1, 4) =

   A.   (−3, −5)   B.   (3, −5)

   C.   (3, 5)   D.   (−3, 5)

25. Find the Laplace transform of $f(t) = t \ e^{2t}$.

   A. $\dfrac{1}{(s - 2)^2}$ B. $\dfrac{1}{s^2}$

   C. $\dfrac{1}{(s + 2)^2}$ D. $\dfrac{1}{(s - 2)^3}$

26. The combined mean of two groups with means $\bar{x}_1 = 60$, $\bar{x}_2 = 70$ and sizes $n_1 = 40, n_2 = 60$ is

   A.   65   B.   66

   C.   67   D.   68

27. The empirical relation between mean, median and mode is :

   A.   Mean = 3 × Mode − 2 × Median

   B.   Mode = 3 × Median − 2 × Mean

   C.   Median = $\dfrac{\text{Mean} + \text{Mode}}{2}$

   D.   Mode = 2 × Median − Mean

28. If all values of a dataset are increased by a constant, the standard deviation will :

A. Increase
B. Decrease
C. Remain unchanged
D. Become zero

29. A distribution with kurtosis greater than 3 is called :

A. Mesokurtic
B. Platykurtic
C. Leptokurtic
D. Skewed

30. Which of the following is not a discrete probability distribution?

A. Binomial
B. Poisson
C. Geometric
D. Normal

31. Which of the following is a non-probability sampling method?

A. Stratified sampling
B. Cluster sampling
C. Quota sampling
D. Systematic sampling

32. Spearman's rank correlation coefficient is used when :

A. Data is normally distributed
B. Data is on an interval scale
C. Data is ordinal or ranked
D. Data contains outliers

33. The number of permutations of the word "BALLOON" is :

A. 7!
B. 1260
C. 1620
D. 1062

34. If X is a random variable and a and b are constants then $\text{var}(aX + b) =$

A. $a \cdot \text{var}(X) + b$
B. $a \cdot \text{var}(X)$
C. $a^2 \text{var}(X)$
D. $a^2 \text{var}(X) + b$

35. The mean and variance of a binomial random variable X are 16 and 8 respectively. Then $P(X = 0)$ is

A. $\dfrac{1}{32}$
B. $\dfrac{1}{2^{32}}$
C. 2
D. 32

36. If X is a Poisson variable with $P(X=2)=P(X=3)$, then $E(X)$ is

A. 3
B. 2
C. 1
D. 0

37. The joint probability mass function of two random variables X and Y is given by
$p(x,y)=\begin{cases} k(2x+y): x=1, 2;\ y=1, 2 \\ 0, \qquad\qquad \text{otherwise} \end{cases}$. Then the constant k is

A. 18
B. 1
C. 8
D. $\dfrac{1}{18}$

38. How many numbers between 1000 and 9999 have all different digits?

A. 4536
B. 5463
C. 6453
D. 4563

39. A committee of 4 is to be formed from 6 men and 5 women such that at least 2 women are included. How many ways can this be done?

A. 300
B. 360
C. 200
D. 250

40. 100 fair coin are thrown. Then the expectation of the sum of the numbers thrown is :

A. 500
B. 250
C. 300
D. 350

41. The probability density function of a continuous random variable with density function $f(x)=\begin{cases} x(1-x): 0\le x\le 1 \\ 0, \qquad : \text{otherwise} \end{cases}$. Then $P\left(X\le\tfrac{1}{2}\right)$ is

A. 0
B. $\dfrac{1}{2}$
C. $\dfrac{1}{5}$
D. $\dfrac{1}{12}$

42. Random sample of size 225 are drawn from a population with standard deviation 20. Then the standard deviation of the sample mean is :

