



Tribhuvan University
Institute of Science and Technology
SCHOOL OF MATHEMATICAL SCIENCES
BALKHU, KATHMANDU, NEPAL

Model Question for Written Entrance Examination
(For New Admission of B. Math. Sc. Major Actuarial Science Program)

Full Marks: 80

Time: 1:45 Hrs

Symbol No.:

General Instructions

Please read the following instructions carefully before you start answering the questions.

1. Write your **symbol No.** on your answer sheet.
2. Do not write anything else on your question sheet.
3. Use the blank paper given with the answer sheet for rough work.
4. Mark your correct answers by **darkening option** on your answer sheet.
5. Try answering all questions. *There is no negative marking for wrong answer.*
6. All sheets (**Question paper and rough papers**) must be submitted with the answer sheets.

How to Answer the Questions?

1. If $n(U) = 120, n(A)=90$ and $n(B)=55$, then minimum value of $n(A \cap B)$ is
a) 40 b) 25 c) 55 d) 35

Indicate your correct answer on the Answer Sheet

a

b

c

d

Solution

You should indicate your answer by darkening the correct answer choice (b) as shown below:

a

b

c

d

Section-I: Mathematics (40 Marks)

Find the correct answer for the questions given below.

1. If $n(U) = 120$, $n(A) = 90$ and $n(B) = 55$, then minimum value of $n(A \cap B)$ is
a) 40 b) 25 c) 55 d) 35
2. The solution set of the inequality $4 + 3x - x^2 > 0$ is
a) $(-\infty, -1)$ b) $(4, \infty)$ c) $(-\infty, \infty)$ d) $(-1, 4)$.
3. The range of the function $\frac{x+2}{|x+2|}$ is
a) $\{-1, 1\}$ b) $\{-1, 0, 1\}$ c) $\{-2, 2\}$ d) $[-1, 1]$
4. If $f(x) = 1 + \alpha x$, ($\alpha \neq 0$) is the inverse of itself, then the value of α is
a) -2 b) -1 c) 0 d) 2
5. If $\log_{1/2} x = -1$, then the value of x is
a) 2 b) $1/2$ c) -1 d) 0
6. If n A.M's are inserted between 3 and 17 and the ratio of first mean is to last mean is 1:3, then the value of n is
a) 4 b) 6 c) 8 d) 10
7. In an infinite geometric progression, the first term is equal to twice the sum of the remaining terms. Then its common ratio is
a) $2/3$ b) $1/3$ c) $5/4$ d) $1/6$
8. Let m and n be the number of elements of two finite sets. If the difference of their number of subsets is 24, then the value of m and n are
a) 7, 6 b) 5, 3 c) 6, 3 d) 6, 5
9. The number of ways in which n distinct objects can be put into three different boxes is
a) $3n$ b) 3^n c) n^3 d) ${}^n P_3$
10. If ${}^8 C_r - {}^7 C_3 = {}^7 C_2$, then the value of r is
a) 3 b) 5 c) 7 d) 9
11. If A is a skew symmetric matrix, then trace of A is
a) 1 b) -1 c) 0 d) 2
12. For any square matrix A , which of the following is true?
a) $|A| = |A^T|$ b) $|A^{-1}| = |A|$ c) $|A^{-1}| = \frac{1}{|A|}$ d) $A \operatorname{adj}(A) = |A|$
13. Value of $\left(\frac{1-i}{1+i}\right)^{1000}$ is

