Roll No. ....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Biochemistry) (Second Semester)
EXAMINATION, July, 2022

BIOSTATISTICS, COMPUTER APPLICATION & IPR

Paper Code

BCH | 2 | 0 | 0 | 4

Time : 1:30 Hours]

[*Maximum Marks : 100*

Instructions to the Examinee :

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

2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. 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.

(Remaining instructions on the last page)

परीक्षार्थियों के लिए निर्देश :

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

2. प्रश्न-पुस्तिका में 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। 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।

(शेष निर्देश अन्तिम पृष्ठ पर)

(Only for Rough Work)

1. The range of the following data is :

   12, 37, 13, 15, 45, 19, 23, 32, 34, 42

   (A) 33

   (B) 34

   (C) 35

   (D) 36

2. Which of the following properties are true for intellectual property (IP) ?

   (A) IP is intangible without any physical parameters.

   (B) IP encompasses the things which are creation of human mind

   (C) Photographs and architectural designs are covered under IP acts

   (D) All of the above

3. India is signatory under the following IPR treaties :

   (A) TRIPS agreement

   (B) Convention on Biological Diversity (CBD)

   (C) Both (A) and (B)

   (D) None of the above

4. Which of the following statements is NOT correct ?

   (A) Indian patent law does not specify the rigid protection of computer software.

   (B) Genetically altered micro-organisms were patentable

   (C) Medical and surgical procedures are patentable

   (D) Microbiological processes and emanating products are patentable

5. The degree of peakedness of a distribution is called as :

   (A) Arithmetic mean

   (B) Geometric mean

   (C) Kurtosis

   (D) Mode

6. The hypothesis for possible rejection under the assumption that it is true is referred to as :

   (A) Null hypothesis

   (B) Alternate hypothesis

   (C) Zero hypothesis

   (D) Fixed hypothesis

7. The statistical method which helps in estimating the unknown value of one variable from the known value of the related variable :

   (A) Correlation

   (B) F statistic

   (C) Chi-square

   (D) Regression

8. The main cause of non-sampling error is :
   (A) Vague definition of population
   (B) Improper definition of the variable
   (C) Errors in data processing
   (D) All of the above

9. Identify incorrect statement :
   (A) Judgment sampling is useful in case sample size is very small
   (B) Random sampling would be more appropriate when the sample size is large
   (C) Stratified sampling is a method for heterogeneous population
   (D) Random sampling will produce biased sample

10. The degree of correlation coefficient can be in the range of :
    (A) -1 to $+1$
    (B) 0 to $+1$
    (C) -1 to 0
    (D) Only $+1$

11. Which of the following claims can't be patented ?
    (A) New vector or gene constructs
    (B) Wild type plant accession
    (C) Plants and animals tissue culture product
    (D) Antibodies or antigen binding fragments

12. Which of the following is a feature of database ?
    (A) To deposit and store data
    (B) To retrieve data
    (C) To analyze and interpret data
    (D) All of the above

13. EMBL is an example of :
    (A) Nucleotide database
    (B) Protein database
    (C) Lipid database
    (D) Carbohydrate database

14. What is the size limitation for e-mail attachment ?
    (A) 25 MB
    (B) 250 MB
    (C) 500 MB
    (D) 1000 MB

15. If you were interested in testing for a statistical relationship between spraying a plant growth promoter and number of pods in a population of 100 soybean plants (i. e : testing the null hypothesis of no difference in the proportions of treated and untreated samples), the correct statistical test is :
    (A) ANOVA
    (B) Chi-squared test
    (C) Paired t-test
    (D) Regression

