IES/ISS Exam, 2019

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T.B.C. : XZH–F–STSS

Test Booklet Series

C

Serial No. 1008779

TEST BOOKLET

STATISTICS

Paper—I

Time Allowed : Two Hours

Maximum Marks : 200

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET *DOES NOT* HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet. Any omission/discrepancy will render the Answer Sheet liable for rejection.**
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. *DO NOT* write *anything else* on the Test Booklet.
4. This Test Booklet contains **80** items (questions). Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose *ONLY ONE* response for each item.
5. You have to mark all your responses *ONLY* on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. ***All*** items carry equal marks.
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator *only the Answer Sheet*. You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong answers :**

    THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE-TYPE QUESTION PAPERS.

    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third** of the marks assigned to that question will be deducted as penalty.

    (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.

    (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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1. Consider the following statements :

1. For ordinal and ratio scale data, median is a recommended measure of location.
2. Pie diagrams and bar diagrams are recommended graphs for nominal data.
3. For interval scale data, the recommended graph is histogram and the recommended measure of variability is standard deviation.

Which of the above statements are correct?

(a) 1 and 3 only
(b) 2 and 3 only
(c) 1 and 2 only
(d) 1, 2 and 3

2. The joint distribution of two random variables X and Y is given below :

$X \backslash Y$	-1	1
0	α_1	α_2
1	α_3	α_4

where $\alpha_i \geq 0$, for all i and $\sum_1^4 \alpha_i = 1$.

Which of the following are correct?

1. $E(X^r) = \alpha_3 + \alpha_4$, for all r
2. $E(XY) = \alpha_4 - \alpha_3$
3. $E(XY)^{2n} = \alpha_3 + \alpha_4$, for all n

Select the correct answer using the code given below.

(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

3. For a group of 7-year-old boys

Body Height : $\bar{X}_1 = 115$ cm, $s_1 = 6{\cdot}5$ cm
Body Weight : $\bar{X}_2 = 23$ kg, $s_2 = 2{\cdot}7$ kg

where $\bar{X}$ is the mean of the group and s is the group's standard deviation.

Which one of the following is correct?

(a) Boys are five times as variable in body weight than in body height
(b) Boys are twice as variable in body weight than in body height
(c) Boys are $\frac{2}{5}$ times as variable in body weight than in body height
(d) Boys are $\frac{2}{5}$ times as variable in body height than in body weight

4. If for two attributes A and B, $(A) = 50$, $(B) = 60$, $(AB) = 40$, $N = 100$, then

(a) A and B are independent
(b) A and B are positively associated
(c) A and B are negatively associated
(d) nothing definite can be said about the association between A and B without further information

5. If $x = 4y + 5$ and $y = kx + 4$ are the lines of regression of x on y and that of y on x respectively, then which one of the following is true?

(a) $k \geq 1$ *(b)* $k \leq -1$
(c) $-1 \leq k \leq 0$ *(d)* $0 \leq k \leq \frac{1}{4}$

6. The regression lines of Y on X and of X on Y are respectively $Y = aX + b$ and $X = cY + d$. If r_{XY} is the correlation coefficient between X and Y, and $\frac{s_X}{s_Y}$ is the ratio of standard deviation of X to standard deviation of Y, then the pair $\left(r_{XY}, \frac{s_X}{s_Y}\right)$ would assume the value

(a) $\left(\sqrt{ac}, \sqrt{\frac{c}{a}}\right)$

(b) $\left(\sqrt{\frac{c}{a}}, \sqrt{ac}\right)$

(c) $\left(\frac{bd}{\sqrt{ac}}, \sqrt{ac}\right)$

(d) $\left(\sqrt{ac}, \sqrt{\frac{a}{c}}\right)$

7. Let X, Y, Z be independently and identically distributed standard normal variates and $(X + \theta Z, Y + \theta Z)$ follows bivariate normal distribution with correlation coefficient 0·25. Then the absolute value of θ is