- a) -2 b) $-\frac{1}{2}$ c) 1 d) -1
14. The straight line $2x+3y=k$ forms a triangle with the coordinate axes whose area is 27 sq. unit. Then the value of k is
a) 9 b) $-\frac{27}{2}$ c) ± 18 d) ± 6
15. If the vectors $\vec{i} - 2\vec{j} + 4\vec{k}$ and $2\vec{i} + 7\vec{j} + m\vec{k}$ are orthogonal, then the value of m is
a) 3 b) $-\frac{1}{2}$ c) 2 d) -4
16. The length of the y-intercept made by the circle $x^2 + y^2 - 8x + y - 20 = 0$ is
a) 5 b) 9 c) 7 d) 6
17. Distance between the pair of lines represented by $x^2 - 6xy + 9y^2 + 3x - 9y - 4 = 0$ is
a) $\sqrt{\frac{1}{5}}$ b) $\sqrt{\frac{5}{2}}$ c) $\frac{\sqrt{3}}{4}$ d) $\frac{1}{2}$
18. After continue devaluation of pound-sterling dollars for 2 years at 10% p.a., the present exchange rate is £1= Rs. 72, what was the exchange rate 2 years ago?
a)Rs. 64.80 b)Rs. 7.20 c)Rs. 79.20 d)Rs. 88.88
19. In a certain store, the profit is 320% of the cost. If the cost increases by 25% but the selling price remains constant, approximately then the percentage of the selling price on profit is
a) 30% b) 100% c) 70% d) 250%
20. A man completes a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. The total journey (in km.) is
a) 220 km b) 230 km c) 224km d) 234 km
21. If 20% of $a = b$, then $b\%$ of 20 is the same as
a) 4% of a b) 5% of a c) 20% of a d) None
22. Two cars start towards each other from points 200 miles apart. One car travels at 40 miles per hours and the other travel at 35 miles per hour. How far apart will the two cars be after four hours of continuous traveling?
a) 20 b) 40 c) 75 d) 100
23. In any triangle ABC, if $a = 18$, $b = 24$ and $c = 30$, then the radius of in-circle is
a) 1 b) 9 c) 3 d) 6
24. In how many years will a sum of money double itself at 4% compound interest payable half yearly?
a) 17 years b) 17.5 years c) 18 years d) 18.5 years
25. A and B can do a work in 8 days, B and C can do the same work in 12 days. A, B and C together can finish it in 6 days. A and C together will do it in
a) 4 days b) 6 days c) 8 days d) 12 days

26. If the sum of the roots of a quadratic equation is 1 and the sum of their square is 13, then the equation is
 a) $x^2 - x - 6 = 0$ b) $x^2 - 12x + 13 = 0$ c) $x^2 - 5x + 6 = 0$ d) $x^2 - 7x - 10 = 0$
27. A sum of money is to be distributed among A, B, C, D in the proportion of 5:2: 4: 3. If C gets Rs. 1000 more than D, what is B's share?
 a) Rs. 500 b) Rs. 1500 c) Rs. 2000 d) 400
28. The number of solutions of the system $x+4y-z = 0$, $3x-4y-z = 0$ and $x-3y+z = 0$ is
 a) 0 b) 1 c) 2 d) infinite
29. The value of $\lim_{n \rightarrow \infty} \frac{1-n^2}{\sum n}$ is
 a) 1 b) $\frac{1}{2}$ c) -2 d) -1
30. The point of discontinuity of the function $\frac{1}{1+2^{\frac{1}{x}}}$ is
 a) 1 b) 0 c) e d) No discontinuity point
31. The differential coefficient of e^x with respect to \sqrt{x} is
 a) e^{x^2} b) $e^{\sqrt{x}}$ c) $\frac{e^x}{e^{\sqrt{x}}}$ d) $2\sqrt{x}e^x$
32. If $y = \frac{x}{1} + \frac{x^2}{2} + \frac{x^3}{3} + \dots$, then $\frac{dy}{dx} =$
 a) $\frac{1}{1-x}$ b) $\ln(1-x)$ c) $\ln(1+x)$ d) e^x
33. A function f is such that $f'(4) = f''(4) = 0$ and f has minimum value 10 at $x = 4$. Then $f(x)$ is
 a) $4+(x-4)^5$ b) $4+(x-4)^4$ c) $10+(x-4)^4$ d) $10+(x-4)^3$
34. The value of $\int \frac{e^{2x}}{1+e^x} dx$ is
 a) $1+e^x - \ln(1+e^x) + C$ b) $e^x + \ln(1+e^x) + C$
 c) $e^x - \ln(1+e^x) + C$ d) $\ln(1+e^x) + C$
35. The value of $\int_2^3 f(5-x) dx - \int_2^3 f(x) dx$ is
 a) $2f(x) + C$ b) 5 c) -3 d) 0
36. The area of the region bounded by the curves $y=x^2$ and $y = |x|$ is
 a) $\frac{1}{2}$ b) $\frac{1}{4}$ c) $\frac{7}{3}$ d) $\frac{1}{3}$

