

**075/2024**

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. The principal features of the National Income Committee Report in 1954 were :
- (1) During 1950 – 51, agriculture contributed nearly half of the national income.
  - (2) Mining, manufacturing, and handicrafts contributed about one-fourth of the national income.
  - (3) Commerce, transport, and communications accounted for a little more than one-sixth of the total national income.
  - (4) Other services such as professions and liberal arts, administrative services, domestic services, and house property accounted for about 15 percent of national income.

Choose the correct statements :

- (A) All the above (1), (2), (3) and (4)
- (B) (1), (2) and (3) only
- (C) (1), (3) and (4) only
- (D) (2), (3) and (4) only

2. Given below two statements, one is labelled as Assertion [A] and the other as Reason [R].

Assertion [A] : Devaluation is known as the Expenditure switching measure.

Reason [R] : Devaluation encourages the switching of expenditure between foreign and domestic goods.

Select the correct answer from the codes given below :

- (A) Both [A] and [R] are true and [R] is the correct explanation of [A]
- (B) Both [A] and [R] are true and [R] is not the correct explanation of [A]
- (C) [A] is true and [R] is false
- (D) [A] is false and [R] is true

3. The main features of the Employment Guarantee Act, 2005 :

- (1) Every household in rural India will have a right to at least 100 days of guaranteed employment every year for at least one adult member.
- (2) Work should be given within 30 days of demanding it, and the work should be located within a 5-kilometer distance.
- (3) 5% of wages may be deducted as contributions to welfare schemes like health insurance, accident insurance, etc.
- (4) The Grama Sabha will monitor the work of the Grama Panchayat by way of a social audit.

Choose the correct statements :

- |                           |                           |
|---------------------------|---------------------------|
| (A) (1), (2) and (3) only | (B) (2), (3) and (4) only |
| (C) (1), (3) and (4) only | (D) All the above         |









27. According to the SDG India Index 2020, which Indian state ranked first in sustainable development achievement?  
 (A) Tamil Nadu (B) Karnataka  
 (C) Kerala (D) Andhra Pradesh
28. In calculating the Sustainable Development Goals (SDG) India index, how many goals are considered?  
 (A) 5 (B) 17  
 (C) 30 (D) 3
29. In the United Nations Sustainable Development Goals (SDG) Index -2023, out of 166 countries, what was India's rank?  
 (A) 115<sup>th</sup> (B) 117<sup>th</sup>  
 (C) 120<sup>th</sup> (D) 112<sup>nd</sup>
30. Which is the current base year used for estimating national income in India as of 2023?  
 (A) 2004-05 (B) 2015-16  
 (C) 2011-12 (D) 2018-19
31. Whose theory affirms that humans have three motivational drivers regardless of age and gender?  
 (A) Maslow (B) Herzberg  
 (C) Vrooms (D) Mc Clelland
32. Which among the following is not a Quality management tool?  
 (A) Pareto Chart (B) Histogram  
 (C) Scatter diagram (D) Qlik
33. A transaction that involves an increase in current ratio but no change in working capital :  
 (A) Purchase of goods on credit  
 (B) Cash payment of non current liabilities  
 (C) Payment to trade creditors  
 (D) Sale of fixed assets for cash
34. Du Pont formula was developed by :  
 (A) Alfred Porter (B) Donaldson Brown  
 (C) James Du Pont (D) F.W. Taylor
35. A \_\_\_\_\_ hypothesis is one which is at low level of abstraction.  
 (A) Refined hypothesis (B) Null hypothesis  
 (C) Crude hypothesis (D) Descriptive hypothesis
36. Longitudinal Research approach deals with :  
 (A) Long term Research (B) Horizontal Research  
 (C) Short term Research (D) Descriptive Research

