Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Fourth Semester)
(NEP) EXAMINATION, 2025-26
STATISTICS
(Biostatistics) (Elective)

Paper Code							
B	0	6	1	0	0	3	T

Questions Booklet Series
A

Time : 1:30 Hours] [*Maximum Marks : 75*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.

3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।

2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।

3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page) **(शेष निर्देश अन्तिम पृष्ठ पर)**

(Only for Rough Work)

1. Which measure of morbidity reflects the number of new cases of a disease in a population over a specific time ?
   (A) Prevalence
   (B) Incidence Rate
   (C) Case Fatality Rate
   (D) Cumulative Frequency

2. Prevalence is best described as :
   (A) A measure of risk
   (B) A measure of the burden of disease at a specific time
   (C) The rate of recovery
   (D) The speed of disease spread

3. If the duration of a disease increases (e.g., better survival without cure), the prevalence will :
   (A) Decrease
   (B) Stay the same
   (C) Increase
   (D) Become zero

4. The formula for the relationship between Prevalence (P), Incidence (I), and Mean Duration (D) in a steady state is :
   (A) $P = I / D$
   (B) $P = I + D$
   (C) $P = I \times D$
   (D) $I = P \times D$

5. A "Problem with Prevalence Measurement" includes :
   (A) Difficulty in identifying the start of the disease
   (B) High cost of calculation
   (C) Inclusion of only new cases
   (D) It is unaffected by migration

6. Incidence is generally more useful than prevalence for :
   (A) Allocating hospital beds
   (B) Studying the etiology (causes) of a disease
   (C) Determining the total number of people needing medication
   (D) Measuring chronic disease burden

7. Kappa statistics are primarily used to assess :
   (A) The mean difference between two groups
   (B) The extent of agreement between observers beyond chance
   (C) The correlation between height and weight
   (D) The significance of a regression slope

8. A Kappa value of 0.8 to 1.0 indicates :

(A) Poor agreement

(B) Moderate agreement

(C) Substantial to Perfect agreement

(D) No agreement

9. The Mantel-Haenszel test is often used in Unit I contexts to :

(A) Calculate simple averages

(B) Test for clinical agreement across different strata

(C) Measure the volume of blood

(D) Determine the age of a patient

10. Intra-class correlation (ICC) is preferred over Pearson's correlation for reliability because :

(A) It accounts for both correlation and systematic differences between raters

(B) It is easier to calculate by hand

(C) It only works for categorical data

(D) It ignores the mean of the samples

11. Which of the following is an example of 'Incidence Density' ?

(A) 50 cases per 1,000 people

(B) 50 cases per 1,000 person-years

(C) 5% of the population

(D) 10 deaths per month

12. Person-time at risk is the denominator for :

(A) Point prevalence

(B) Period prevalence

(C) Incidence rate

(D) Attack rate

13. In a population of 10,000, 500 people have Diabetes on Jan 1st. During the year, 100 more develop it. What is the point prevalence on Jan 1st ?

(A) 1%

(B) 5%

(C) 6%

(D) 10%

14. Referring to question 13, what is the annual incidence (assuming the 10,000 were all at risk initially) ?

(A) 10 per 1,000

(B) 50 per 1,000

(C) 60 per 1,000

(D) 100 per 1,000

15. Clinical agreement refers to :

(A) How much a doctor likes a patient

(B) The consistency between two different diagnostic methods or observers

(C) The cost of a medical procedure

(D) The speed of a lab result

16. If a disease is highly fatal and has a very short duration :

(A) Prevalence will be high

(B) Incidence will be much lower than prevalence

(C) Prevalence will be low and similar to incidence

(D) Incidence cannot be measured

17. Which is a 'Measure of Morbidity' ?

(A) Crude Death Rate

(B) Infant Mortality Rate

(C) Attack Rate

(D) Standardized Mortality Ratio

18. The 'numerator' for incidence includes :

(A) All existing cases

(B) Only new cases

(C) All deaths

(D) Only healthy people

19. 'Period Prevalence' includes :

(A) Cases existing at the start + new cases during the period

(B) Only cases at the end of the period

(C) Only deaths during the period

(D) Only people who recovered

20. A major problem with using hospital records for incidence is :

(A) Records are too detailed

(B) They only represent people who seek care (Selection Bias)