   A. 20

   B. $\dfrac{20}{225}$

   C. 0

   D. $\dfrac{20}{15}$

43. Which diagram is best for comparing parts of a whole?

   A. Line diagram
   B. Bar diagram
   C. Pie chart
   D. Histogram

44. Which of the following is a measure of dispersion?

   A. Median
   B. Mode
   C. Standard deviation
   D. Geometric mean

45. The Central Limit Theorem states that as sample size increases, the sampling distribution of the sample mean approaches :

   A. Uniform distribution
   B. Poisson distribution
   C. Normal distribution
   D. Exponential distribution

46. Which test is appropriate for comparing means of two independent small samples ($n < 30$)?

   A. Z-test
   B. Two sample t-test
   C. Chi-square test
   D. None of the above

47. Rejecting a true null hypothesis is called :

   A. Type I error
   B. Type II error
   C. Correct decision
   D. Power of the test

48. The significant level of the testing a hypothesis is :

   A. Probability of committing Type I error
   B. Probability of committing Type II error
   C. Probability of committing both Type I and Type II error
   D. None of these

49. The infant mortality rate is :

    A.   Deaths of children aged 0-5 per 1000

    B.   Deaths of infants under 1 year per 1000 live births

    C.   Births minus deaths

    D.   Percentage of population under 1 year

50. The main purpose of control charts is to :

    A.   Increase cost   B.   Eliminate defects entirely

    C.   Monitor process variation   D.   Compare workers

51. If a function $f(x) = x^3 - 6x^2 + 9x + 15$, $f(x) = x^3 - 6x^3 + 9x + 15$, then the minimum value occurs at :

    A. $x = 1, x = 1$ B. $x = 2, x = 2$

    C. $x = 3, x = 3$ D. $x = 0, x = 0$

52. The effective annual rate corresponding to a nominal annual rate of 12% compounded quarterly is :

    A.   12.55%   B.   12.00%

    C.   12.36%   D.   13.00%

53. The present value of an annuity-immediate of Rs. 1000 per year for 5 years at 8% interest is approximately :

    A.   Rs. 3990   B.   Rs. 4329

    C.   Rs. 3996   D.   Rs. 4592

54. Which of the following is a real account?

    A.   Cash   B.   Rent

    C.   Salary   D.   Interest paid

55. Double-entry bookkeeping means :

    A.   Recording each transaction twice

    B.   Posting transactions into two books

    C.   Every debit has a corresponding credit

    D.   Transactions are entered in two ledgers

56. The Law of Demand states that :
   A. Price and demand are directly related
   B. Price and demand are inversely related
   C. Price and supply are unrelated
   D. Demand creates its own supply

57. Which of the following is not a factor of production?
   A. Land
   B. Labour
   C. Capital
   D. Profit

58. The Weighted Average Cost of Capital (WACC) is best defined as :
   A. Cost of equity plus debt
   B. Risk-free rate of return
   C. Average rate firm pays on all its capital sources
   D. Return on assets

59. The primary goal of corporate finance is to :
   A. Maximize profits
   B. Maximize shareholder wealth
   C. Minimize costs
   D. Ensure liquidity

60. A Type I error occurs when :
   A. A false null hypothesis is accepted
   B. A true null hypothesis is rejected
   C. A true null hypothesis is accepted
   D. A false alternative hypothesis is accepted

61. The standard error of the mean decreases as :
   A. Sample size increases
   B. Population size decreases
   C. Standard deviation increases
   D. Sample size decreases