37. Type I error occurs when
- (A) Null hypothesis gets accepted even if false
  - (B) Null hypothesis gets rejected even if it is true
  - (C) Both Alternate and Null hypotheses are rejected
  - (D) None of the above
38. If the field of enquiry is not homogenous and contains variety of items, the sampling method adopted is :
- (A) Systematic sampling
  - (B) Stratified sampling
  - (C) Snowball sampling
  - (D) None of the above
39. Which of the following statements is/are true regarding ARR method?
- (i) It is based on cash flows generated by a project.
  - (ii) it does not differentiate between investments that yield different cash flows over the lifetime of the project.
  - (iii) It ignores time value of money
- (A) (i), (ii) and (iii)
  - (B) (i) and (ii) only
  - (C) (i) only
  - (D) (iii) only
40. \_\_\_\_\_ is commonly referred to as index investing.
- (A) Active Portfolio management
  - (B) Passive Portfolio management
  - (C) Indexed Portfolio management
  - (D) Integrative Portfolio management
41. The key factor that distinguishes project management from just 'management' is that it :
- (A) Is an ongoing process
  - (B) Has a finite time span
  - (C) Needs professional skills
  - (D) Requires effective team work
42. Which among the following is a type of project audit?
- (A) Performance audit
  - (B) Compliance audit
  - (C) Financial audit
  - (D) All of the above
43. \_\_\_\_\_ causes Over capitalisation.
- (i) Raising higher amount through issue of shares or debentures than company needs.
  - (ii) Provision for depreciation is not made properly.
  - (iii) Huge payment for the acquisition of fictitious assets like high payment is made to purchase goodwill etc.
- (A) (i) and (iii)
  - (B) (iii) only
  - (C) (i), (ii) and (iii)
  - (D) (i) only





53. If  $\varphi(t)$  is a characteristic function, then which of the following is not a characteristic function :
- (A) Real part of  $\varphi(t)$  (B) Imaginary part of  $\varphi(t)$   
 (C) Complex conjugate of  $\varphi(t)$  (D)  $\varphi^2(t)$
54. Let  $\{X_n\}$  be a sequence of independent random variables with  $P(X_n = \pm n^\alpha) = 1/2$ . The value of  $\alpha$  for which  $\{X_n\}$  satisfies strong law of large numbers is :
- (A) 3/4 (B) 1/2  
 (C) 1/3 (D) 2/3
55. Let  $(X_1, X_2)$  have a bivariate normal distribution with parameters  $\mu_1 = 1, \mu_2 = 0, \sigma_1^2 = 1, \sigma_2^2 = 4$  and  $\rho = 1/2$ . Then  $P(X_2 > 1 | X_1 = 2)$  is :
- (A) 1/2 (B) 1/3  
 (C) 2/3 (D) 3/4
56. From a population of size 30, a systematic sample of size 5 is drawn. If the first selected unit is 4, then the other units will be :
- (A) 9, 14, 19, 24 (B) 8, 12, 16, 22  
 (C) 10, 16, 22, 28 (D) 9, 13, 17, 21
57. Suppose there is a population consisting of 40 units. A sample of size 7 is to be taken from the population using simple random sampling (SRS). Then, the ratio of the variances of sample mean in SRS with replacement and SRS without replacement is :
- (A) 10/13 (B) 13/11  
 (C) 10/11 (D) 13/10
58. A finite population is divided into three strata of sizes (40, 30, 50) having variances (1, 2, 3). A stratified random sample of size 12 was drawn using proportional allocation. Let  $n_1, n_2, n_3$  be the number of units to be selected from respective strata. Then, the values of  $n_1, n_2, n_3$  are respectively :
- (A) 4, 3, 5 (B) 2, 4, 6  
 (C) 3, 4, 5 (D) 4, 4, 4
59. In a randomized block design with 6 blocks and 5 treatments, the sum of squares for blocks and treatments are 200 and 180, respectively, If the total sum of squares is 500, then the mean square error (MSE) will be:
- (A) 9 (B) 6  
 (C) 4 (D) 8