(C) They are always written in ink

(D) They don't include the patient's age

21. Intra-class correlation is used for :

(A) Categorical data

(B) Continuous/Quantitative data

(C) Nominal data only

(D) Binary data only

22. The 'Steady State' assumption in biostatistics means :

(A) Everyone is healthy

(B) The number of people entering a state is equal to those leaving it

(C) No one ever dies

(D) The population is growing rapidly

23. Kappa of 0 means :

(A) Perfect agreement

(B) Agreement is no better than chance

(C) Total disagreement

(D) High reliability

24. Which measurement is affected by the 'Silent Period' of a disease ?

(A) Mortality

(B) Incidence

(C) Birth rate

(D) Literacy rate

25. The denominator of prevalence is :

(A) People at risk

(B) Total population (sick + healthy)

(C) Only sick people

(D) Person-years

26. The ability of a test to correctly identify those who HAVE the disease is :

(A) Specificity

(B) Sensitivity

(C) Reliability

(D) Precision

27. Specificity is the proportion of :

(A) Diseased people who test positive

(B) Healthy people who test negative

(C) Positive tests that are true

(D) Negative tests that are true

28. Positive Predictive Value (PPV) answers the question :

(A) If the test is positive, what is the probability the patient has the disease ?

(B) If the patient has the disease, what is the probability of a positive test ?

(C) How many people were tested ?

(D) Is the test expensive ?

29. As the prevalence of a disease increases in a population :

(A) Sensitivity increases

(B) Specificity decreases

(C) PPV increases

(D) NPV increases

30. Reliability of a test refers to its :

(A) Accuracy

(B) Consistency/Repeatability

(C) Cost

(D) Legality

31. A test that always gives the same wrong result is :

(A) Valid but not reliable

(B) Reliable but not valid

(C) Both valid and reliable

(D) Neither valid nor reliable

32. The 'Gold Standard' is :

(A) A very expensive test

(B) The best available diagnostic test used for comparison

(C) A test that uses gold particles

(D) The first test ever invented

33. Sensitivity and Specificity are :

(A) Dependent on prevalence

(B) Inherent characteristics of the test

(C) Measures of reliability

(D) Used only for treatment, not screening

34. A False Positive is when :

(A) A sick person tests negative

(B) A healthy person tests positive

(C) A sick person tests positive

(D) A healthy person tests negative

35. Negative Predictive Value (NPV) is :

(A) TN / (TN + FN)

(B) TP / (TP + FP)

(C) TN / (TN + FP)

(D) TP / (TP + FN)

36. An ROC Curve plots :

(A) Sensitivity *vs.* Specificity

(B) Sensitivity *vs.* (1-Specificity)

(C) PPV *vs.* NPV

(D) Incidence *vs.* Age

37. The 'Area Under the Curve' (AUC) of an ROC curve measures :

(A) The cost of the test

(B) The overall accuracy of the test

(C) The number of participants

(D) The prevalence

38. An AUC of 0.5 indicates :

(A) A perfect test

(B) A test with no diagnostic value (random chance)

(C) High sensitivity

(D) High specificity

39. The relationship between validity and reliability is :

(A) High reliability guarantees high validity

(B) Reliability is a necessary but not sufficient condition for validity

(C) They are the same thing

(D) Validity is easier to measure than reliability

40. If we move the 'cutoff' point to increase sensitivity :

(A) Specificity will likely decrease

(B) Specificity will likely increase

(C) PPV will definitely increase

(D) The test becomes more reliable

41. 'Overall Accuracy' is calculated as :

(A) (TP + TN) / Total

(B) TP / Total

(C) TN / Total

(D) (FP + FN) / Total

42. Screening tests are usually designed to have high :

(A) Specificity
(B) Sensitivity
(C) Cost
(D) Complexity

43. Confirmatory tests are usually designed to have high :

(A) Sensitivity
(B) Specificity
(C) Prevalence
(D) Incidence

44. Intrarater reliability refers to :

(A) Consistency between two different doctors
(B) Consistency of the same doctor at two different times
(C) Consistency between two different labs.
(D) Consistency of the patient's symptoms

45. Interrater reliability refers to :

(A) Consistency between different observers
(B) Consistency of the same observer
(C) Reliability of the machine
(D) The validity of the result

46. False negative rate is equal to :

(A) 1 – Sensitivity
(B) 1 – Specificity
(C) 1 – PPV
(D) 1 – NPV

47. False positive rate is equal to :

(A) 1 – Sensitivity
(B) 1 – Specificity
(C) 1 – PPV
(D) 1 – NPV

48. A test with 100% Sensitivity will have :

(A) No False Positives
(B) No False Negatives
(C) 100% Specificity
(D) 100% PPV

49. Predictive values are influenced by :

(A) Only the test's sensitivity
(B) Only the test's specificity
(C) The prevalence of the disease in the population being tested
(D) The color of the test strip