(a) $\frac{1}{\sqrt{2}}$

(b) $\frac{1}{\sqrt{3}}$

(c) $\frac{1}{\sqrt{2}+1}$

(d) $\frac{1}{\sqrt{3}+1}$

8. If r is the observed correlation coefficient in a sample of n pairs of observations from a correlated bivariate normal population, then the statistic

$$\frac{1}{2}\log_e\left(\frac{1+r}{1-r}\right)$$

is approximately normal with variance

(a) $\frac{1}{n-1}$ (b) $\frac{1}{n}$

(c) $\frac{1}{n-2}$ (d) $\frac{1}{n-3}$

9. Consider the pairs of observations on X and Y as $(-1, -2)$, $(0, -1)$, $(1, 0)$, $(2, 1)$. If the correlation coefficient between X and Y is denoted by r and that between X^2 and Y^2 by s, then which one of the following is correct?

(a) $r > 0$ but $s < 0$

(b) $r > 0$ and $s > 0$

(c) $r < 0$ but $s > 0$

(d) $r < 0$ and $s < 0$

10. The coefficient of correlation between X and Y is 0·6. Their covariance is 4·8. If the variance of X is 9, then the standard deviation of Y is

(a) 7·21 (b) 5·23

(c) 3·22 (d) 2·67

11. A stick of length l is tossed at random on a plane that is ruled with a series of parallel lines at a distance $2l$ apart. What is the probability that the stick will intersect one of the lines?

(a) $\frac{1}{2\pi}$

(b) $\frac{3}{2\pi}$

(c) $\frac{1}{\pi}$

(d) $\frac{2}{3\pi}$

12. Two cannons A_1 and A_2 fire at the same target. Cannon A_1 fires on an average 9 projectiles in the time in which cannon A_2 fires 10 projectiles. But on an average 7 out of 10 projectiles from cannon A_1 and 6 out of 10 projectiles from cannon A_2 strike the target. If in the course of shooting, the target is struck by one projectile, then the probability that it was struck by a projectile from cannon A_1 is

(a) $\frac{20}{41}$

(b) $\frac{21}{41}$

(c) $\frac{6}{19}$

(d) $\frac{63}{190}$

13. 5% of patients suffering from a certain disease are selected to undergo a new treatment that is believed to increase the recovery rate from 30% to 50%. A person is randomly selected from these patients after the completion of the treatment and is found to have recovered. What is the probability that the patient received the new treatment?

(a) 0·03

(b) 0·08

(c) 0·80

(d) 0·30

14. A discrete random variable X takes four values $-1{\cdot}5$, -1, $2{\cdot}5$ and 3 with respective probabilities $\frac{1}{6}, \frac{1}{4}, \frac{1}{2}$ and $\frac{1}{12}$. Then what is $E(|X|)$ equal to?

(a) 0

(b) $\frac{1}{4}$

(c) $\frac{3}{2}$

(d) 2

15. If the probability of having a male or a female child is 0·50, then what is the probability that family's seventh child is their second daughter?

(a) $\frac{3}{64}$

(b) $\frac{15}{64}$

(c) $\frac{21}{64}$

(d) $\frac{1}{64}$

16. Let X be a Poisson random variable with p.m.f.

$$P(X=k)=\begin{cases}\dfrac{e^{-\lambda}\lambda^k}{k!}, & k=0,1,2,\ldots;\quad \lambda>0\\ 0 & ;\ \text{otherwise}\end{cases}$$

If $Y=X^2+3$, then what is $P(Y=y)$ equal to?

(a) $\dfrac{e^{-\lambda}\lambda^{\sqrt{y-3}}}{\sqrt{(y-3)!}}$, for $y=\{3, 4, 7, 12, \ldots\}$

(b) $\dfrac{e^{-\lambda}\lambda^{-\sqrt{y-3}}}{\sqrt{(3-y)!}}$, for $y=\{3, 4, 7, 12, \ldots\}$

(c) $\dfrac{e^{-\lambda}\lambda^{\sqrt{3-y}}}{\sqrt{(3-y)!}}$, for $y=\{4, 7, 12, \ldots\}$