37. The mean weight of 100 students in a certain class is 59 kg. The mean weight of the boys in the class is 65 kg and that of the girls is 50 kg, then the number of boys and girls in the class is
- a) 60 and 40 b) 40 and 60 c) 50 and 50 d) 58 and 57
38. The mean and the standard deviation of a set of 100 observations were found to be 30 and 20 respectively. On checking, it was found that two observations were wrongly taken as 20 and 50 instead of 25 and 35, the correct standard deviation is
- a) 29.90 b) 29 c) 19 d) 19.87
39. Which of the following is correct?
- a) $MD = \frac{1}{N} \sum f |X - \bar{X}|$ b) $MD = \frac{1}{N} \sum f |X + M_0|$
- c) $M_0 = \frac{f_M - f_p}{(f_M - f_p) + (f_M - f_s)} \times h$ d) all
40. The probability that there will be 5 sundays in the month of July is
- a) $\frac{3}{7}$ b) $\frac{5}{12}$ c) $\frac{5}{7}$ d) $\frac{3}{30}$

Section-II: English (20 Marks)

Read the passage below and answer Q.no.41 to 45.

Philosophy of Education is a label applied to the study of the purpose, process, nature and ideals of education. It can be considered a branch of both philosophy and education. Education can be defined as the teaching and learning of specific skills, and the imparting of knowledge, judgment and wisdom, and is something broader than the societal institution of education we often speak of. Many educationalists consider it a weak and woolly field, too far removed from the practical applications of the real world to be useful. But philosophers dating back to Plato and the Ancient Greeks have given the area much thought and emphasis, and there is little doubt that their work has helped shape the practice of education over the millennia.

Plato is the earliest important educational thinker, and education is an essential element in "The Republic" (his most important work on philosophy and political theory, written around 360 B.C.). In it, he advocates some rather extreme methods: removing children from their mothers' care and raising them as wards of the state, and differentiating children suitable to the various castes, the highest receiving the most education, so that they could act as guardians of the city and care for the less able. He believed that education should be holistic, including facts, skills, physical discipline, music and art. Plato believed that talent and intelligence is not distributed genetically and thus is to be found in children born to all classes, although his proposed system of selective public education for an educated minority of the population does not really follow a democratic model.

Aristotle considered human nature, habit and reason to be equally important forces to be cultivated in education, the ultimate aim of which should be to produce good and virtuous citizens. He proposed that teachers lead their students systematically, and that repetition be used as a key tool to develop good habits, unlike Socrates' emphasis on questioning his listeners to bring out their own ideas. He emphasized the balancing of the theoretical and practical aspects of

subjects taught, among which he explicitly mentions reading, writing, mathematics, music, physical education, literature, history, and a wide range of sciences, as well as play, which he also considered important.

During the Medieval period, the idea of Perennialism was first formulated by St. Thomas Aquinas in his work "De Magistro". Perennialism holds that one should teach those things deemed to be of everlasting importance to all people everywhere, namely principles and reasoning, not just facts (which are apt to change over time), and that one should teach first about people, not machines or techniques. It was originally religious in nature, and it was only much later that a theory of secular perennialism developed.

During the Renaissance, the French skeptic Michel de Montaigne (1533 – 1592) was one of the first to critically look at education. Unusually for his time, Montaigne was willing to question the conventional wisdom of the period, calling into question the whole edifice of the educational system, and the implicit assumption that university-educated philosophers were necessarily wiser than uneducated farm workers.