62. Whole life insurance provides coverage for :

    A.   A fixed term

    B.   Only up to 65 years

    C.   The entire life of the insured

    D.   After retirement only

63. The insurable interest in life insurance must exist at the time of :

    A.   Policy maturity   B.   Policy surrender

    C.   Claim settlement   D.   Policy inception

64. Which of the following is a non-life insurance product?

    A.   Term insurance   B.   Motor insurance

    C.   Endowment policy   D.   Whole life plan

65. In general insurance, the principle of indemnity means :

    A.   Providing profit to insured

    B.   Insured must not suffer loss

    C.   Compensation equals loss incurred

    D.   Double benefit on loss

66. Risk that affects a large number of people or firms is called :

    A.   Specific risk   B.   Systematic risk

    C.   Diversifiable risk   D.   Liquidity risk

67. SWOT analysis includes all except :

    A.   Strengths   B.   Weaknesses

    C.   Threats   D.   Bonds

68. The net premium reserve is calculated as :

    A.   Present value of future benefits minus future premiums

    B.   Sum assured divided by premium

    C.   Future benefits only

    D.   Future premiums only

69. The premium for a life insurance policy is primarily influenced by :
   A. Agent commission
   B. Underwriting expenses
   C. Mortality, interest and expenses
   D. Company's profit

70. The probability that both lives (x) and (y) survive t years is denoted by :
   A. $tpx + tpyt \_ p \wedge x + t \_ p \wedge y$
   B. $tpxyt \_ p \wedge \{xy\}$
   C. $qx \cdot qyq \_ x \backslash cdotq \_ y$
   D. $px \cdot qyp \_ x \backslash cdotq \_ y$

71. In joint life status, "last survivor" benefit is payable :
   A. On first death
   B. On second death
   C. On policy maturity
   D. On both deaths

72. Agricultural insurance in India primarily covers :
   A. Mortality
   B. Crop failure due to natural calamities
   C. Health of farmers
   D. Farm machinery theft

73. The Pradhan Mantri Fasal Bima Yojana (PMFBY) was launched in :
   A. 2012
   B. 2014
   C. 2016
   D. 2018

74. Gross Domestic Product (GDP) at market price includes :
   A. Indirect taxes minus subsidies
   B. Only direct taxes
   C. Only production
   D. Net National Product

75. Which of the following sectors contributes the most to India's GDP?
   A. Agriculture
   B. Manufacturing
   C. Services
   D. Mining

76. Which sector contributes the largest share to India's GDP in recent years?
    A. Agriculture   B. Industry
    C. Services   D. Mining

77. Who is known as the "Father of Indian Economic Planning"?
    A. P.C. Mahalanobis   B. Jawaharlal Nehru
    C. B.R. Ambedkar   D. M. Vishveshwarayya

78. The Human Development Index (HDI) is published by :
    A. World Bank   B. IMF
    C. UNDP   D. WTO

79. The term "inclusive growth" in India refers to :
    A. Growth limited to rural areas
    B. Growth shared across all sections of society
    C. Growth in export-oriented sectors
    D. Urban-centric growth

80. Which of the following is a direct tax?
    A. Sales tax   B. Excise duty
    C. Income tax   D. GST

81. NITI Aayog replaced the Planning Commission in :
    A. 2012   B. 2013
    C. 2014   D. 2015

82. Which gas is most responsible for the greenhouse effect?
    A. Oxygen   B. Carbon dioxide
    C. Nitrogen   D. Argon

83. DNA stands for :
    A. Deoxyribose Nucleic Acid   B. Dioxyribonucleic Acid
    C. Deoxyribonucleic Acid   D. Double Helix Nucleic Acid

84. Which organ in the human body is mainly responsible for detoxification?
   A. Heart
   B. Liver
   C. Kidney
   D. Lungs

85. The SI unit of electric current is :
   A. Ohm
   B. Volt
   C. Ampere
   D. Watt

86. The Kyoto Protocol deals with :
   A. Protection of ozone layer
   B. Control of population
   C. Reduction of greenhouse gases
   D. Protection of endangered species

87. Which of the following is a critically endangered species in India?
   A. Bengal Tiger
   B. Asian Elephant
   C. Great Indian Bustard
   D. Nilgai

88. Biodiversity refers to :
   A. Different species of plants and animals in a region
   B. Variation among plants only
   C. Variety of crops grown
   D. Difference in climates