50. Which is NOT a measure of validity ?

(A) Sensitivity
(B) Specificity
(C) Kappa
(D) AUC

51. 'Association' in biostatistics means :

(A) One variable causes the other

(B) Two variables move together (correlate)

(C) Both variables are zero

(D) The researcher likes the variables

52. Causal inference is the process of :

(A) Proving a correlation

(B) Determining if an association is likely to be cause-and-effect

(C) Calculating the mean

(D) Writing a summary

53. Which of the following is a criterion for causation (Hill's Criteria) ?

(A) High cost

(B) Temporal relationship (cause precedes effect)

(C) Complexity

(D) Small sample size

54. A 'Confounder' must be :

(A) Associated with the exposure

(B) Associated with the outcome (independent of exposure)

(C) Not an intermediate step in the causal pathway

(D) All of the above

55. Systematic error that leads to an incorrect estimate of association is :

(A) Random Error

(B) Bias

(C) Standard Deviation

(D) P-value

56. Selection bias occurs when :

(A) Participants in the study differ systematically from those not in the study

(B) The scale is broken

(C) The computer crashes

(D) The *p*-value is 0.04

57. Information bias (or Measurement bias) results from :

(A) Wrong sample size

(B) Inaccurate measurement or classification of exposure or outcome

(C) Using the wrong software

(D) Including too many variables

58. 'Controlling confounding' can be done at the design stage by :

(A) Randomization

(B) Matching

(C) Restriction

(D) All of the above

59. 'Controlling confounding' at the analysis stage is done by :

(A) Stratification

(B) Using a larger font

(C) Ignoring the data

(D) Increasing the sample size

60. Measurement of Interaction (Effect Modification) occurs when :

(A) A confounder is present

(B) The effect of an exposure varies across different levels of another variable

(C) The study is double-blind

(D) The results are statistically insignificant

61. Generalizability (External Validity) refers to :

(A) How well the study applies to the specific participants

(B) How well the results apply to other populations

(C) The accuracy of the lab

(D) The length of the report

62. Absolute Risk is simply the :

(A) Ratio of two rates

(B) Incidence of the disease in a group

(C) Difference between two rates

(D) Probability of death

63. Relative Risk (RR) is calculated as :

(A) Incidence in exposed/Incidence in unexposed

(B) Incidence in exposed – Incidence in unexposed

(C) Odds in exposed/Odds in unexposed

(D) Prevalence/Incidence

64. An RR of 1.0 indicates :

(A) Increased risk

(B) Decreased risk

(C) No association

(D) Error in calculation

65. An RR of 2.0 means :

(A) The risk is doubled in the exposed group

(B) The risk is halved

(C) There is no difference

(D) The disease is cured

66. Odds Ratio (OR) is calculated as :

(A) (a/b) / (c/d) or (ad/bc)

(B) (a/c) / (b/d)

(C) a/(a + b)

(D) c/(c + d)

67. In a Case-Control study, the primary measure of association is :

(A) Relative Risk

(B) Odds Ratio

(C) Incidence Rate

(D) Mean Difference

68. In a Cohort study, the primary measure of association is :

(A) Relative Risk
(B) Odds Ratio
(C) Sensitivity
(D) Specificity

69. Recall Bias is a type of :

(A) Selection Bias
(B) Information Bias
(C) Confounding
(D) Random Error

70. Randomization helps eliminate :

(A) Known confounders
(B) Unknown confounders
(C) Both known and unknown confounders
(D) None of the above

71. Blinding (Masking) is used to reduce :

(A) Confounding
(B) Information bias
(C) Selection bias
(D) Sample size

72. 'Internal Validity' means :

(A) The study results are applicable to the whole world
(B) The study results are true for the population studied
(C) The researcher is honest
(D) The data is stored internally

73. A dose-response relationship (Biological Gradient) supports :

(A) Reliability
(B) Causation
(C) Specificity
(D) Prevalence

74. If RR < 1.0, the exposure is :

(A) Harmful
(B) Protective
(C) Neutral
(D) Random

75. 'Risk Difference' is another name for :

(A) Relative Risk
(B) Attributable Risk
(C) Odds Ratio
(D) Prevalence

76. Attributable Risk (AR) is calculated as :

(A) Incidence in exposed / Incidence in unexposed
(B) Incidence in exposed – Incidence in unexposed
(C) Odds of exposure
(D) 1 – Specificity