60. In a  $2^2$  factorial experiment with factors  $A$  and  $B$  conducted in 3 replicates, the total yields of the treatment combinations  $a_0 b_0, a_1 b_0, a_0 b_1$  and  $a_1 b_1$  are 12, 14, 20, and 28, respectively. Then the sum of squares for the interaction  $AB$  is equal to :
- (A) 4 (B) 6  
(C) 5 (D) 3
61. Let  $X_1, X_2, X_3, X_4$  be a random sample form  $N(0, \sigma^2)$ . Then the value of  $k$  for which the estimator  $k \sum_{i=1}^4 |X_i|$  is an unbiased estimator of  $\sigma$  is :
- (A)  $\sqrt{\frac{2}{3\pi}}$  (B)  $\sqrt{\frac{\pi}{24}}$   
(C)  $\sqrt{\frac{24}{\pi}}$  (D)  $\sqrt{\frac{\pi}{32}}$
62. Let  $X$  be a random variable with p.d.f.  $f(x) = 1 - \theta + 2\theta x$ ;  $0 < x < 1, -1 \leq \theta \leq 1$ . Based on a sample of size one, the most powerful critical region for testing  $H_0: \theta = 0$  against  $H_1: \theta = 1$  at level  $\alpha = 0.1$  is :
- (A)  $x > 0.75$  (B)  $x > 0.9$   
(C)  $x > 0.8$  (D)  $x \leq 0.75$
63. A random sample of 20 students was selected from a class. Their marks in the first and second semesters are noted down. To test the hypothesis that there is no change in the average performance of the students in that class against the hypothesis that it has improved, which of the following tests is to be used?
- (A) Z-test (B) Paired  $t$ -test  
(C) Two sample independent  $t$ -test (D)  $\chi^2$ -test
64. Which of the following is not an assumption for simple linear regression?
- (A) Multicollinearity (B) Constant variance  
(C) Linear relationship (D) Normally distributed residuals
65. In a multiple regression model  $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$ ,  $MSE = 20$ ,  $n = 54$ , and  $SST$  (total) = 4000. What is the  $R^2$  of the regression model?
- (A) 0.25 (B) 0.50  
(C) 0.75 (D) 0.90
66. Which one of the following is a subspace of  $\mathbb{R}^3$ ?
- (A)  $\{(1, b, 1) | b \in \mathbb{R}\}$  (B)  $\{(a, 1, 1) | a \in \mathbb{R}\}$   
(C)  $\{(a, b, c) | a + b + c = 1\}$  (D)  $\{(0, b, 0) | b \in \mathbb{R}\}$

67. Which of the following statements is false?
- (A) Similar matrices have the same characteristic polynomial
- (B) The matrix  $A = \begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$  has no characteristic value in  $\mathbb{R}$ .
- (C) The matrix  $A = \begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$  has no characteristic value in  $\mathbb{C}$ .
- (D) None of the above
68. The standard matrix for the reflection about the  $xy$ -plane in  $\mathbb{R}^3$  is :
- (A)  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$
- (B)  $\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$
- (C)  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$
- (D)  $\begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
69. Which one of the following statements is false?
- (A) For any group  $G$  and  $G'$ , there is always at least one homomorphism  $\phi:G \rightarrow G'$
- (B) A group homomorphism  $\phi:G \rightarrow G'$  is a one-to-one map if and only if  $\text{Ker}(\phi) = \{e\}$ ,  $e$  is the identity element of  $G$
- (C) If  $\phi:G \rightarrow G'$  is a group homomorphism, then  $\text{Ker}(\phi)$  is a normal subgroup of  $G$
- (D) Every homomorphism is a one-to-one map
70. The orbits of the permutation  $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 3 & 8 & 6 & 7 & 4 & 1 & 5 & 2 \end{pmatrix}$  are :
- (A)  $\{1, 3, 6\}, \{2, 8\}, \{4, 5, 7\}$
- (B)  $\{1, 2, 8\}, \{3, 6\}, \{4, 5, 7\}$
- (C)  $\{1, 4, 5\}, \{2, 8\}, \{3, 6, 7\}$
- (D)  $\{1, 3, 6\}, \{4, 5\}, \{2, 8, 7\}$
71. Which of the following intervals represent  $C = \{x \in \mathbb{R} : \frac{2x+1}{x+2} < 1\}$ ?
- (A)  $(-1, 2)$
- (B)  $(-2, 1)$
- (C)  $(-2, -1)$
- (D)  $(-1, 1)$
72. Which of the following sets is not denumerable?
- (A)  $\mathbb{N} \times \mathbb{N}$
- (B)  $E = \{2n : n \in \mathbb{N}\}$
- (C)  $[0, 1]$
- (D)  $\mathbb{Q}$

73. Let  $f:[a, b] \rightarrow \mathbb{R}$ . Then  $f$  need not be Riemann integrable on  $[a, b]$  if :

- (A)  $f$  is a step function
- (B)  $f$  is a continuous function on  $[a, b]$
- (C)  $f$  is monotone on  $[a, b]$
- (D) None of the above

74. The Maclaurin series expansion of  $f(z) = \frac{1}{(1-z)^2}$  is :

- (A)  $\sum_{k=1}^{\infty} kz^{k-1}$
- (B)  $\sum_{k=1}^{\infty} kz^{k+1}$
- (C)  $\sum_{k=1}^{\infty} z^k$
- (D)  $\sum_{k=1}^{\infty} kz^k$

75. The residue of the function  $f(z) = \frac{1}{(z-1)^2(z-3)}$  at  $z=1$  is :

- (A)  $\frac{1}{4}$
- (B)  $-\frac{1}{4}$
- (C)  $\frac{3}{4}$
- (D)  $-\frac{3}{4}$

76. What is the indicial equation of the differential equation  $2x^2 y'' + x(2x+1)y' - y = 0$  ?

- (A)  $m(m-1) + \frac{1}{2}m - \frac{1}{2}$
- (B)  $m(m+1) + \frac{1}{2}m - \frac{1}{2}$
- (C)  $m(m-1) - \frac{1}{2}m - \frac{1}{2}$
- (D)  $m(m-1) + \frac{1}{2}m + \frac{1}{2}$

77. What is the general solution of the differential equation  $\frac{1}{y} dx - \frac{x}{y^2} dy = 0$  ?

- (A)  $xy = c$
- (B)  $\frac{x}{y} = c$
- (C)  $x^2 y = c$
- (D)  $(xy)^2 = c$

78. Which of the following statements is false for the function  $f(x, y) = xy$  ?

- (A) Satisfies a Lipschitz condition on any rectangle  $a \leq x \leq b$  and  $c \leq y \leq d$
- (B) Satisfies a Lipschitz condition on any strip  $a \leq x \leq b$  and  $-\infty < y < \infty$
- (C) Does not satisfy a Lipschitz condition on the entire plane
- (D) None of the above

79. What is the complete integral of the first order partial differential equation  $(u_x + u_y)(u - xu_x - yu_y) = 1$ ?
- (A)  $u = ax + by + \frac{1}{a+b}$  (B)  $u = ax - by + \frac{1}{a+b}$
- (C)  $u = ax - by - \frac{1}{a+b}$  (D) None of the above
80. What is the solution of the partial differential equation  $u_x + u_y = 2$  subject to the initial condition  $u(x, 0) = x^2$ ?
- (A)  $u(x, y) = 4y + (x - y)^2$  (B)  $u(x, y) = y + (x - y)^3$
- (C)  $u(x, y) = 2y + (x - y)^2$  (D)  $u(x, y) = 2y^2 + (x - y)^2$
81. Which of the following statements is true for a discrete topology?
- (A) Every point is an accumulation point of any set
- (B) No point is an accumulation point of any set
- (C) Number of accumulation points depend on the cardinality of the set
- (D) None of the above
82. Which of the following is an example of a totally disconnected space?
- (A)  $\mathbb{R}$  with usual topology (B)  $\mathbb{R}$  with semi-open interval topology
- (C)  $\mathbb{R}$  with cofinite topology (D) None of the above
83. Which of the following statements is false?
- (A) Every path-connected space is connected
- (B) Subsets of the real line  $\mathbb{R}$  are connected if and only if they are path-connected
- (C) Topologist's sine curve is path-connected
- (D) None of the above
84. Let  $X$  and  $Y$  be normed spaces and  $F: X \rightarrow Y$  be a linear map. Which of the following statements is not equivalent to the statement 'F is continuous on X'?
- (A) F is continuous at 0
- (B) F is uniformly continuous on X
- (C)  $\|F(x)\| \leq \alpha \|x\|$  for all  $x \in X$  and some  $\alpha > 0$
- (D) None of the above

85. Which one of the following normed space is not a Banach space?
- (A) The vector space  $\mathbb{R}$  over  $\mathbb{R}$  under the norm  $\|x\|=|x|$
- (B) The vector space  $C[a, b]=\{f:[a, b]\rightarrow \mathbb{R} \mid f \text{ is a continuous function}\}$  over  $\mathbb{R}$  under the norm  $\|f\|=\max_{x\in[a, b]}|f(x)|$ .
- (C) The vector space  $C[0,1]=\{f:[0,1]\rightarrow \mathbb{R} \mid f \text{ is a continuous function}\}$  over  $\mathbb{R}$  under the norm  $\|f\|=\int_0^1|f(t)|dt$
- (D) The vector space  $\mathbb{C}^n=\{x_1, x_2, \dots, x_n \mid x_i \in \mathbb{C}\}$  over  $\mathbb{C}$  under the norm  $\|x\|=\sum_{i=1}^n|x_i|^2$
86. NSS 79<sup>th</sup> round is earmarked for :
- (A) Collection of data on ‘Domestic Tourism Expenditure’ and ‘Multiple Indicators’
- (B) Collection of data for compilation of a number of SDG indicators through a “Comprehensive Annual Modular Survey (CAMS)” along with a survey AYUSH
- (C) Collection of data on ‘Land and Livestock Holdings of Households and Situation Assessment of Agricultural Households’ and ‘Debt and investment’
- (D) All the above
87. The headquarters of Survey Design and Research Division (SDRD) of NSSO located at :
- (A) Kolkata (B) New Delhi
- (C) Faridabad (D) Bangalore
88. The General Crop Estimation Survey (GCES) under EARAS Scheme, Department of Economics and Statistics, Kerala is conducting crop cutting experiments of \_\_\_\_\_ crops for the estimation of production and yield rate of crops.
- (A) 10 (B) 19
- (C) 9 (D) 14
89. The list of all sampling units in the population is
- (A) Sampling design (B) Sampling frame
- (C) Population (D) Sample
90. The design generally adopted for carrying out General Crop Estimation Surveys (GCES) :
- (A) Cluster sampling
- (B) Simple random sampling
- (C) Multiphase sampling
- (D) Stratified multi-stage random sampling design

91. If a statistic  $t$  follows student's  $t$ -distribution with  $n$  d.f., then  $t^2$  follows :
- (A)  $\chi^2$  distribution with  $n$  d.f.                      (B) T distribution with  $n^2$  d.f.  
(C) Standard normal distribution                      (D) F distribution with  $(l, n)$  d.f.
92. Level of significance refers to :
- (A) Probability of non sampling error  
(B) Probability of Type II error  
(C) Probability of Type I error  
(D) None of these
93. Mann-Whitney U test is used to test :
- (A) The quality of means of two independent population  
(B) Equality of variances of two independent populations  
(C) Equality of medians of two independent populations  
(D) To test the randomness
94. Consider the following statements :
- (i) Principal components analysis is a data reduction technique  
(ii) Principal components are Un correlated  
(iii) Variances of principal components are equal to eigen values of variance covariance matrix  
(iv) Principal components are unobservable
- Then
- (A) Only (i) is true  
(B) Only (i), (ii) and (iii) are true  
(C) Only (i) and (ii) are true  
(D) All are true
95.  $\chi^2$  test is used :
- (i) To test the hypothetical value single of population variance  
(ii) To test goodness of fit  
(iii) To test equality of more than two means  
(iv) To test the equality of three or more population variances
- Then
- (A) Only (i), (ii), (iv) is correct  
(B) Only (i), (ii), (iii) is correct  
(C) Only (i), (iii), (iv) is correct  
(D) All are correct

96. Consider the following statements :
- (i) R is a free and open source software
  - (ii) R is a programming language for statistical computing and data visualization
  - (iii) Key feature of R was that its syntax is very similar to S
  - (iv) R is licensed by the GNU Project and available under the GNU General Public License
  - (v) R runs only on Windows computing platform and operating system

Then

- (A) Only (v) is correct
  - (B) Only (i) and (iv) are correct
  - (C) Only (i), (ii) and (iv) are correct
  - (D) Only (i), (ii), (iii) and (iv) are correct
97. The following commands are entered in R :
- ```
data <- data.frame(x=1:3, y=2:4, z=8:10)
data [, - c(1,3)]
```
- Then the output will be
- (A) [1] 2 3 4
  - (B) [1] 8 9 10
  - (C) [1] 1 2 3
  - (D) None of these
98. The R command  $t.test(y_1, y_2)$ , where  $y_1$  and  $y_2$  are numeric vectors is used for :
- (A) Paired t test between  $y_1$  and  $y_2$
  - (B) Independent sample t test between  $y_1$  and  $y_2$
  - (C) Single sample  $t$  test for  $y_1$  and  $y_2$
  - (D) None of these
99. Which of the following is not a valid function in MS Excel?
- (A) AVERAGE()
  - (B) PRODUCT()
  - (C) COUNTA()
  - (D) MEAN()
100. In MS Excel to add numerical values in column A, from rows A10 to A20, the formulae that should be used is :
- (A) SUM (A10,A20)
  - (B) TOTAL (A10,A20)
  - (C) SUM (A10:A20)
  - (D) TOTAL (A10:A20)



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