(d) $\dfrac{e^{-\lambda}\lambda^{-\sqrt{3-y}}}{\sqrt{(3-y)!}}$, for $y=\{4, 7, 12, \ldots\}$

17. A person purchases a weekly lottery ticket until he wins the lottery. If p is the probability of winning the lottery, then the expected number of weeks required to win the lottery is

(a) $\dfrac{1}{p}$

(b) $\dfrac{1}{p}-1$

(c) $\dfrac{1}{1-p}$

(d) $\dfrac{1}{1-p}-1$

18. Consider the following statements :

1. Binomial distribution with mean $a>0$ and variance $b>0$ is such that $\dfrac{a^2}{(a-b)^2}$ is an integer.
2. Binomial distribution with mean 3·5 and variance 1·75 is bimodal.
3. For a binomial distribution, with mean and variance equal to 4 and $\dfrac{4}{3}$ respectively, $P(X\geq 1)>0{\cdot}99$.
4. Sum of two independent binomial variates is a binomial variate.

Which of the above statements are correct?

(a) 1 and 3

(b) 1, 2 and 4

(c) 2 and 3 only

(d) 2, 3 and 4

19. r is given to be the correlation coefficient between two random variables X and Y. If $Z=aY+b$, where $a(\neq 0)$ and b are real numbers, then the correlation coefficient between X and Z is

(a) r (b) $r|a|$

(c) $\left(\dfrac{a}{|a|}\right)|r|$ (d) $\left(\dfrac{a}{|a|}\right)r$

20. Let $f(x, y)=4xy,\ 0\leq x\leq 1,\ 0\leq y\leq 1$ be the joint p.d.f. of (X, Y). Then the marginal distribution of X is

(a) $f_X(x)=4x\ ;\ 0\leq x\leq 1$

(b) $f_X(x)=2x\ ;\ 0\leq x\leq 1$

(c) $f_X(x)=\dfrac{x}{2}\ ;\ 0\leq x\leq 1$

(d) $f_X(x)=x\ ;\ 0\leq x\leq 1$

21. Consider the following statements :

1. Correlation coefficient is a measure of proportion or percentage in a relationship.
2. Statistic Z^2 is an equivalent measure of the statistic χ^2.
3. t-distribution becomes mesokurtic when degrees of freedom approach a very large value.
4. $(1-\alpha)$ significant points of $F(n_2, n_1)$ distribution are same as reciprocal of $(1-\alpha)$ significant points of $F(n_1, n_2)$ distribution.

Which of the above statements are correct?

(a) 2 and 3 only
(b) 2 and 4 only
(c) 3 and 4 only
(d) 1, 2, 3 and 4

22. Consider the following statements :

1. A type I error of 0·05 means that 5 times out of 100, one can reject a true null hypothesis.
2. The smaller the type I error rate, the more correct is the inference.
3. Type I error is sensitive to the number of subjects in a sample.
4. Type I error is completely under the control of the experimenter.

Which of the above statements is/are correct?

(a) 1 and 3 only
(b) 2 and 4 only
(c) 4 only
(d) 1, 2, 3 and 4

23. Let W_1 and W_2 denote the standard errors of the sample means $\bar{X}_1$ and $\bar{X}_2$ of two independent random samples. The standard error of $T = (\bar{X}_1 - \bar{X}_2)$ is

(a) 0
(b) $|W_1 - W_2|$
(c) $\sqrt{|W_1^2 - W_2^2|}$
(d) $\sqrt{(W_1^2 + W_2^2)}$

24. Two independent groups A and B consist of 100 people each who have a disease. A serum is given to group A but not to group B; otherwise the two groups are treated identically. It is found that in groups A and B, 75 and 65 people respectively, recover from the disease.

Given $Z_{0\cdot05} = 1\cdot645$ and $Z_{0\cdot10} = 1\cdot28$.

Consider the following statements :

1. The results are due to chance only at 5% level of significance.
2. The serum is effective at 10% level of significance.
3. Assuming that the serum has no effect, 70 people are expected to recover in group A.
4. The standard deviation of the difference in proportions is given by 0·06.