77. Attributable Risk represents :

(A) The strength of an association
(B) The potential for prevention if the exposure is removed
(C) The accuracy of a test
(D) The number of people in a study

78. Which is better for identifying the 'Public Health Impact' of an exposure ?

(A) Relative Risk

(B) Attributable Risk

(C) P-value

(D) Correlation Coefficient

79. Odds Ratio (OR) approximates Relative Risk (RR) when :

(A) The disease is common

(B) The disease is rare (Rare Disease Assumption)

(C) The sample size is large

(D) The study is prospective

80. A Retrospective study (Case-Control) starts with :

(A) The exposure and looks for the outcome

(B) The outcome and looks back for the exposure

(C) Healthy people and follows them

(D) A drug trial

81. A Prospective study (Cohort) starts with :

(A) The outcome

(B) The exposure

(C) The past

(D) The end of the study

82. Exact Inference for Odds Ratio is used when :

(A) Sample sizes are very large

(B) Cell counts in the 2×2 table are very small or zero

(C) The data follows a normal distribution

(D) The researcher is in a hurry

83. Matched Case-Control data analysis focuses on :

(A) Concordant pairs

(B) Discordant pairs

(C) The whole population

(D) Only the cases

84. In matched analysis, if both case and control are exposed, the pair is :

(A) Discordant

(B) Concordant

(C) Invalid

(D) Independent

85. Population Attributable Risk (PAR) tells us :

(A) The risk for one person

(B) The excess risk in the whole population due to an exposure

(C) The total number of deaths

(D) The birth rate

86. Which measure is most relevant for a clinician advising an individual patient ?

(A) Relative Risk

(B) Attributable Risk

(C) PAR

(D) Mean

87. Which measure is most relevant for a government health policy maker ?

(A) Relative Risk

(B) Population Attributable Risk

(C) Sensitivity

(D) Kappa

88. If the OR in a matched case-control study is calculated as b/c, what are b and c ?

(A) Number of concordant pairs

(B) Number of discordant pairs (Cases exposed/Control not, and vice versa

(C) The total number of cases

(D) The total number of controls

89. Retrospective Odds Ratios are :

(A) Always higher than RR

(B) Always lower than RR

(C) Used when incidence cannot be calculated directly

(D) Only used for infectious diseases

90. The DHS (Demographic and Health Surveys) often report on :

(A) Only laboratory results

(B) Large scale population-based health and nutrition indicators

(C) Individual hospital billing

(D) Veterinary medicine

91. Which of the following is a limitation of retrospective studies ?

(A) They are very expensive

(B) They are prone to recall bias

(C) They take a long time to complete

(D) They are not good for rare diseases

92. Lead-time bias relates to :

(A) The speed of a doctor

(B) Earlier detection of disease through screening appearing to increase survival

(C) The time it takes to publish a paper

(D) The age of the patient

93. Length-time bias occurs because :

(A) Screening identifies fast-growing tumors more easily

(B) Screening identifies slow-growing (less aggressive) tumors more easily

(C) The study lasts too long

(D) The questionnaire is too long.

94. "Number Needed to Treat" (NNT) is :

(A) 1/Relative Risk

(B) 1/Absolute Risk Reduction (or AR)

(C) 1/ Sensitivity

(D) 1/Odds Ratio

95. In a 2 × 2 table, if a = 10, b = 20, c = 5, d = 100, what is the cross-product ratio (OR) ?

(A) (10 × 100) /(20 × 5) = 10

(B) (10 × 20) /(100 × 5) = 0.4

(C) 10/135

(D) 10/30

96. A confidence interval for RR that is (1.5, 3.5) means :

(A) The result is not significant

(B) The result is statistically significant (does not include 1.0)

(C) The exposure is protective

(D) The study is biased

97. An OR of 0.4 suggests :

(A) Exposure is a risk factor

(B) Exposure is protective (60% reduction in odds)

(C) Exposure has no effect

(D) The test is invalid

98. Comparison of RR and AR : RR tells us about the …… of association, while AR tells us about the ……..of the association

(A) strength; public health impact

(B) impact; strength

(C) color; weight

(D) validity; reliability

99. Which study design is best for a 'rare exposure' ?

(A) Case-control

(B) Cohort

(C) Cross-sectional

(D) Case report

100. Which study design is best for a 'rare disease' ?

(A) Cohort

(B) Case-control

(C) Randomized Controlled Trial

(D) Survey

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।