16. In order to test the null hypothesis :

    (A) The p value shall be less than 0.05

    (B) The p value shall be greater than 0.05

    (C) The p value shall be equal to 0.1

    (D) Cannot be detennined from the p value

17. The standard deviation will :

    (A) Increase with the increase in sample size

    (B) Decrease with the increase in sample size

    (C) Doesn't change with the increase in sample size

    (D) Sample size and standard deviation has no relation

18. A survey was conducted on a random sample of 1,000 Baltimore residents. Residents were asked whether they have health insurance. 650 individuals surveyed said they do have health insurance and 350 said they do not have health insurance. A 95% CI for the proportion of Baltimore residents with health insurance is :

    (A) 60% to 75%

    (B) 32% to 38%

    (C) 62% to 68%

    (D) 36% to 46%

19. 200 hypertensive patients are randomized to either a diet program or an exercise program. (102 patients to diet program, 98 patients to exercise program) blood pressure is measured on each patient both before the programs start and 3 months after the start of each program. The correct statistical procedure to determine whether or not the mean blood pressure change (after-before) was statistically significantly different for the two programs is :

    (A) Paired t-test

    (B) 2 sample unpaired t-test

    (C) Fisher's exact test

    (D) None of the above

20. The scores of 10 students are 75, 82, 90, 92, 67, 95, 110, 80, 82, 86 :

    Find the mean for the data.

    (A) 83.6

    (B) 85.9

    (C) 836

    (D) 43

21. What is the class interval for classes 20 – 30; 30 – 40; 40 – 50; 50 – 60 ?
    (A) 10
    (B) 20
    (C) 30
    (D) 40

22. An event in the probability that will never be happened is called as :
    (A) Unsure event
    (B) Sure event
    (C) Possible event
    (D) Impossible event

23. The square root of the variance is called as :
    (A) Standard deviation
    (B) Mean
    (C) Median
    (D) Mode

24. The probability of team India to win a cricket match (p) is 0.7. What is the probability of losing (q) :
    (A) 10%
    (B) 20%
    (C) 30%
    (D) 40%

25. Correlation coefficient was formulated by :
    (A) Fisher
    (B) Karl Pearson
    (C) Murphy
    (D) Porway

26. The man behind Indian statistical institute and national statistics day celebration :
    (A) C. R. Rao
    (B) P. C. Mahalanobis
    (C) R. R. Bahadur
    (D) R. C. Bose

27. What is the current term of patents in India ?
    (A) 50 years
    (B) 40 years
    (C) 30 years
    (D) 20 years

28. Most recent amendment of Indian Patent Act is in the year :
    (A) 2015
    (B) 2016
    (C) 2017
    (D) 2018

29. Identify the incorrect statement :

(A) Patent protection is a territorial right and is effective only within the territory

(B) An invention which claims anything contrary to natural laws can't be patented

(C) A method of agriculture or horticulture can be patentable

(D) Topography of integrated circuits are not covered under patents

30. Which of the following statements is true about the standard deviation ?

(A) It is used to calculate confidence intervals

(B) It is used to determine variability of a sample around a sample mean

(C) It is used to display bimodal or skewed data

(D) A large SD shows that individual data points are clustered closer to the mean