89. One of the causes of acid rain is :
   A. Carbon monoxide
   B. Sulphur dioxide
   C. Methane
   D. Hydrogen

90. As of 2025, who is the President of India?
   A. Pranab Mukherjee
   B. Ram Nath Kovind
   C. Droupadi Murmu
   D. Jagdeep Dhankhar

91. The headquarters of ISRO is located in :
   A. Hyderabad
   B. Bangalore
   C. Thiruvananthapuram
   D. Chennai

92. PM Gati Shakti scheme is primarily related to :
   A. Rural employment
   B. Agricultural subsidies
   C. Infrastructure development
   D. MSME growth

93. The Indian National Space Promotion and Authorization Center (IN-SPACe) supports :
   A. Tourism
   B. Farming
   C. Private space sector
   D. Defence research

94. COP28 summit on climate change was held in :
   A. Paris, France
   B. Glasgow, UK
   C. Dubai, UAE
   D. New York, USA

95. The current Secretary-General of the United Nations (as of 2025) is :
   A. António Guterres
   B. Ban Ki-moon
   C. Tedros Adhanom
   D. Kristalina Georgieva

96. Which country recently joined BRICS in 2024?
   A. Argentina
   B. Iran
   C. Turkey
   D. Nigeria

97. The 2024 Nobel Peace Prize was awarded to :
   A. Greta Thunberg
   B. Malala Yousafzai
   C. Narges Mohammadi
   D. Denis Mukwege

98. India's first indigenous aircraft carrier is named :
   A. INS Arihant
   B. INS Vikramaditya
   C. INS Vikrant
   D. INS Virat

99. Which mission is associated with India's human spaceflight program?
   A. Chandrayaan
   B. Shukrayaan
   C. Gaganyaan
   D. Mangalyaan

100. The World Economic Forum is headquartered in :
   A. Geneva
   B. London
   C. Davos
   D. Paris

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RESPONSE SHEET

1 A B C D E	26 A B C D E	51 A B C D E	76 A B C D E
2 A B C D E	27 A B C D E	52 A B C D E	77 A B C D E
3 A B C D E	28 A B C D E	53 A B C D E	78 A B C D E
4 A B C D E	29 A B C D E	54 A B C D E	79 A B C D E
5 A B C D E	30 A B C D E	55 A B C D E	80 A B C D E
6 A B C D E	31 A B C D E	56 A B C D E	81 A B C D E
7 A B C D E	32 A B C D E	57 A B C D E	82 A B C D E
8 A B C D E	33 A B C D E	58 A B C D E	83 A B C D E
9 A B C D E	34 A B C D E	59 A B C D E	84 A B C D E
10 A B C D E	35 A B C D E	60 A B C D E	85 A B C D E
11 A B C D E	36 A B C D E	61 A B C D E	86 A B C D E
12 A B C D E	37 A B C D E	62 A B C D E	87 A B C D E
13 A B C D E	38 A B C D E	63 A B C D E	88 A B C D E
14 A B C D E	39 A B C D E	64 A B C D E	89 A B C D E
15 A B C D E	40 A B C D E	65 A B C D E	90 A B C D E
16 A B C D E	41 A B C D E	66 A B C D E	91 A B C D E
17 A B C D E	42 A B C D E	67 A B C D E	92 A B C D E
18 A B C D E	43 A B C D E	68 A B C D E	93 A B C D E
19 A B C D E	44 A B C D E	69 A B C D E	94 A B C D E
20 A B C D E	45 A B C D E	70 A B C D E	95 A B C D E
21 A B C D E	46 A B C D E	71 A B C D E	96 A B C D E
22 A B C D E	47 A B C D E	72 A B C D E	97 A B C D E
23 A B C D E	48 A B C D E	73 A B C D E	98 A B C D E
24 A B C D E	49 A B C D E	74 A B C D E	99 A B C D E
25 A B C D E	50 A B C D E	75 A B C D E	100 A B C D E

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ROUGH WORK

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