Which of the above statements are correct?

(a) 1, 3 and 4
(b) 1, 2 and 3
(c) 1, 2 and 4
(d) 2, 3 and 4

25. Let X_1, X_2, X_3, X_4, X_5 be a random sample of size 5 from a population having standard normal distribution. If

$$\bar{X} = \frac{1}{5}\sum_{i=1}^{5} X_i \text{ and } T = \sum_{i=1}^{5}(X_i - \bar{X})^2$$

then $E(T^2\bar{X}^2)$ is equal to

(a) 3 (b) 3·6

(c) 4·8 (d) 5·2

26. For $\chi^2 = 2{\cdot}38$ and $N = 200$, the coefficient of contingency C for the given data is

(a) 0·01 (b) 0·1084

(c) 0·1096 (d) 0·1840

27. Which of the following is/are ***not*** needed for the validity of χ^2 test?

1. The sample observations should be independent.
2. Constraints on the cell frequencies should not be linear.
3. N, the total frequency, should be reasonably large.
4. None of the theoretical frequencies should be less than 5.

Select the correct answer using the code given below.

(a) 1 and 2

(b) 2 only

(c) 2 and 3

(d) 4

28. Suppose that the five random variables $X_1, X_2, \ldots, X_5$ are independent and each has a standard normal distribution. A constant C such that the random variable

$$\frac{C(X_1 + X_2)}{(X_3^2 + X_4^2 + X_5^2)^{\frac{1}{2}}}$$

will have a t-distribution, has value

(a) $\frac{\sqrt{3}}{2}$ (b) $\sqrt{\frac{3}{2}}$

(c) $\frac{3}{2}$ (d) $\sqrt{\frac{2}{3}}$

29. If X is an $F(m, n)$ random variable, where $m > 2$ and $n > 2$, then $E(X).E\left(\frac{1}{X}\right)$ equals

(a) $\frac{n(n-2)}{m(m-2)}$ (b) $\frac{m(m-2)}{n(n-2)}$

(c) $\frac{mn}{(m-2)(n-2)}$ (d) $\frac{m(n-2)}{n(m-2)}$

30. What is the probability that the sample median based on a random sample of size 3 drawn from a distribution with p.d.f.

$$f(x) = \begin{cases} 2x, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

exceeds $\frac{1}{2}$?

(a) $\frac{3}{4}$ (b) $\frac{13}{16}$

(c) $\frac{27}{32}$ (d) $\frac{29}{32}$

31. Let X be a random variable with p.d.f.

$$f(x) = \begin{cases} \dfrac{2x}{\pi^2}, & 0 < x < \pi \\ 0, & \text{otherwise} \end{cases}$$

Let $Y = \sin X$, then for $0 < y < 1$, the p.d.f. of Y is given by

(a) $\dfrac{2\pi}{\sqrt{1-y^2}}$

(b) $\dfrac{\pi}{2}\sqrt{1-y^2}$

(c) $\dfrac{2}{\pi}\sqrt{1-y^2}$

(d) $\dfrac{2}{\pi\sqrt{1-y^2}}$

32. Suppose that r balls are drawn one at a time without replacement from a bag containing n white and m black balls. What is the variance of the number of black balls drawn?

(a) $\dfrac{mr(m+n-2)}{(m+n)(m+n+1)}$

(b) $\dfrac{mnr(m+n-r)}{(m+n)^2(m+n+1)}$

(c) $\dfrac{mr(m+n)^2}{(m+n-1)(m+n-r)}$

(d) $\dfrac{(m+n)(m+n-r)}{(m+n)^2}$

33. The number of items produced in a factory during a week is a random variable with mean 50. If the variance of a week's production is known to be 25, then the probability that this week's production will be between 40 and 60 is at least

(a) 0·50

(b) 0·60

(c) 0·75

(d) 0·80

34. The smallest value of k in Chebyshev's inequality, for which the probability that a random variable will take a value in between $\mu - k\sigma$ and $\mu + k\sigma$ is at least 0·99, is given by

(a) 9·5

(b) 10

(c) 10·5

(d) 11

35. The round-off error to the second decimal place has the uniform distribution on the interval (−0·05, 0·05). What is the probability that the absolute error in the sum of 1000 numbers is less than 2?