31. Which of the following protects films and podcasts ?

(A) Patents

(B) Trademarks

(C) Copyrights

(D) Geographical indicators

32. According to the Copyright Act of India, the creator of work will get protection :

(A) Till 40 years after death

(B) Till 50 years after death

(C) Till 60 years after death

(D) No protection after the death of the creator

33. Which of the following is NOT an element of patentability according to Patents Acts ?

(A) Novelty

(B) Cost of production

(C) Inventive step

(D) Industrial applicability

34. Identify the geographical indicator :

1. Mysore silk   (p) Odisha

2. Pattachitra   (q) Kashmir

3. Pashmina   (r) Rajasthan

4. Blue pottery   (s) Karnataka

(A) 1-s, 2-q, 3-r, 4-p

(B) 1-s, 2-p, 3-q, 4-r

(C) 1-q, 2-r, 3-p, 4-s

(D) 1-q, 2-p, 3-s, 4-r

35. Use of computer applications for analysis of biological data is referred as :

(A) Biostatistics

(B) Biophysics

(C) Bioinformatis

(D) Biomedical science

36. Which of the following is an operating system ?

(A) Windows 10

(B) Linux

(C) Unix

(D) All of the above

37. Identify a measure of central tendency :

(A) Mode

(B) 'F' statistic

(C) ANOVA

(D) Range

38. Standard deviation is represented by :

(A) σ

(B) μ

(C) β

(D) ∞

39. The correct relation between standard deviation and variance :

(A) The square root of standard deviation is variance

(B) The square of standard deviation is variance

(C) Standard deviation and variance are same

(D) Standard deviation and variance are not related to each other

40. Mark the correct expression for central tendency :

(A) Typical value for a probability distribution

(B) Central value for a probability distribution

(C) Measure of central tendency

(D) All of the above

41. The scientist who formulated the standard deviation :

(A) Fisher

(B) Pearson

(C) Karlsen

(D) Mendel

42. 'F' statistic is used to find out :

(A) Correlation between two distributions

(B) Significance of difference between two samples

(C) Similarity index between populations

(D) Not useful for biological data analysis

43. The mode of the following distribution is :

12 16 22 12 16 18 19 16 12

(A) 12

(B) 22

(C) 16

(D) 18

44. A surgeon performed 400 kidney transplantations out of which 160 are successful. What is the probability of failure ?

(A) 40

(B) 50

(C) 60

(D) 70

45. In a field experiment, the observed phenotypes were tested for significance of difference with the monohybrid ratio 3 : 1. Upon chi-square test, the null hypothesis will be accepted if the calculated chi-square value is :

(A) Greater than the table value

(B) Less than the table value

(C) Equal to table value

(D) Can't determine with table value

46. What is the most popular method of experimental design in working with replicates ?

(A) Random block design

(B) Latin square design

(C) Incomplete block design

(D) None of the above

47. Find the median of the given distribution :

5 8 16 22 9 12 15 18 14

(A) 9

(B) 14

(C) 15

(D) 16

48. Sample mean is indicated using the symbol :

(A) X

(B) μ

(C) X^2

(D) $\bar{X}$

49. When two variables are independent of each other then we use :

(A) Addition rule

(B) Multiplication rule

(C) Both (A) and (B)

(D) None of the above

50. Probability depends on :

(A) Chance

(B) Preference

(C) Both (A) and (B)

(D) None of the above

51. The type of test used to find the statistical difference between samples is :

(A) t-test

(B) F-test

(C) ANOVA

(D) All of the above

52. The test used to find difference between expected samples and observed samples :

(A) F-test

(B) ANOVA

(C) Chi-square

(D) t-test

53. The no. of outcomes in a binomial distribution is :

(A) 2

(B) 3

(C) 5

(D) 1

54. The command that is used to display all the files in MS-DOS is :

(A) DIR

(B) CLS

(C) COPY

(D) MOVE

55. Population mean is indicated with :

(A) B

(B) μ

(C) α

(D) X

56. Which of the following is a Hardware device ?

(A) Monitor

(B) Bar code reader

(C) Printer

(D) All of the above

57. Which of the following is a discrete probability distribution ?

(A) Binomial

(B) Bernoulli

(C) Poisson

(D) All of the above

58. Significant test related to three samples is :

(A) ANOVA

(B) t-test

(C) Chi-square

(D) All of the above

59. Which of the following is NOT an application of Chi square test ?

(A) To test the goodness of fit

(B) To test the detection of linkage

(C) To test the significance of difference between samples

(D) To test the independence of attributes

60. Null hypothesis (H_0) usually states that :

(A) There is no difference between expected and observed values

(B) There is a significant difference between observed and expected values

(C) There is no relation between expected and observed values

(D) There is an inverse relationship between expected and observed values

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate 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 ny 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 एक सबसे सही अथवा सबसे उपयुक्त 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।