41. What is the difference between the approaches of Socrates and Aristotle?
 - a) Aristotle felt the need for repetition to develop good habits in students; Socrates felt that students need to be constantly questioned
 - b) Aristotle felt the need for rote-learning; Socrates emphasized on dialogic learning
 - c) There was no difference
 - d) Aristotle emphasized on the importance of paying attention to human nature; Socrates emphasized upon science
42. Why do educationists consider philosophy a ‘weak and woolly’ field?
 - a) It is irrelevant for education
 - b) Its theoretical concepts are easily understood
 - c) It is not practically applicable
 - d) None of the above
43. What do you understand by the term ‘Perennialism’, in the context of the given comprehension passage?
 - a) It refers to something which is of ceaseless importance
 - b) It refers to something which is quite unnecessary
 - c) It refers to something which is abstract and theoretical
 - d) It refers to something which existed in the past and no longer exists now
44. Were Plato’s beliefs about education democratic?
 - a) He believed that only the rich have the right to acquire education
 - b) Yes
 - c) He believed that only a select few are meant to attend schools
 - d) He believed that all pupils are not talented
45. Why did Aquinas propose a model of education which did not lay much emphasis on facts?
 - a) Facts are not important
 - b) Facts do not lead to holistic education
 - c) Facts change with the changing times
 - d) Facts are frozen in time

Find the correct answer for the questions given below.

46. The police arrived ...the nick of time and caught the criminal red handed.
a) at b) by c) on d) in
47. It appears that she is enjoying herself.....?
a) does she b) doesn't she c) isn't it d) isn't she
48. The new teacher says, "Some students are extraordinarily brilliant." can be reported as:
a) The teacher says that some students were extraordinarily brilliant.
b) The teacher said that some students are extraordinarily brilliant.
c) The teacher says that some students are extraordinarily brilliant.
d) The teacher says that some students had been extraordinarily brilliant.
49. The negative statement of "Very few invitees participated in the seminar." is
a) Very few invitees didn't participate in the seminar.
b) No invitees participated in the seminar.
c) Not many invitees participated in the seminar.
d) Very few invitees didn't participated in the seminar.
50. Which of the following is closest in meaning to "a person who adheres rigidly to book knowledge without regard to common sense."?
a) assassinator b) black sheep c) chromatics d) pedant
51. The speaker used aeuphemism for an unpleasant subject. The best definition of the underlined word is
a) ugly picture b) substituted word c) visual aid d) an assistant
52. Which is closest in meaning to the phrase "let the cat out of the bag"?
a) to examine b) to distribute
c) to share a concealed information d) to acquire glory
53. You hit me sowith the ball that my arm is still aching.
a) hardly b) forcely c) force d) hard
54. Thethat all doctors are infallible still persists in some parts of the world.
a) illusion b) allusion c) delusion d) elision
55. Rssuka's poor typing skills were a to finding a new job nearby her residence.
a) hindrance b) recommendation c) temptation d) partiality
56. The art of gardening is called
a) cariculture b) periculture c) floriculture d) horticulture
57. The correct synonym of the word exuberant is
a) ebullient b) versatile c) eloquent d) extempore
58. I was disinterested about having a banana pie, but my friend.....it at a local restaurant.
a) gets me to try b) had me to try c) got me to try d) have me to try
59. "Wordsworth's poems evoke the memories of the past." Can be written in the passive voice as.....
a) The memories of the past are evoked by Wordsworth's poems.
b) Wordsworth's poems are evoked by the memories of the past.

- c) The memories of the past is evoked by Wordsworth's poems.
 d) Wordsworth's poems is evoked by the memories of the past.
60. He talks about Dharan in such a way as if he...there for ages.
 a) has lived b) lived c) had liven d) lives

Section-III: General Knowledge and IQ (20 Marks)

Choose the correct answer for the questions given below.