[Given $\Phi(2{\cdot}19) = 0{\cdot}985$]

(a) 0·92

(b) 0·95

(c) 0·97

(d) 0·99

36. If X and Y are independent $N(0, 1)$, then what is $E[\text{Max}(X, Y)]$ equal to?

(a) $\frac{1}{\sqrt{2\pi}}$ (b) $\frac{1}{\sqrt{\pi}}$

(c) $\frac{1}{\sqrt{2}}$ (d) $\frac{2}{\sqrt{\pi}}$

37. Let X be a continuous random variable with p.d.f.

$$f(x) = \begin{cases} ax, & 0 \le x < 1 \\ a, & 1 \le x \le 2 \\ -ax + 3a, & 2 < x \le 3 \\ 0, & \text{elsewhere} \end{cases}$$

What is the value of the constant a?

(a) 1 (b) $\frac{1}{2}$

(c) $\frac{1}{3}$ (d) $\frac{1}{4}$

38. If the probability density function of the normal distribution of X is

$$f(x) = k\exp\left(-\frac{1}{8}x^2 + 2x\right), \; -\infty < x < \infty$$

then the mean and variance of the distribution are respectively

(a) 8 and 2

(b) 4 and 2

(c) 8 and 4

(d) 4 and 4

39. The random variable X has p.d.f.

$$f(x) = \begin{cases} \frac{3x^2}{2}, & -1 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

What are the values of $E(|X|)$ and $\text{var}(|X|)$ respectively?

(a) $\frac{1}{4}$ and $\frac{1}{80}$

(b) $\frac{3}{4}$ and $\frac{1}{80}$

(c) $\frac{1}{4}$ and $\frac{3}{80}$

(d) $\frac{3}{4}$ and $\frac{3}{80}$

40. Let X and Y be two i.i.d. random variables with p.d.f. $f(x) = 2e^{-2x}$, $x \ge 0$. The distribution of $Z = X - Y$ is

(a) exponential

(b) beta

(c) Laplace

(d) Cauchy

41. A bus that manages the transfer of data and addresses among various components is

(a) address bus

(b) control bus

(c) data bus

(d) None of the above

42. Which of the following codes is/are positional weighted code(s)?

1. Gray code
2. BCD code
3. ASCII code
4. Excess-3 code

Select the correct answer using the code given below.

(a) 1 and 4

(b) 1 and 2 only

(c) 1, 2 and 3

(d) 2 only

43. When $(217)_{10}$ is divided by $(12)_{10}$, then the quotient and remainder in binary system will be respectively

(a) 11010 and 1001

(b) 10100 and 0001

(c) 10010 and 0001

(d) 10010 and 0010

44. A software development module that arranges the object code of all the modules that have been generated by the language translators into a single program, is

(a) editor

(b) debugger

(c) linker

(d) loader

45. Antivirus is a software that comes in the category of

1. system software
2. application software
3. utility software
4. debugger

Select the correct answer using the code given below.

(a) 2

(b) 3 and 4 only

(c) 3 only

(d) 1, 3 and 4

46. Which of the statements regarding Network Protocol are ***not*** correct?

1. Identification of type of physical connection cannot be done by Network Protocol.
2. Error detection and correction are done by Network Protocol.
3. Message formatting cannot be done by Network Protocol.
4. Network Protocol does initiation and termination.

Select the correct answer using the code given below.

(a) 1 and 4

(b) 1 and 3 only

(c) 2, 3 and 4

(d) 1, 2 and 3

47. A software that gathers information about a person and organization without their knowledge is called

(a) firmware

(b) adware

(c) virus

(d) spyware

48. Consider the following statements in respect of subroutine :

1. It reduces the length of code.
2. It is a program stored somewhere else in memory and called to execute it.
3. It does not require the use of stack for its execution.

Which of the above statements is/are ***not*** correct?

(a) 1 and 2

(b) 3 only

(c) 2 and 3

(d) 1 and 3

49. If someone wants to reduce the cost of developing and maintaining a computer software, which operating system(s) should be installed?

(a) Windows only

(b) Linux only

(c) Mac

(d) Both Windows and Linux

50. Which one of the following protocols is used to send email messages?

(a) TCP

(b) SMTP

(c) POP

(d) UDP

51. Consider the following table :

x	2	3	4	5	6
y	45	49·2	54·1	k	67·4

What is the value of k in the above table?

(a) 60·05

(b) 61·05

(c) 62·05

(d) 63·05

52. What is the value of

$$\Delta^{10}[(1-ax)(1-bx^2)(1-cx^3)(1-dx^4)]?$$

(a) 0

(b) 10!

(c) $abcd \times (10)!$

(d) $abcd$

53. What are the values of $\Delta^5 O^3$ and $\Delta^3 O^5$ respectively?

(a) 0 and 0

(b) 144 and 0

(c) 0 and 150

(d) 0 and 96

54. For interval of differencing as unity, consider the following observations :

$f(0) = 41,\ f(1) = 61,\ f(5) = 20$ and $f(6) = 50$

What is the value of the sum

$$S = \sum_{k=0}^{4} \Delta^2 f(k)?$$

(a) −10

(b) 10

(c) 50

(d) Cannot be determined

55. Which one of the following is equal to $1 + x + x^2 + x^3$?

(a) $x^{(3)} + 3x^{(2)} + 4x^{(1)} + 1$

(b) $x^{(3)} + x^{(2)} + 3x^{(1)} + 1$

(c) $3x^{(3)} + 4x^{(2)} + x^{(1)} + 1$

(d) $x^{(3)} + 4x^{(2)} + 3x^{(1)} + 1$

56. Given that $f(x)$ is a polynomial of third degree with the values $f(-2) = -33$, $f(-1) = m_1$, $f(0) = 5$, $f(1) = 9$, $f(2) = m_2$ and $f(3) = 47$. What are the values of m_1 and m_2 respectively?

(a) −10 and 19

(b) −10 and 21

(c) −5 and 19

(d) −5 and 21

57. Gauss forward interpolation formula involves

(a) even differences above the central line and odd differences on the central line

(b) even differences below the central line and odd differences on the central line

(c) odd differences below the central line and even differences on the central line

(d) odd differences above the central line and even differences on the central line

58. The third divided difference of the polynomial $2x^2 + 1$ over the points 0, 1, 3, 6 is

(a) 0

(b) 1

(c) 2

(d) 4

59. It is given that a curve passes through the points (0, 18), (1, 10), (3, − 18) and (6, 90). What is the slope of the curve at $x = 2$ (using Lagrange's formula)?

(a) −16

(b) −8

(c) 1

(d) 0

60. Consider the following table where $y = f(x)$:

x	10	15	20
y	1754	2648	3564

What is the value of x for $y = 3000$ obtained by applying inverse interpolation (iterative method) with $h = 5$?

(a) 15·90

(b) 16·10

(c) 16·93

(d) 17·02

61. Which one of the following translates IP address to readable manner such as website URLs?

(a) DNS (b) SMTP
(c) DHCP (d) POP

62. Which one of the following is content-based addressable memory?

(a) ROM
(b) Cache memory
(c) Associative memory
(d) SRAM

63. Which one of the following systems does ***not*** share common memory and common bus?

(a) Tightly coupled system
(b) Distributed system
(c) Batch system
(d) Multiprogramming system

64. Which one of the following network cables is capable for faster data transmission?

(a) Thin Ethernet cable
(b) Thick Ethernet cable
(c) Fiber optic cable
(d) UTP cable

65. Which one of the following techniques, a hacker uses for listening to private voice or data transmission often using wiretap?

(a) Spoofing
(b) Snooping
(c) Eavesdropping
(d) Piggybacking

66. The name of the network developed by the Government of India in public interest for various government activities is

(a) ARPANET
(b) NICNET
(c) Quicknet
(d) None of the above

67. Which one of the following communication media supports higher Internet bandwidth?

(a) UTP cable
(b) Coaxial cable
(c) Fiber optic cable
(d) Thin Ethernet

68. A technique used by an operating system for efficient management of memory space of a computer system is

(a) paging (b) swapping
(c) caching (d) debugging

69. Which of the following are the functions of an operating system?

1. Memory management
2. Device management
3. Security management

Select the correct answer using the code given below.

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

70. Which type of memory is suitable for mobile phones, digital cameras and ipods?

(a) Programmable ROM
(b) Flash memory
(c) RAM
(d) Optical disk

71. The value estimated for ln2, obtained by applying trapezoidal rule to

$$\int_1^2 \frac{1}{x}\,dx$$

with two equal divisions of [1, 2], is

(a) $\frac{1}{2}$

(b) $\frac{17}{24}$

(c) $\frac{19}{24}$

(d) 1

72. Simpson's one-third rule for evaluation of

$$\int_a^b f(x)\,dx$$

requires the interval $[a, b]$ to be divided into

(a) an even number of subintervals of equal width

(b) an odd number of subintervals of equal width

(c) any number of subintervals of equal width

(d) any number of subintervals

73. Consider the following table :

x	−1	0	1	2	3	4	5
$f(x)$	2	1	2	5	10	17	26

The value of the integral

$$\int_{-1}^{5} f(x)\,dx$$

when computed by Simpson's $\frac{3}{8}$th rule is

(a) 48 (b) 47

(c) 46 (d) 45

74. Consider the initial value problem $y' = y + 2x - 1$ with $y(0) = 1$ over the interval $0 \le x \le 1$. The value of the solution $y(0{\cdot}2)$, obtained using Euler's method with $h = 0{\cdot}1$, is

(a) 0 (b) 1

(c) 1·020 (d) 1·062

75. The third approximation of the initial value problem

$$\frac{dy}{dx} = x + y,\ y(0) = 1$$

obtained using Picard's method, is

(a) $1 + x + x^2 + \frac{x^3}{3} + \frac{x^4}{24}$

(b) $1 + x + x^2 + \frac{x^3}{6}$

(c) $1 + x^2 + \frac{x^3}{6}$

(d) $x + \frac{x^2}{2} + \frac{x^3}{3}$

76. The values of the function $f(x)$ for different values of x are $f(1) = 4$, $f(2) = 5$, $f(7) = 5$ and $f(8) = 4$. Then $f(x)$ attains

(a) maximum value at $x = 4 \cdot 5$

(b) minimum value at $x = 4 \cdot 5$

(c) neither maximum nor minimum for any x

(d) minimum value at $x = -4 \cdot 5$

77. Let

$$f(x) = \log_{10}(1 + x)$$

with $x_0 = 1$ and $x_1 = 1 \cdot 1$. What is the approximate value of $f(1 \cdot 04)$ obtained by using linear interpolation?

[Given that $\log_{10} 2 = 0 \cdot 301030$ and $\log_{10} 2 \cdot 1 = 0 \cdot 322219$]

(a) 0·309506 *(b)* 0·095603

(c) 0·390506 *(d)* 0·090356

78. What is the approximate value of y when $x = 1 \cdot 1$ for

$$\frac{dy}{dx} = 3x + y^2$$

obtained by using Runge-Kutta method of second-order formula?

[Given that $y = 1 \cdot 2$ when $x = 1$]

(a) 1·722 *(b)* 1·644

(c) 1·044 *(d)* 1·022

79. If δ is the central difference operator, then what is

$$\frac{1}{2}\delta^2 + \delta\sqrt{1 + \frac{\delta^2}{4}}$$

equal to?

(a) $E + 1$

(b) ∇

(c) Δ

(d) $\Delta + 1$

80. The third divided difference of the function $f(x) = x^3 - 2x$ with the arguments 2, 4, 9, 10 is equal to

(a) 23

(b) 21

(c) 15

(d) 1

SPACE FOR ROUGH WORK

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