61. Who was the bowler to bowl out Sachin Tendulkar for the first time ever in Sachin's ICC Test Career?
 a) SalilAnkola b) Shahid Saeed c) RuwanKalpage d) WaqarYounis
62. Which is the largest glacier of Asia continent?
 a) Purugangri Glacier b) Kangshung Glacier
 c) Siachen Glacier d) Gondogoro Glacier
63. Which were the three ships that Columbus used in his first voyage to America?
 a) The Nina, The Pinta and Santa Barbara
 b) The Nina, Santa Maria and Santa Barbara
 c) The Nina, The Pinta and Santa Maria
 d) Santa Maria, The Pinta and Santa Barbara
64. Who was the creator of the famous website Wikipedia?
 a) Julian Assange and Mark Juckerberg b) Jimmy Wales and Larry Sanger
 c) Bill Gates and Sergey Brin d) Sergey Brin and Larry Sanger
65. Who wrote the autobiography "The Story of My life"?
 a) Helen Keller b) Mahatma Gandhi
 c) Barrack Obama d) Nelson Mandela
66. Which is the biggest Hydro Project that is being wholly financed by the Nepalese investors?
 a) Upper Trishuli Hydro Project b) Upper Karnali Hydro Project
 c) Upper Tarun III Hydro Project d) Upper Tamakoshi Hydro Project
67. Which famous international brand does the slogan "Because You're Worth It" belong to?
 a) BMW b) Apple c) Toyota d) L'Oreal
68. Which animal is imprinted in a 500 rupees Nepali note?
 a) Cow b) Rhino c) Elephant d) Tiger
69. To which product is the brand name "Bimbo" associated with?
 a) sanitary pads b) bakery c) automobiles d) toothpaste
70. Who is the author of the famous Bengali novel "Devdas" which is adapted into many movies?
 a) Rabindra Nath Tagore b) Haribansha Rai Bachhan
 c) Sarat Chandra Chattopadhyay d) Sarad Lal Das
71. Who said "You must be the change you wish to see in the world"?
 a) Barack Obama b) Donald Trump
 c) Narendra Modi d) Mahatma Gandhi

72. In which district is Jhilmile Taal located?
a) Kanchanpur b) Surkhet c) Palpa d) Kaski
73. If Pacific Ocean is Triangular shaped and Atlantic Ocean is English alphabet S shaped, what is the shape of Indian Ocean?
a) Rectangular b) English Alphabet L c) Quadrilateral d) English Alphabet U
74. Which number should come next in the sequence 123, 234, 345,...?
a) 435 b) 543 c) 456 d) 453
75. Marathon is to race as hibernation is to
a) sleep b) bear c) dream d) winter
76. Pointing to a photograph of a boy Suresh said, "He is the son of the only son of my mother." How is Suresh related to that boy?
a) son b) uncle c) grand-father d) father
77. Two students appeared at an examination. One of them secured 9 marks more than the other and his marks was 56% of the sum of their marks. The marks obtained by them are:
a) 39, 30 b) 41, 32 c) 42, 33 d) 43,
78. The angle of elevation of a ladder leaning against a wall is 60° and the foot of the ladder is 4.6 m away from the wall. The length of the ladder is:
a) 9.2 m b) 2.9 m c) 7.8 m d) 8.7 m
79. Complete the following word analogy: **Buzz: Bees :: Chirp:?**
a) bat b) sparrow c) monkey d) cricket
80. Seema started early in the morning on the road towards the sun. After some time she turned to her left. Again after some time she turned to her right. After moving some distance she again turned to her right and began to move. At this time, in which direction was she moving?
a) North b) East c) West d) South

□□

Sample Answer Sheet

Symbol No. :

Symbol No. (In Words):

- | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. | (a) | (b) | (c) | (d) | 21. | (a) | (b) | (c) | (d) | 41. | (a) | (b) | (c) | (d) | 61. | (a) | (b) | (c) | (d) |
| 2. | (a) | (b) | (c) | (d) | 22. | (a) | (b) | (c) | (d) | 42. | (a) | (b) | (c) | (d) | 62. | (a) | (b) | (c) | (d) |
| 3. | (a) | (b) | (c) | (d) | 23. | (a) | (b) | (c) | (d) | 43. | (a) | (b) | (c) | (d) | 63. | (a) | (b) | (c) | (d) |
| 4. | (a) | (b) | (c) | (d) | 24. | (a) | (b) | (c) | (d) | 44. | (a) | (b) | (c) | (d) | 64. | (a) | (b) | (c) | (d) |
| 5. | (a) | (b) | (c) | (d) | 25. | (a) | (b) | (c) | (d) | 45. | (a) | (b) | (c) | (d) | 65. | (a) | (b) | (c) | (d) |
| 6. | (a) | (b) | (c) | (d) | 26. | (a) | (b) | (c) | (d) | 46. | (a) | (b) | (c) | (d) | 66. | (a) | (b) | (c) | (d) |
| 7. | (a) | (b) | (c) | (d) | 27. | (a) | (b) | (c) | (d) | 47. | (a) | (b) | (c) | (d) | 67. | (a) | (b) | (c) | (d) |
| 8. | (a) | (b) | (c) | (d) | 28. | (a) | (b) | (c) | (d) | 48. | (a) | (b) | (c) | (d) | 68. | (a) | (b) | (c) | (d) |
| 9. | (a) | (b) | (c) | (d) | 29. | (a) | (b) | (c) | (d) | 49. | (a) | (b) | (c) | (d) | 69. | (a) | (b) | (c) | (d) |
| 10. | (a) | (b) | (c) | (d) | 30. | (a) | (b) | (c) | (d) | 50. | (a) | (b) | (c) | (d) | 70. | (a) | (b) | (c) | (d) |
| 11. | (a) | (b) | (c) | (d) | 31. | (a) | (b) | (c) | (d) | 51. | (a) | (b) | (c) | (d) | 71. | (a) | (b) | (c) | (d) |
| 12. | (a) | (b) | (c) | (d) | 32. | (a) | (b) | (c) | (d) | 52. | (a) | (b) | (c) | (d) | 72. | (a) | (b) | (c) | (d) |
| 13. | (a) | (b) | (c) | (d) | 33. | (a) | (b) | (c) | (d) | 53. | (a) | (b) | (c) | (d) | 73. | (a) | (b) | (c) | (d) |
| 14. | (a) | (b) | (c) | (d) | 34. | (a) | (b) | (c) | (d) | 54. | (a) | (b) | (c) | (d) | 74. | (a) | (b) | (c) | (d) |
| 15. | (a) | (b) | (c) | (d) | 35. | (a) | (b) | (c) | (d) | 55. | (a) | (b) | (c) | (d) | 75. | (a) | (b) | (c) | (d) |
| 16. | (a) | (b) | (c) | (d) | 36. | (a) | (b) | (c) | (d) | 56. | (a) | (b) | (c) | (d) | 76. | (a) | (b) | (c) | (d) |
| 17. | (a) | (b) | (c) | (d) | 37. | (a) | (b) | (c) | (d) | 57. | (a) | (b) | (c) | (d) | 77. | (a) | (b) | (c) | (d) |
| 18. | (a) | (b) | (c) | (d) | 38. | (a) | (b) | (c) | (d) | 58. | (a) | (b) | (c) | (d) | 78. | (a) | (b) | (c) | (d) |
| 19. | (a) | (b) | (c) | (d) | 39. | (a) | (b) | (c) | (d) | 59. | (a) | (b) | (c) | (d) | 79. | (a) | (b) | (c) | (d) |
| 20. | (a) | (b) | (c) | (d) | 40. | (a) | (b) | (c) | (d) | 60. | (a) | (b) | (c) | (d) | 80. | (a) | (b) | (c) | (d) |

Marks Obtained:

Marks Obtained (In Words):

Signature:

