Sl. No.:

QUESTION BOOKLET

Booklet Id.:
AAO/02/C/400

Roll No.						

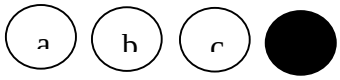
Time Allowed: 2 hrs 30 mins **Total Marks:150**

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE ASKED TO DO SO

Read the following instructions carefully before you begin to answer the questions.

INSTRUCTIONS TO CANDIDATE

1) You are required to write your Roll Number in the prescribed place provided at the top of this Question Booklet and the OMR Answer Sheet.
2) **You are required to mention the Question Booklet Id. as mentioned above in your OMR Answer Sheet.**
3) Please ensure that the Question Booklet has the required number of pages immediately after opening the same. In case there is any shortage of any page(s), please report the same to the invigilator.
4) This Question Booklet contains 150 multiple choice questions to be answered in a separate OMR Answer Sheet by using **Blue/Black ball pen** only. Do not use **Ink/Gel pen**.
   The Booklet comprises of the following two parts:
   Part A: General Mathematics : 50 questions
   Part B: (i) Accountancy : 100 questions
   (ii) Statistics : 100 questions
   (iii) Mathematics : 100 questions
   - **Part A (General Mathematics) is compulsory for all candidates.**
   - **Part B (Accountancy/Statistics/Mathematics): The candidates are required to answer any one subject area in Part B. Further, you need to mention about the subject area in your OMR Answer Sheet against the subject space.**
   - All questions are compulsory and carry equal marks.
   - There is no negative marking for wrong answers.
   - **Directions for answering the questions**:
     Each question is followed by four alternative suggested answers. You are required to select the correct answer and darken the appropriate circle of a, b, c and d by Blue/ Black ball pen in such a manner that the circle is completely darkened.
     Example: Question No.63
     Given below are four odd words, three are alike in some way and one is different. Find the odd word:
     (a) Ganga (b) Brahmaputra (c) Jamuna (d) Himalaya
     Here the correct answer is Himalaya, i.e., (d). So, in the OMR Answer Sheet the darkened circle should be marked as

63. 

5) In any case, if more than one circle against each question is darkened, that particular question would be treated as invalid and will not be evaluated.
   - At the end of the examination, the candidate should ensure that he/ she submits the OMR Answer Sheet and the Question Booklet to the invigilator before leaving the examination hall/ room.
6) This Question Booklet cannot be carried with you. You have to submit this along with your OMR Answer Sheet to the invigilator.
7) No rough work is to be done on the OMR Answer Sheet. You can do the rough work on the space provided on the Question Booklet.
8) **Use and possession of mobile phones and electronic gadgets/calculators are strictly prohibited inside examination hall/ room.**
9) Non compliance with any of the above instructions will make a candidate liable to action/ penalty as may be deemed fit.

Space for Rough Work

PART A: GENERAL MATHEMATICS

1. √ 2 is a _____ number.
   a) Rational b) irrational c) Prime d) None
2. Trivial solution of homogeneous linear equation is
   a) (1, 0, 0) b) (0, 1, 0) c) (0, 0, 1) d) (0,0,0)
3. The general term of the sequenced 2, 4, 6, 8, ….. is
   a) N b) 2n c) 2n – 1 d) n^2
4. 0! = ?
   a) 1 b) 0 c) undefined d) None
5. ^nCr in factorial form is :
   a) n!r / (n-n)! b) n! / r! (n-r)! c) n! d) n! –r / n!
6. 1 + 2 + 3 + ……..+ (n -1)= ?
   a) n (n-1) /2 b) n (n+1)/2 c) (n-1)(n+1)/2 d) [n(n+1)]^2/2
7. (1-Cos^2 θ) (1+Cot^2 θ) = ?
   a) Sin^2 θ b) Cos^2 θ c) $Cosec^2$ θ d) 1
8. Cos (α + β) = ?
   a) Sin α cos β + cos α sin β b) Sin α cos β - cos α sin β
   c) cos α cos β - sin α sin β d) cos α cos β + sin α sin β
9. 'Sine' and 'cosine' are periodic function whose period is :
   a) л / 2 b) л c) 2 л d) 4 л
10. The inverse exists only for the function which is:
    a) One to one b) onto c) into d) All of these
11. General solution of the equation 1 + Cos x = 0 is
    a) {π/2 + 2nπ} b) {- π/2 + 2nπ} c) {π+ 2nπ} d) None of these
12. If *a+ib= c+id*, then it must be tru that
    a) *a=c, & b=d* b) *a= -c & b=d* c) *a=d & b=c* d) *ad=bc*
13. Harmonic mean between two numbers *'a'* and '*b*' is
    a) *(a+b) /2* b) *2ab/(a+b)* c) $\sqrt{ab}$ d) *(a+b)/ab*
14. If $^nC_6 = {}^nC_{12}$, then n equals
    a) 18 b) 12 c) 6 d) 20
15. The numbers of terms in the expansion of $(a+b)^n$ is
    a) n b) n+1 c) 2^n d) $2^n - 1$
16. Any point on the line y = x is of the form :
    a) (a, a) b) (0, a) c) (a, 0) d) (a, – a)
17. The equation of the line whose graph passes through the origin, is :
    a) 2x + 3y = 1 b) 2x + 3y = 0 c) 2x + 3y = 6 d) none of these
18. The equation of y-axis is :
    a) y = 0 b) x = a c) y = a d) x = 0

19. Real part of *(2+i)/i* is equal to

a) 1 b) 2 c) -1 d) ½

20. If roots of the equation $ax^2 + bx + 1 = 0$ are equal, the value of k will be…

a) $ab^2 - 4=0$ b) $b^2 - 4a=0$ c) $a^2 - 4b=0$ d) $b^2 - 4ab=0$

21. If A =[5,6,7] and B=[7,8,9]then A U B is equal to:

(a) [5,6,7,8,9] b) [5,6,7] c) [7,8,9] d) [7]

22. In 2nd quadrant?

(a) x>0, y<0 b) x<0, y<0 c) x>0, y>0 d) x<0, y>0

23. The intersection of sets A and B is expressed as:

(a) AUB b) A/B c) AΩB d)AXB

24. Empty set is a :

a) Invalid set b) Finite set c)Infinite set d) None of above

25. If $\frac{x}{y} = \frac{3}{2}$ then $\frac{2x + 3y}{6x + 5y}$ =?

(a) $\frac{4}{9}$ b) $\frac{3}{7}$ c) $\frac{9}{7}$ d) $\frac{7}{17}$

26. If salary of Ram is 25% more than the salary of Shyam, then the salary of Shyam is less than the salary of Ram in percentage is

(a) 10% b) 15% c) 20% d) 25%

27. Four angles of a quadrilateral are in the ratio 1 : 2 : 3 : 4. Find them.

(a) 36°, 72°, 108°, 144° b) $35^0, 70^0, 105^0, 140^0$

c) $40^0, 80^0, 120^0, 160^0$ d) $25^0, 50^0, 75^0, 100^0$

28. Find the false statement

a) Line segment joining the centre to any point on the circle is a radius of the circle.
b) If a circle is divided into three equal arcs, each is a major arc.
c) A chord of a circle, which is twice as long as its radius, is a diameter of the circle. .
d) A circle is a plane figure.

29. A bag contains 4 red and 6 black balls. A ball is taken out of the bag at random. Find the probability of getting of black ball.

(a) 3/5 b) 5/3 c) 3/7 d) 2/5

30. The condition that the equation ax + by + c = 0 represent a linear equation in two variables is

(a) a ≠ 0, b = 0 b) b ≠ 0, a = 0 c) a = 0, b = 0 d) a ≠ 0, b ≠ 0

31. The graph of the linear equation 2x + 3y = 9 cuts y-axis at the point:

(a) 9/2 , 0 b) (0, 9) c) (0, 3) d) (3,1)

32. Find the value of *x* from $log_x^{81} = -4$

(a) 3 b) – 3 c) 1/3 d) 4

33. Zero s of the quadratic polynomial $4u^2 + 8u$ are

(a) 0, -2 b) 2, -2 c) 0, 2 d) 1, 0

34. The product of two consecutive positive integers is 306. What are the integers?

a) 16, 17 b) 17, 18 c) 18, 19 d) 19, 20

35. Write first four terms of the A.P. when the first term *a* and the common difference *d* are given as follows $a = -1$ $d = ½$

(a) 1, ½. 0 and -1/2 b) -1, ½. -1/2 and 1 c) -1, -1/2, 0 and 1/2 d) 1, -1/2, 1 and 0

36. All circles are :

a) Congruent b) Both Congruent and similar

c) neither congruent nor similar d) similar

37. In ΔABC right angled at B, AB = 24 cm, BC = 7 m. Determine sin A, cos A

a) 24/25, 7/25 b) 8/25, 24/25 c) 8/25, 7/ 25 d) 7/25, 24/25

38. If an AP has a=1, t_n =20 and S_n=399 then value of n is:

a) 20 b) 32 c) 38 d) 40

39. In terms of powers of prime numbers, 1260 can be written as :

a) $2^2 \times 3 \times 5^2$ b) $2^2 \times 3^2 \times 5 \times 7$ c) $2 \times 3^2 \times 5^2 \times 7$ d) $2^2 \times 3 \times 5 \times 7^2$

40. 0.35% expressed as a decimal, is equal to :

a) 0.35 b) 0.035 c) 0.0035 d) 3.5

41. The product of (2 x – 3)and (2 x + 3) is :

a) $2x^2 - 3$ b) $4x^2 - 3$ c) $4x^2 - 9$ d) $4x^2 + 9$

42. In a frequency distribution, the class mark of a class is 10 and its width is 5. The lower limit of class is:

a) 5 b) 7.5 c) 10 d) 12.5

43. ---- is a collection of well defined and distant objects

a) Set b) Conjugate c) Power d) Relation

44. Additive inverse of "0" is

a) 1 b) -1 c) 0 d) 2

45. Find the distance between the points (2, 3), and (4, 1):

a) $3\sqrt{3}$ b) $2\sqrt{2}$ c) $2\sqrt{3}$ d) $3\sqrt{2}$

46. $3x^2y+5$ is a polynomial of degree

a) one b) two c) three d) zero

47. Factors of $x^2 - 5x + 6$ are

a) (x+6)(x+1) b) (x-2)(x+3) c) (x+2)(x+3) d) (x+1)(x-6)

48. HFC of a^3+b^3 and $a^2- ab+ b^2$ is

a) $a^2- ab+ b^2$ b) $(a+b)^3$ c) (a^2+b^2) d) (a+b)

49. Two equations in two variable which are true for the same ordered pair are called ----- equations

a) Cubical b) Quadratic c) Simultaneous d) Radical

50. The Cartesian coordinate system is also called

a) Binary b) Functional c) Denary d) Rectangular

PART B: ACCOUNTANCY/STATISTICS/MATHEMATICS
(ANSWER ANY ONE SUBJECT)

ACCOUNTANCY

51. Accounting Standard-3 describes :
    a) Cash Flow Statement
    b) Funds Flow Statement
    c) Balance Sheet
    d) Income Statement

52. International Accounting Standard Committee was formed in the year:
    a) 1977
    b) 1973
    c) 1920
    d) 1949

53. Valuation of Inventories is described by:
    a) AS-6
    b) AS-4
    c) AS-10
    d) AS-2

54. IFRSs are issued by:
    a) IASC
    b) IASB
    c) ICAI
    d) ICWA.

55. Accounting is a language of
    a) Assets
    b) Liabilities
    c) Business
    d) Balance Sheet

56. Which of the following organisations is not connected to the accounting Standard Setting process in India?
    a) Accounting Standard Board (ASB)
    b) Institute of Chartered Accountants of India (ICAI)
    c) Assam Industrial Development Corporation (AIDC)
    d) Institute of Cost and Works Accountants of India (ICWAI)

57. Disclosure of Accounting Policies is covered by
    a) AS 1
    b) AS 10
    c) AS 12
    d) AS 20

58. Accounting for Amalgamation is covered by
    a) AS 6
    b) AS 9
    c) AS 14
    d) AS 21

59. International Accounting Standards Board (IASB) was founded on
    a) April 1, 2012
    b) April 1, 2001
    c) April 1, 1973
    d) April 1, 1956

60. Debtors Ledger records
    a) All credit transactions
    b) Only credit sales
    c) Both credit and cash transactions
    d) None of the above

61. The source of information for credit sales is
    a) Cash Book
    b) Returns Outward Book
    c) Journal Proper
    d) Sales Day Book

62. Bad Debts previously written off, now recovered is recorded in
    a) Total Debtors Account
    b) Total Creditors Account
    c) Cash Book
    d) None of the above

63. Cash collected from customers is entered in
    a) Debit side of Total Debtors Account
    b) Credit side of Total Debtors Account
    c) Both Total Debtors and Total Creditors Account
    d) None of the above

64. Under Self Balancing System, Trial Balance in prepared in
    a) Only Debtors Ledger
    b) Only Creditors Ledger
    c) Only General Ledger
    d) Each of the above three Ledgers

65. Under Hire Purchase System, ownership of goods passes from seller to buyer
    a) After Down Payment is made
    b) After payment of the last instalment
    c) After signing the agreement
    d) None of the above

66. Under Hire Purchase System, Down Payment includes
    a) Interest for the first instalment
    b) Interest for all the instalments
    c) No Interest
    d) Interest for the Cash Price

67. Hire Purchase Price means
    a) Total Payments to be made by the buyer including interest
    b) Only Cash Price
    c) Cash Price Plus Down Payment
    d) None of the above

68. The Hire Purchase agreement gives the buyer the right to get the possession of the goods
    a) Immediately after signing the agreement
    b) After the last payment is made
    c) After Down Payment is made
    d) None of the above.

69. Shortworking means
    a) Excess of minimum rent over actual royalty
    b) Excess of actual royalty over minimum rent
    c) Difference between shortworking lapsed and shortworking recouped
    d) None of the above

70. The agreement in connection with 'Royalty' is subject to the provisions of the
    a) Indian Companies Act, 1956
    b) Indian Partnership Act, 1932
    c) Indian Contract Act, 1972
    d) Income Tax Act, 1961

71. In the books of the lessee, the 'Royalty' account is closed by transferring to
    a) Profit and Loss A/c
    b) Manufacturing A/c
    c) Trading A/c
    d) Any of the above

72. In the books of the lessor, Shortworking lapsed is a
    a) Loss
    b) Gain
    c) Liability
    d) None of the above

73. For recoupment of past Shortworking, in the books of the lessee
    a) Landlord A/c is debited
    b) Landlord A/c is credited
    c) Shortworking A/c is debited
    d) None of the above.

74. Receipts and Payments account generally starts with
    a) Closing balance of cash
    b) Closing balance of bank
    c) Opening balance of cash and bank
    d) Opening balance of cash and/or bank

75. Receipts and Payments account records the transactions of
    a) capital nature only
    b) revenue nature only
    c) both capital and revenue nature
    d) None of the above.

76. Income and expenditure account is
    a) Just like Balance sheet
    b) Just like Profit and Loss account
    c) Just like Cash book
    d) None of the above.

77. Life membership fee is a
    a) Capital receipt
    b) Revenue receipt
    c) Capital expenditure
    d) None of the above

78. Not for profit organisation prepares
    a) Income and expenditure acount
    b) Trading account
    c) Profit and Loss account.
    d) None of the above.

79. Income and expenditure account shows
    a) Cash in hand
    b) Cash at bank
    c) Capital expenditure
    d) Excess of income over expenditure.

80. Subscription received in advance is treated as
    a) An income
    b) An asset
    c) Capital
    d) A liability.

81. Profit on sale of old furniture of a club is shown on the
    a) Credit side of Profit and Loss A/c
    b) Income side of Income and Expenditure account
    c) Both credit side and debit side of expenditure account
    d) None of the above.

82. The minimum number of partners in a firm is:
    a) Three
    b) Two
    c) Ten
    d) Twenty

83. If the partnership deed is silent, Interest on partners' loan is allowed @:
    a) 4%
    b) 6%
    c) 5%
    d) 10%

84. When a new partner pays cash for goodwill, the amount is credited to:
    a) Premium for goodwill Account
    b) Partner's loan Account
    c) New partner's Drawings Account
    d) Investment Account

85. On the admission of a new partner, the increase in the values of assets is
    a) Debited to Revaluation Account
    b) Credited to Revaluation Account
    c) Transferred to Reserve Account
    d) None of the above

86. Profit on revaluation of assets and liabilities is shared by the old partners in:
    a) Sacrificing ratio
    b) New ratio
    c) Old ratio
    d) Gaining ratio

87. A company is :
    a) An artificial person
    b) A Natural person
    c) A Club
    d) Non-trading organisation

88. Shareholders are:
    a) Creditors of the company
    b) Employees of the company
    c) Officers of the company
    d) None of the above

89. Shares can be forfeited due to :
    a) Non-payment of Bank loan
    b) Non-payment of Call money
    c) Failure to attend meeting
    d) None of the above

90. Premium on issue of shares should be shown on the :
    a) Asset side of the Balance Sheet
    b) Liability side of the Balance Sheet
    c) Credit side of the Profit & Loss Account
    d) Debit side of the Profit & Loss Account

91. Profit & Loss Account is also known as:
    a) Income & Expenditure Account
    b) Position Statement
    c) Cash Flow statement
    d) None of the above

92. Current ratio is the relation between:
    a) Current Asset and fixed Asset
    b) Current Asset and Net profit
    c) Current Asset and Investment
    d) None of the above

93. If current ratio is 2:1 and Current assets are Rs. 5,00,000/-, then Current liabilities are:
    a) Rs. 3,00,000/-
    b) 10,00,000/-
    c) 1,00,000/-
    d) None of the above.

94. AS-9 deals with:
    a) the principle of Revenue Recognition
    b) Depreciation
    c) Amalgamation of Companies
    d) Disclosure of Accounting Policies.

95. The difference between goods sent to branch and goods received by branch represents:
    a) Cash in transit
    b) Cash lost in transit
    c) goods lost in transit
    d) None of the above

96. Advertisement expenses are apportioned among different departments on the basis of:
    a) Purchases
    b) Profits
    c) Production
    d) Sales.

97. Goodwill is :
    a) An intangible asset
    b) A tangible asset
    c) A Current asset
    d) None of the above.

98. Super Profit is the:
    a) Excess of normal profit over actual profit
    b) Excess of actual profit over normal profit
    c) Excess of gross profit over net profit
    d) Excess of current year's profit over previous year's profit.

99. 'Bank of Last Resort' represents :
    a) BOI
    b) SBI
    c) UBI
    d) RBI

100. Working capital is the:
   a) Excess of current assets over current liabilities
   b) Excess of current liabilities over current asset
   c) Excess of fixed assets over current liabilities
   d) Excess of fixed assets over current assets.

101. Contribution is the:
   a) Excess of fixed assets over current assets
   b) Excess of sales over variable cost
   c) Excess of sales over current assets
   d) None of the above

102. Margin of safety is the:
   a) Excess B.E.P sales over actual sales
   b) Excess actual sales over B.E.P sales
   c) Excess fixed assets over current assets
   d) None of the above

103. In absence of Partnership Deed, profits and losses of the firm are shared by partners:
   a) in gaining ratio
   b) in sacrificing ratio
   c) in capital ratio
   d) equally

104. If profit volume ratio is 40%, variable cost is:
   a) 360% of sales
   b) 960% of sales
   c) 760% of sales
   d) None of the above.

105. If sale price is Rs. 200/-, Variable cost is Rs.150/- and Fixed cost is Rs. 1,00,000/-, then B.E.P is:
   a) 1,000 units
   b) 2,000 units
   c) 3,000 units
   d) 4,000 units.

106. If Subscription received Rs. 3,00,000/-, subscription outstanding for previous year Rs. 10,000/- and subscription outstanding for the current year is Rs. 20,000/-; then the amount of subscription to be credited to Income and Expenditure account is:
   a) Rs. 3,10,000/-
   b) Rs. 3,20,000/-
   c) Rs. 3,30,000/-
   d) Rs. 3,00,000/-.

107. Balance Sheet reflects:
   a) Assets Only
   b) Assets, Liabilities and Capital
   c) Assets, Liabilities, Capital, income and expenses
   d) All of the above

108. Balance sheet provides information of financial position of the enterprise:
   a) at a point of time
   b) over a period of time
   c) for a period of time
   d) None of the above.

109. Liquid assets consist of :
   a) Current assets – Inventory
   b) Current Assets – Inventories – Prepaid Expenses
   c) All Current Assets
   d) Profitability Ratio

110. Return on Capital is measured by:
   a) Acid Test Ratio
   b) Activity Ratio
   c) Debt-Equity Ratio
   d) Profitability Ratio

111. ROI is calculated on:
a) Capital employed
b) Total Assets
c) Share Capital
d) None of the above.

112. Which of the following items results into an application of fund ?
a) Payment of Dividend
b) Issue of Share Capital
c) Sale of plant
d) None of the above.

113. Dividend received on shares held as investments is a cash flow from:
a) Financing activity
b) Investing activity
c) Operating activity
d) Any of the above

114. If Selling Price per unit is Rs. 12/-, Variable cost per unit is Rs. 9/-, then Profit Volume Ratio is :
a) 33.33%
b) 25%
c) 75%
d) 125%.

115. As per Income Tax Act. 1961, Previous Year starts from:
a) 1st April
b) 1st March
c) 1st January
d) 31st March.

116. The word 'AUDIT' has been derived from the word:
a) Audio
b) Audition
c) Audire
d) Audible.

117. In Auditing, Internal Check System means a system whereby :
a) the work of the organization is internally checked by the Auditor
b) the work of one employee is automatically checked by another employee
c) the work of the company is checked by Government
d) the works of the employees are checked by the Managing Director.

118. A voucher is :
a) a book of account
b) a transaction
c) a documentary evidence in support of a transaction
d) a technique of sample survey

119. At present, all income tax related matters are regulated in India by:
a) Income Tax Act, 1922
b) Income Tax Act, 1961
c) Income Tax Act, 1957
d) Income Tax Act, 2013.

120. Agricultural Income is fully exempt from income-tax under Section
a) 80 C of the Income Tax Act
b) 28 G of the Income Tax Act
c) 28 D of the Income Tax Act
d) 10(1) of the Income Tax Act

121. Central Excise duty is an indirect tax levied by:
a) Union Government
b) State Governments
c) Both Union and State Governments
d) None of the above.

122. The Customs Act, 1962 covers :
a) Import duties only
b) Export duties only
c) Both Import and Export duties
d) None of the above

123. A debenture holder is a:
a) Creditor of the Company
b) Debtor of the Company
c) Employee of the Company
d) None of the above

124. A Debenture holder gets:
a) Dividend from the Company
b) Interest from the Company
c) Both Dividend and Interest from the Company
d) None of the Above

125. A Company limited by shares if permitted by Articles and passed a resolution in the general meeting to this effect, can do:
a) Increase capital only
b) consolidate capital only.
c) convert capital into stock only
d) All of the above

126. A Company can reduce capital if:
a) only Articles of Association permits
b) only a special resolution has been passed to this effect
c) only the national company law tribunal approves it
d) all of the above three jointly

127. Reduction of capital under section 100 involves:
a) only reduction of unpaid call on shares
b) only cancellation of paid up capital of shares
c) only return of a part of paid up capital to its shareholders
d) all of them.

128. A company can be voluntarily wound up by members if:
a) the directors give a declaration of solvency
b) the auditors give a declaration of solvency
c) the creditors give consent
d) None of the above.

129. In order to be a holding company, a company must acquire:
a) All the equity shares
b) Majority of equity shares with voting rights
c) Power to compose the board of Directors
d) Any one of the above.

130. A consolidated Balance Sheet of a holding company must contain:
a) all the assets and liabilities of the subsidiary companies
b) proportionate assets and liabilities of the subsidiary companies
c) all the shares of the subsidiary companies
d) None of the above.

131. The cost of control for acquiring of the shares of the subsidiary companies may show :
    a) Goodwill
    b) Capital Reserve
    c) Nil
    d) Any of the above

132. A consolidated Balance Sheet is:
    a) Principal Balance Sheet of the holding company
    b) A Substitute Group Balance Sheet
    c) A statutory Balance Sheet
    d) None of the above

133. The transfer of an entry from journal to ledger is known as:
    a) Vouching
    b) Transaction
    c) Posting
    d) Auditing

134. A Trial Balance is prepared to ascertain the:
    a) Arithmetical accuracy of the books of accounts
    b) Profit or loss of the business
    c) Assets and liabilities of the business
    d) None of the above.

135. Transactions are:
    a) Any events
    b) Only Monetary Events
    c) Both Monetary and non-monetary events
    d) Only non-monetary events

136. In case of a Paper Transaction:
    a) Money is to be paid later on
    b) Money is to be paid immediately
    c) Money is not to be paid at all
    d) None of the above

137. Which of the following events is not a transaction?
    a) Payment of children's school fees
    b) Receipt of income-tax refund
    c) Withdrawing of money from bank for personal use
    d) None of the above.

138. Net working capital is the:
    a) Excess of current liabilities over current assets
    b) Excess of current assets over current liabilities
    c) Excess of fixed assets over long term liabilities
    d) Excess of total profits over expected profits.

139. Margin of Safety is:
    a) Excess of Break-even Sales over total sales
    b) Excess of total sales over Break-even Sales
    c) Excess of maximum stock level over minimum stock level
    d) None of the above.

140. At Economic Order Quantity:
    a) Carrying Cost and Buying Cost are equal
    b) Carrying Cost is more than Buying Cost
    c) Buying Cost is more than Carrying Cost
    d) Sum of Carrying Cost and Buying Cost is equal to Total Cost.

141. In case of Dissolution of a Partnership Firm, the following Account is prepared:
    a) Revaluation Account
    b) Realisation Account
    c) Profit & Loss Account
    d) Income & Expenditure Account

142. A & B are partners sharing profits as 2:1. C is admitted for 1/4ths share. The sacrificing ratio is:
    a) 4:1
    b) 8:1
    c) 2:1
    d) None of the above

143. A & B are partners sharing profits as 3:2. C has been admitted in the firm. The new ratio of A, B and C is 2:1:2. The sacrificing ratio is:
    a) 1:1
    b) 3:2
    c) 1:2
    d) 5:1

144. Test Check enables the Auditor to:
    a) Reduce his work burden only
    b) Reduce his responsibility only
    c) Reduce both his work burden and his responsibility
    d) All of the above.

145. Receipts & Payments Account records:
    a) Cash transactions only
    b) Credit transactions only
    c) Both Cash & Credit transactions
    d) None of the above

146. The Accountant of a Company forgot to record the payment of Rs. 5,000/- made to a temple for donation. It is:
    a) Error of Principle
    b) Error of Commission
    c) Error of Duplication
    d) None of the above

147. Which of the following items does not come under the head, “Income from Salaries”?
    a) wages
    b) pension
    c) gratuity
    d) None of the above

148. Cost Inflation Index is applicable in the case of:
    a) Long-term Capital Gains only
    b) Short-term Capital Gains only
    c) Both Long-term and Short-term Capital Gains
    d) None of the above.

149. As per Income-tax Act, 1961, the Deduction in respect of medical insurance premia comes under:
    a) Section 80 C
    b) 80 D
    c) 80 E
    d) 80 G.

150. Which of the following statements is true?
    a) Fixed cost is fixed per unit
    b) Variable cost is variable per unit
    c) Fixed cost is fixed only in the short period
    d) None of the above.

STATISTICS

51. In schedule method , the questionnaire is filled by –
    a) Respondent b) Enumerator
    c) Investigator d) None of the above

52. From a Histogram , one can find the approximate value of –
    a) Mean b) Mode
    c) Median d) None of the above

53. Arithmetic mean is not independent of change of –
    a) Origin b) Scale
    c) Both (a) and (b) d) None of the above

54. Coefficient of variation is a ..... number.
    a) Pure b) Irrational
    c) Complex number d) None of the above

55. β_2 is the measure of –
    a) Mean b) Skewness
    c) Kurtosis d) None of the above

56. The relation among μ_4 , κ_2 and κ_4 is –
    a) $\kappa_4 = \mu_4$ b) $\kappa_4 = \kappa_2 + \mu_4^2$
    c) $\mu_4 = \kappa_4 + 3\kappa_2^2$ d) None of the above

57. The best measure of dispersion is –
    a) Range b) Quartile deviation
    c) Mean deviation d) Standard deviation

58. Mean deviation about ..... is the least.
    a) Mode b) Mean
    c) Median d) Standard deviation

59. For positive skewed distribution –
    a) Mean > Median > Mode c) Mean < Median < Mode
    b) Mean = Median = Mode d) None of the above

60. For two distinct observations, which of the following is correct?
    a) AM > GM > HM b) AM < GM < HM
    c) AM = GM = HM d) None of the above

61. Skewness means .....
    a) Symmetry b) Lack of symmetry
    c) Homogeneous d) None of the above

62. The coefficient of correlation lies between –
    a) 0 to 1 b) 0 to ∞
    c) -1 to 1 d) 0 to 2

63. The sign of regression coefficient depends on –
    a) Mean b) Standard deviation
    c) Correlation coefficient d) None of the above

64. The product of two regression coefficients can never be greater than –
    a) 2 b) 0
    c) 1 d) None of the above

65. The value of β_2 is always –
    a) 0 b) Greater than 1
    c) Less than -1 d) None of the above

66. If A and B are two mutually exhaustive events, then P(AUB) is –
    a) P(A) b) 1
    c) 0 d) P(B)

67. If P(A/B) = P(A) then A and B are ..... events.
    a) Mutually exclusive events b) Dependent
    c) Independent d) Equally likely

68. If A is a certain event then P(A) is –
    a) 0 b) 2
    c) >0 d) 1

69. If X and Y are two ..... random variables then V(X±Y) = V(X) + V(y)
    a) Any b) Independent
    c) Dependent d) None of the above

70. If A and B are two independent events then –
    a) A^c and B^c are also independent
    b) A^c and B are also independent
    c) A and B^c are also independent
    d) All of the above

71. If X is a random variable, then
    a) $E(X^2) \geq (E(X))^2$ b) $E(X^2) = E(5X)$
    c) $E(X^2) < (E(X))^2$ d) $E(X^2) = 0$

72. For two distributions with different units of measurement, the variation of Data can be compared by –
    a) Mean b) Range
    c) Coefficient of variation d) Median

73. If ‘a’ and ‘b’ are constants, then V(aX ± b) = ?
    a) aV(X) ± b b) aV(X) – b
    c) $a^2V(X)$ d) None of the above

74. If X and Y are independent random variables, then covariance(X,Y) =?
    a) 2 b) 5
    c) 0 d) 1

75. Two dice are rolled together, if the probability of the event(A) that the sum of numbers on two dice is 8, then P(A) –
    a) 5/8 b) 1/2
    c) 1/4 d) 5/36

76. Binomial distribution has ..... number of parameters.
    a) 3 b) 1
    c) 2 d) 5

77. When p=q, then the Binomial distribution will be –
    a) Homogeneous b) Symmetrical
    c) Skewed d) None of the above

78. Poisson distribution is –
    a) Symmetrical b) Positively skewed
    c) Negatively skewed d) None of the above

79. If A and B are mutually exclusive events then P(AB)= ?
    a) 1 b) 3
    c) 2 d) 0

80. For normal distribution –
    a) $\beta_1=0$ b) $\beta_2=3$
    c) Both (a) and (b) d) None of the above

81. If X~N(5,49) then the distribution of Y=2X is –
    a) N(10,14) b) N(5,49)
    c) N(10,98) d) N(10,196)

82. The area under the normal curve beyond $\mu \pm 3\sigma$ for the variable X is –
    a) 0.6826 b) 0.9544
    c) 0.9973 d) 0.0027

83. If X is a random variable with mean μ then $E(X-\mu)^r$ is known as –
    a) Variance b) Skewness
    c) Central moment of order r d) None of the above

84. When r = ±1, two regression lines will be –
    a) Perpendicular b) Parallel
    c) Coincide d) None of the above

85. The two regression lines passes through the point –
    a) (a,b)
    b) (mean of X,Mean of Y)
    c) (σ_x, σ_y)
    d) None of the above

86. Goodness of fit can be tested by –
    a) t-test
    b) F-test
    c) χ^2-test
    d) Z-test

87. For testing the equality of population variances, which of the following distribution is used.
    a) Normal
    b) t-distribution
    c) F-distribution
    d) None of the above

88. The degrees of freedom for student's t based on a random sample of size n is:
    a) n-1
    b) n-2
    c) n
    d) n-3

89. For large sample test, the sample size should be –
    a) 10
    b) >30
    c) <25
    d) None of the above

90. The probability of Type-I is called –
    a) Null hypothesis
    b) Level of significance
    c) Critical region
    d) None of the above

91. The probability level of correct decision in case of testing a null hypothesis is:
    a) Power
    b) Size of critical region
    c) β
    d) None of the above

92. Which of the following is true?
    a) $1-\beta < 0$
    b) $1-\beta \geq$ level of significance(α)
    c) $1-\beta = 2$
    d) None of the above

93. Under the following condition Power=Level of significance –
    a) When alternative hypothesis becomes null hypothesis
    b) When $\alpha=\beta$
    c) When the error is zero
    d) None of the above

94. Neyman-Pearson's lemma is used –
    a) For unbiased test
    b) For construction of most powerful critical region
    c) For minimax test
    d) None of the above

95. The degree of freedom for χ^2 statistic in case of contingency table of order of (3X3) is –
    a) 4 b) 6
    c) 9 d) 12

96. Factorization theorem is related to study the property of –
    a) Unbiasedness b) Consistency
    c) Sufficiency d) None of the above

97. Rejecting a null hypothesis H_o when H_o is always true is –
    a) Type II error b) Type I error
    c) Both (a) and (b) d) None of the above

98. In case of efficient estimator 't', the V(t) is the –
    a) Maximum b) Least
    c) -5 d) None of the above

99. The probability of all the possible outcomes of a random experiment is equal to:
    a) Infinity b) Zero
    c) One d) None of the above

100. If $X \sim N(\mu,\sigma^2)$, the maximum probability at the point $X=\mu$ is:
    a) $\frac{1}{\sqrt{2\Pi}}\, e^{-1/2}$ b) $\frac{1}{\sqrt{2\Pi}\sigma}$
    c) $\frac{1}{\sqrt{2\Pi}\sigma}\, e^{-1/2}$ d) $\frac{1}{\sqrt{2\Pi}}$

101. Test of null hypothesis H_o: $\mu=70$ vs. H_1: $\mu>70$ leads to –
    a) One sided test (left)
    b) One sided test(right)
    c) Two failed test.
    d) None of the above

102. The mean of chi-square distribution n d.o.f is –
    a) 2n b) n^2
    c) $\sqrt{n}$ d) n

103. If X is a random variable, then the moment generating function of X is given by:
    a) $E[e^{tX}]$ b) $E[X^t]$
    c) $E[S^X]$ d) None of the above

104. The size of critical region under H_o is called:
    a) Power b) Level of significance
    c) β d) None of the above

105. Which of following distribution possessing the memoryless property :
    a) Uniform b) Geometric
    c) Normal d) Gamma

106. Name the following distribution for which mean and variance are equal:
   a) Binomial b) Normal
   c) Poisson d) Exponential

107. In case of normal population, the sample mean is –
   a) Unbiased estimate b) Consistent estimator
   c) Most efficient d) All of the above

108. In time series, the number of components is –
   a) 5 b) 10
   c) 8 d) 4

109. The long term effect in time series is known as:
   a) Trend b) Seasonal
   c) Cyclical d) Irregular

110. Seasonal variation in a time series is:
   a) Regular movement b) Oscillatory movement
   c) Period less than one year d) Both (a) and (c)

111. Method of least square to fit in the trend is applicable only if the trend is:
   a) Linear b) Parabolic
   c) Both (a) and (b) d) None of the above

112. If the slope of the trend line is positive, it shows:
   a) Rising trend b) Declining trend
   c) Stagnation d) Any one of the above

113. Index numbers are also known as:
   a) Economic barometer b) Lactometer
   c) Both (a) and (b) d) None of the above

114. Index numbers are generally expressed as:
   a) In ratios b) In percentage
   c) In thousands d) None of the above

115. Base period for an Index number should be:
   a) A normal period
   b) Should not be too long or too short from current period
   c) Both (a) and (b)
   d) None of the above

116. The ideal Index number is:
   a) Laspeyre's price Index number
   b) Paache's price Index number
   c) Fisher's price Index number
   d) None of the above

117. Laspeyre's Index number possess:
   a) Downward bias b) No bias
   c) Upward bias d) None of the above

118. The condition for time reversal test to be satisfied with usual notation is:
   a) $P_{01} \cdot V_{01} = V_{01}$ b) $P_{01} \cdot P_{10} = 1$
   c) $P_{01} \cdot V_{01} = 1$ d) None of the above

119. Any Index number is:
   a) Pure number b) Expressed in rupees
   c) Expressed in kgs d) None of the above

120. The geometric mean of Laspeyre's and Paache's price Index numbers is:
   a) Kelly's price Index number b) Edgeworth price Index number
   c) Fisher's price Index number d) None of the above

121. Laspeyre's Index formula uses the weights of the:
   a) Base year b) Current year
   c) Both (a) and (b) d) None of the above

122. If the consumer price Index for 2015 is 800, then the purchasing power of a rupee is:
   a) 0.15 paise b) 12.5 paise
   c) 8 paise d) None of the above

123. In India, the collection of vital statistics started for the first time in:
   a) 1920 b) 1886
   c) 1969 d) 1946

124. Vital statistics are obtained through:
   a) Census operation b) Registration system
   c) Survey method d) All of the above

125. Vital rates are generally expressed in:
   a) Percentage b) Per thousand
   c) Per million d) None of the above

126. The child bearing age in India is:
   a) 20-28 years b) 20-29 years
   c) 15-49 years d) None of the above

127. The death rate obtained for a segment of a population is known as:
   a) Specific death rate b) Crude death rate
   c) Infant mortality rate d) None of the above

128. The ratio of births to the total deaths in a year is called:
   a) Survival rate b) Fertility rate
   c) Vital Index d) None of the above

129. The relation between NRR and GRR is:
   a) NRR = $\frac{1}{GRR}$ b) NRR > GRR
   c) NRR ≤ GRR d) None of the above

130. A complete life table is constructed for an age interval of:
   a) 5 years b) 10 years
   c) 1 year d) None of the above

131. A population maintaining a constant growth rate is said to be a :
   a) Stable population b) Stationary population
   c) Mobile population d) None of the above

132. The NRR > 1 indicates that –
   a) Increase in population b) Decrease in population
   c) Constant in population size d) None of the above

133. An experimental design is:
   a) A map b) A plan of experiment
   c) An architect d) All of the above

134. The number of principles of design of experiment is:
   a) 2 b) 3
   c) 5 d) 10

135. For an (5X5) LSD, the d.f for error is –
   a) 12 b) 24
   c) 4 d) 5

136. In RBD local control is applied in .... way direction.
   a) 2 b) 3
   c) 1 d) None of the above

137. In the analysis of data of RBD with 'b' blocks and 't' treatments , the d.f for error is :
   a) t(b-1) b) b(t-1)
   c) (b-1)(t-1) d) None of the above

138. The method of confounding is a device to reduce the size of :
   a) Experiments b) Replications
   c) Blocks d) None of the above

139. In 2^3 factorial experiment, the number of first order interaction effect is:
   a) 4 b) 7
   c) 3 d) 8

140. Replication in an experiment is means:
   a) The number of blocks b) Total number of treatments
   c) Repetition of the treatment d) None of the above

141. In CRD with 't' treatments for 'n' experimental units the d.f for error is:
   a) t-1
   b) n-1
   c) n-t
   d) None of the above

142. If n units are selected in a sample from N population units, then the sampling fraction is given by:
   a) $1/n$
   b) n/N
   c) $1/N$
   d) None of the above

143. The number of possible sample of size n out of N population units without replacement is:
   a) N^n
   b) N/n
   c) ${}^{N}C_{n}$
   d) n!

144. Under proportional allocation, the size of the sample from each stratum depends on:
   a) Total sample size
   b) Size of the stratum
   c) Population size
   d) All of the above

145. Which of the following statement is correct?
   a) $V(\bar{y}_{st})_{opt} \leq V(\bar{y}_n)_R \leq V(\bar{y}_{st})_{prop}$
   b) $V(\bar{y}_{st})_{opt} \leq V(\bar{y}_{st})_{prop} \leq V(\bar{y}_n)_R$
   c) $V(\bar{y}_{st})_{prop} \leq V(\bar{y}_{st})_{opt} \leq V(\bar{y}_n)_R$
   d) None of the above

146. In case of linear systematic sampling, the population size is:
   a) Large
   b) Small
   c) Multiple of sample size
   d) None of the above

147. When sample size increases then –
   a) Sampling error increases
   b) Sampling error decreases
   c) Sampling error remains constant
   d) None of the above

148. Census method is free from:
   a) Non- Sampling error
   b) Sampling error
   c) Both (a) and (b)
   d) None of the above

149. Errors in a statistical model are always taken to be –
   a) Independent
   b) Distributed as $N(0, \sigma_e^2)$
   c) Both (a) and (b)
   d) None of the above

150. In random number table, the distribution of digits follows:
   a) Normal distribution
   b) Uniform distribution
   c) Binomial distribution
   d) None of the above

MATHEMATICS

51. Consider the following statements:
    (I) There is a set which has exactly 1 subset.
    (II) There is no set having exactly 100 subsets.

    Now select the correct option below:
    (a) Only (I) is true
    (b) Only (II) is true
    (c) Both (I) and (II) are true
    (d) Both (I) and (II) are false

52. There are 25 members in a cricket club. There are 5 of them who can play as both wicketkeeper and bowler. There are 15 who can play as bowler and 7 who can play as wicketkeeper. How many are neither bowlers nor wicketkeepers?
    (a) 3
    (b) 4
    (c) 7
    (d) 8

53. The relation $\geq$ (greater than or equal to) in the set of real number is
    (a) Reflexive but not transitive
    (b) Reflexive and symmetric
    (c) Reflexive and transitive
    (d) Symmetric and transitive

54. Which of the relations below on the set {*x*, *y*, *z*} is an equivalence relation?
    (a) {(*x*, *y*), (*y*, *x*), (*y*, *z*), (z, y), (*z*, *x*), (*x*, *z*)}
    (b) {(*x*, *x*), (*x*, *y*), (*y*, *x*)}
    (c) {(*x*, *x*), (*y*, *y*), (*z*, *z*)}
    (d) None of the above

55. Let*A* = {1, 2, 3, 4} and *B* = {*x*, *y*, *z*}. Then
    (a) There is no mapping *f* : *A*→*B* which is one-to-one
    (b) Every mapping *f* : *A*→*B* is onto
    (c) There are exactly 3 mappings *f* : *A*→*B* which are not onto
    (d) None of the above

56. The set of rational numbers is
    (a) Countably infinite
    (b) Uncountable
    (c) Finite
    (d) None of the above

57. The quadratic expression $5x^2 - 8x + 4$
    (a) is > 0 for all real values of *x*
    (b) is equal to zero for two distinct real numbers
    (c) has a zero at $x = \frac{4}{5}$.
    (d) None of the above

58. The roots of the equation $9x^2 - 6x + 1$ are
    (a) Real and equal
    (b) Equal in magnitude but opposite in sign
    (c) Not real
    (d) None of the above

59. The equation $x^3 - x^2 - x - 2 = 0$ has
    (a) All roots real
    (b) Exactly one real root
    (c) All roots imaginary
    (d) None of the above

60. The product of the roots of the equation $5x^2 - 17x^3 + 19x^2 + 107x = 0$ is
    (a) 0
    (b) $\frac{17}{5}$
    (c) $-\frac{107}{5}$
    (d) $\frac{19}{5}$

61. If α, β, γ are the roots of the equation $x^3 - 4x^2 + 8x + 11 = 0$ then the value of $\alpha^2 + \beta^2 + \gamma^2$ equals
    (a) 0
    (b) 4
    (c) 8
    (d) 16

62. The simplified value of the following expression is
$$\left(\frac{e^x + e^{-x}}{2}\right)^2 - \left(\frac{e^x - e^{-x}}{2}\right)^2$$
    (a) 0
    (b) 1
    (c) 2
    (d) $\frac{1}{2}$

63. The value of the expression $\log 11 + \log \frac{1}{11}$ is equal to
    (a) 0
    (b) 1
    (c) 2
    (d) None of the above

64. Let *A*, *G* and *H* be the arithmetic, geometric and harmonic means of *n* given positive numbers. Then
    (a) $A \le G \le H$
    (b) $H \le A \le G$
    (c) $H \le G \le A$
    (d) $G \le H \le A$

65. The minimum value of $4^x + 4^{1-x}, x \in \square$, is
    (a) 2
    (b) 4
    (c) 1
    (d) None of the above

66. The sequence $\{(-1)^n\}$ is
    (a) Convergent
    (b) Divergent
    (c) Oscillatory
    (d) None of the above

67. The sequence $\{2^{-n}\}$ is
    (a) Convergent
    (b) Divergent
    (c) Oscillatory
    (d) None of the above

68. Let $\sum_{n=1}^{\infty} a_n$ be a series of positive numbers. Now select the correct statement from below:
    (a) $\sum_{n=1}^{\infty} a_n$ is convergent whenever $\lim_{n\to\infty} a_n = 0$
    (b) $\sum_{n=1}^{\infty} a_n$ is convergent if and only if $\lim_{n\to\infty} a_n = 0$
    (c) $\sum_{n=1}^{\infty} a_n$ is not convergent if $\lim_{n\to\infty} a_n \neq 0$
    (d) None of the above

69. The geometric series $\sum_{n=1}^{\infty} r^{n-1}$ is
    (a) Convergent if $r \geq 1$
    (b) Convergent if $r \leq -1$
    (c) Convergent if $|r| < 1$
    (d) None of the above

70. For any two complex numbers z_1 and z_2
    (a) $|z_1| + |z_2| \leq |z_1 + z_2|$
    (b) $|z_1| + |z_2| = |z_1 + z_2|$
    (c) $||z_1| - |z_2|| \leq |z_1 - z_2|$
    (d) $||z_1| - |z_2|| \geq |z_1 - z_2|$

71. Choose the correct statement below:
    (a) The moduli of a complex number and its conjugate are equal
    (b) The arguments of a complex number and its conjugate are equal
    (c) If the arguments of two complex numbers are equal then their moduli are equal
    (d) None of the above

72. Let ω be a complex cube root of 1. Then
    (a) ω^2 is a real number
    (b) $1 + \omega + \omega^2 = 0$
    (c) $1 - \omega + \omega^2 = 0$
    (d) $1 + \omega - \omega^2 = 0$

73. There are 10 boxes to keep 11 medals. Then
    (a) Every box will get at least one medal
    (b) At least one box will contain 2 or more medals
    (c) At least one box will contain no medal
    (d) None of the above

74. The inside of an auditorium has 8 different electric lights, all connected to different switches. In how many different ways can the auditorium be lit?
    (a) 8
    (b) 8!
    (c) 256
    (d) 255

75. How many 4-digit numbers can formed with the digits 0, 1, 2, 3?
    (a) 192
    (b) 256
    (c) 24
    (d) None of the above

76. In how many ways can 12 apples be distributed among 4 boys so that every boy gets at least 1 apple?
    (a) 165
    (b) 495
    (c) 455
    (d) None of the above

77. Suppose *A* and *B* be two mutually exclusive events. Then
    (a) *A* and *B* are independent events
    (b) $P(A \cup B) = 0$
    (c) $P(A \cap B) = 0$
    (d) None of the above

78. If *A* and *B* are independent events then
    (a) $P(A \cap B) = P(A)P(B)$
    (b) $P(A \cap B) = P(A) + P(B)$
    (c) $P(A \cap B) = P(B) - P(A)$
    (d) None of the above

79. A local football club has 15 players including 3 foreign players. A team of 11 players is selected at random. What is the probability that all 3 foreign players are selected?
    (a) $\frac{33}{91}$
    (b) $\frac{2}{3}$
    (c) $\frac{11}{15}$
    (d) None of the above

80. A coin is tossed three times. The probability of getting a result in the third toss different from those obtained in the first two tosses is
    (a) $\frac{1}{2}$
    (b) $\frac{1}{4}$
    (c) $\frac{1}{8}$
    (d) $\frac{1}{16}$

81. The value of the determinant $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega^2 & 1 & \omega \\ \omega & \omega^2 & 1 \end{vmatrix}$ where ω is a complex cube root of 1, is
    (a) 0
    (b) 1
    (c) ω
    (d) ω^2

82. Let *a* be a diagonal entry of a skew-symmetric real matrix *A*. Then
    (a) *a* must be positive
    (b) *a* must be negative
    (c) *a* = 0
    (d) None of the above

83. Choose the correct statement below:
    (a) Matrix addition is not commutative
    (b) Matrix multiplication is commutative
    (c) An invertible matrix has determinant not equal to 0
    (d) None of the above

84. The matrix $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ is

(a) Nilpotent
(b) Idempotent
(c) Invertible
(d) Skew-symmetric

85. The eigenvalues of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 2 & 0 & 2 \end{bmatrix}$ are

(a) All real and distinct
(b) 1 and 2
(c) 1, -1 and 2
(d) None of the above

86. Select the correct statement below:

(a) Eigenvalues of two distinct matrices can never be the same
(b) Every square matrix satisfies its characteristic equation
(c) The eigenvalues of real matrices are real and distinct
(d) None of the above

87. If $\cos\theta = \frac{x}{x+1}$ then $\sin\theta =$

(a) $\frac{x-1}{x+1}$
(b) $\frac{\sqrt{1-x^2}}{x+1}$
(c) $\frac{\sqrt{2x+1}}{x+1}$
(d) None of the above

88. The value of $\sin 75^0$ is

(a) $\frac{\sqrt{6}-\sqrt{2}}{4}$
(b) $\frac{\sqrt{6}+\sqrt{2}}{4}$
(c) $\frac{\sqrt{2}-\sqrt{6}}{4}$
(d) $\frac{\sqrt{6}+\sqrt{2}}{2}$

89. If $\sin\theta = -\frac{7}{25}$ and θ is in the 4th quadrant then

(a) $\tan\theta = \frac{7}{24}$

(b) $\cos\theta = -\frac{24}{25}$

(c) $\cot\theta = -\frac{24}{7}$

(d) $\sec\theta = -\frac{25}{24}$

90. Select the correct statement:

(a) $\sin^{-1}(-1) = \frac{3\pi}{2}$ because $\sin\frac{3\pi}{2} = -1$

(b) $\sin^{-1}(-1) = -\frac{\pi}{2}$

(c) The domain of the inverse trigonometric function $\sin^{-1} x$ is $[0, 2\pi]$

(d) None of the above

91. The simplified value of $\sin\left(2\cos^{-1}\frac{3}{5}\right)$ is

(a) $\frac{24}{25}$

(b) $-\frac{7}{25}$

(c) $\frac{7}{25}$

(d) $-\frac{24}{25}$

92. If $2\sin\frac{x}{2} = 1, 0 \le x < \frac{\pi}{2}$ then

(a) $x = \frac{5\pi}{6}$

(b) $x = \frac{\pi}{3}$

(c) x has exactly 2 solutions in the given interval

(d) x has no solution in the given interval

93. In a triangle *ABC* the measure of angle A is 60^o, side a is $\sqrt{6}$ cm and side b is 2 cm. What is the measure of angle B?

(a) 90°

(b) 60°

(c) 30°

(d) 45°

94. In a triangle *ABC* the sides *a*, *b* and *c* are of lengths 2 cm, 4 cm and $2\sqrt{3}$ cm respectively. What is the measure of angle *C*?

(a) 90°

(b) 60°

(c) 30°

(d) 45°

95. The simplified form of the expression $\frac{12(\cos 23^o + i\sin 23^o)}{6(\cos 293^o + i\sin 293^o)}$ is

(a) $2i$

(b) $2(1-i)$

(c) $-2i$

(d) $2(i-1)$

96. The sum of the series $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\cdots$ is

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

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

(c) $\frac{\pi}{8}$

(d) None of the above

97. Select the correct statement from below:

(a) It is not possible to add two vectors of different directions

(b) Multiplication of a vector with a scalar always increases the magnitude of the vector

(c) The zero vector has no direction

(d) None of the above

98. The dot product of the two vectors $\hat{i}+3\hat{j}-4\hat{k}$ and $2\hat{i}-\hat{j}-\hat{k}$ is equal to

(a) 3

(b) $3\hat{i}$

(c) $3\hat{j}$

(d) $3\hat{k}$

99. The cross product $\vec{a}\times\vec{b}$ of the vectors $\vec{a}=\hat{i}+\hat{j}+\hat{k}$ and $\vec{b}=2\hat{j}-\hat{k}$ is equal to

(a) $3\hat{i}-\hat{j}+2\hat{k}$

(b) $-3\hat{i}+\hat{j}+2\hat{k}$

(c) $-3\hat{i}-\hat{j}+2\hat{k}$

(d) $3\hat{i}+\hat{j}+2\hat{k}$

100. Given three vectors $\vec{a},\vec{b}$ and $\vec{c}$ the scalar triple product $\vec{a}\cdot(\vec{b}\times\vec{c})$ is

(a) the volume of the parallelepiped defined by the three vectors given

(b) the area of a triangle whose sides are represented by the given vectors

(c) the perimeter of a triangle whose sides are represented by the given vectors

(d) none of the above

101. Choose the correct formula from below:

(a) $\vec{a}\times(\vec{b}\times\vec{c})=(\vec{a}\cdot\vec{c})\vec{b}-(\vec{a}\cdot\vec{b})\vec{c}$

(b) $\vec{a}\times(\vec{b}\times\vec{c})=(\vec{a}\cdot\vec{c})\vec{b}+(\vec{a}\cdot\vec{b})\vec{c}$

(c) $\vec{a}\times(\vec{b}\times\vec{c})=(\vec{b}\cdot\vec{a})\vec{c}-(\vec{a}\cdot\vec{c})\vec{b}$

(d) $\vec{a}\times(\vec{b}\times\vec{c})=(\vec{b}\cdot\vec{c})\vec{a}-(\vec{a}\cdot\vec{c})\vec{b}$

102. Let *f* be a vector function and let ∇ be the vector differential operator. Which of the following is false?

(a) $\nabla \cdot (\nabla \times f) = 0$

(b) $\nabla \times (\nabla f) = 0$

(c) $\nabla \times (\nabla \times f) = 0$

(d) None of the above

103. Consider the equations below:

(I) $x^2 + y^2 - 6x + 8y - 24 = 0$

(II) $x^2 + y^2 - 6x + 8y = 0$

(a) Equation (I) represents a circle but (II) does not

(b) Equation (I) represents a circle but (II) does not

(c) The two equations represent concentric circles

(d) The two equations represent degenerate circles

104. Consider the circle represented by the equation $x^2 + y^2 + 2x - 10y + 25 = 0$. Then

(a) The *y* - axis is a tangent to the circle at the point (0, 5)

(b) The *x* - axis is a normal to the circle at the point (0, 5)

(c) There is no tangent to the circle passing through the origin

(d) The radius of the circle is 5 units

105. The equation of a circle of radius *r* in parametric form is

(a) $x = r\sec\theta, y = r\tan\theta$

(b) $x = r\cos\theta, y = r\sin\theta$

(c) $x = \cos r\theta, y = \sin r\theta$

(d) None of the above

106. For the parabola $y^2 = 4ax$ which of the following is true?

(a) The coordinates of the vertex is (*a*, 0)

(b) The coordinates of the focus is (0, 0)

(c) The equation of the axis is *x* = 0.

(d) The length of the latus rectum is 4*a*

107. The focus of a parabola is (3, 0) and the equation of its directrix is $x = -3$. The equation of the parabola is:

(a) $x^2 = 12y$

(b) $y^2 = 12x$

(c) $x^2 = -12y$

(d) $y^2 = -12x$

108. The equation of the tangent to the parabola $y^2 = 8x$ at the point (2,4) is?

(a) $x = y + 2$
(b) $y = x + 2$
(c) $x + y = 2$
(d) None of the above

109. For the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$

(a) The eccentricity is $\frac{5}{4}$
(b) The length of latus rectum is $\frac{9}{5}$
(c) Equations of the directrices are $x = \pm\frac{25}{4}$
(d) None of the above

110. A circle is a special case of an ellipse when

(a) the eccentricity is equal to 0
(b) the equation of the directrices are $x = \pm y$
(c) the major axis becomes infinite
(d) None of the above

111. The equation of the normal to the ellipse $x^2 + 2y^2 = 9$ at the point (1,2) is

(a) $x + 4y = 9$
(b) $y - 4x = 9$
(c) $y = 4x - 2$
(d) $4x + y = 2$

112. The equation $xy = 4$ represents

(a) A circle
(b) An ellipse
(c) A pair of straight lines
(d) A rectangular hyperbola

113. What is the centre of the hyperbola represented by the equation

$$4x^2 - 5y^2 + 40x - 30y - 45 = 0\,?$$

(a) $(-5, -3)$
(b) $(-3, -5)$
(c) $(5, 3)$
(d) None of the above

114. An equation for the hyperbola with center (0, 0), vertex (0, 5), and asymptotes $y = \pm\frac{5}{3}x$ is

(a) $\frac{x^2}{25} - \frac{y^2}{9} = 1$
(b) $\frac{x^2}{9} - \frac{y^2}{25} = 1$
(c) $\frac{y^2}{25} - \frac{x^2}{9} = 1$
(d) None of the above

115. Which of the triads below represents the direction cosines of a line?
(a) 1, 0, 1
(b) 1, 1, 0
(c) 1, 1, 1
(d) $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0$

116. The direction cosines of a line perpendicular to the plane $8x + y + 4z = 1$ are
(a) $l = 8, m = 1, n = 4$
(b) $l = \frac{8}{9}, m = \frac{1}{9}, n = \frac{4}{9}$
(c) $l = 0, m = 1, n = 0$
(d) None of the above

117. Let l_1, m_1, n_1 and l_2, m_2, n_2 be the direction ratios of two perpendicular lines. Then
(a) $l_1 l_2 + m_1 m_2 + n_1 n_2 = 1$
(b) $l_1 m_2 + m_1 n_2 + n_1 l_2 = 0$
(c) $(l_1^2 + m_1^2 + n_1^2)(l_2^2 + m_2^2 + n_2^2) = 1$
(d) $l_1 l_2 + m_1 m_2 + n_1 n_2 = 0$

118. The equation to the tangent plane at the point (1,0,0) of the sphere $x^2 + y^2 + z^2 = 1$ is
(a) $x = 1$
(b) $y = 0$
(c) $z = 0$
(d) $x = 0$

119. The direction cosines of the normal to the sphere $(x-3)^2 + (y-4)^2 + z^2 = 16$ at the point (3,0,0) are
(a) $l = 0, m = 1, n = 0$
(b) $l = 1, m = 0, n = 0$
(c) $l = 0, m = 0, n = 1$
(d) None of the above

120. If $f(x) = [x]$ is the greatest integer function then $\lim_{x \to 1} f(x)$ is equal to
(a) 0
(b) 1
(c) 2
(d) Does not exist

121. If the function $f(x)$ is continuous at $x = a$ then
(a) $f(x)$ is differentiable at $x = a$
(b) $\lim_{x \to a-} f(x)$ may not exist
(c) $\lim_{x \to a+} f(x) = f(a)$
(d) None of the above

122. The function $f(x)=\begin{cases} x\sin\frac{1}{x}, & x\neq 0 \\ 0, & x=0 \end{cases}$

(a) Has a removable discontinuity at $x=0$
(b) Is continuous at $x=0$
(c) Is monotonically increasing
(d) Is monotonically decreasing

123. Let $f(x)=\begin{cases} -x, & x<0 \\ x, & x\geq 0 \end{cases}$

(a) $f(x)$ is not continuous at $x=0$
(b) $f(x)$ is not differentiable at $x=0$
(c) $f'(0)$ exists and is equal to 1.
(d) None of the above

124. Let $x=a(\theta+\sin\theta), y=a(1-\cos\theta)$. Then $\frac{dy}{dx}$ is equal to

(a) $\frac{\cos\theta}{1+\sin\theta}$
(b) $\frac{\sin\theta}{1+\cos\theta}$
(c) $\frac{1+\sin\theta}{\cos\theta}$
(d) $\frac{1+\cos\theta}{\sin\theta}$

125. The function $f(x)=-\frac{x^3}{3}+\frac{x^2}{2}+6x-17$ is

(a) Strictly increasing in □
(b) Strictly increasing in the interval $(-2,3)$
(c) Strictly decreasing in the interval $(-2,3)$
(d) None of the above

126. Let $f(x)=\sin ax$ then $\frac{d^3y}{dx^3}$ is equal to

(a) $-a^3\cos ax$
(b) $\sin^3 ax$
(c) $-a^3\sin ax$
(d) $-\cos^3 ax$

127. The equation of the tangent to the curve $y=3x^3-7x^2+x+1$ at $(2,-1)$ is

(a) $9x+y-19=0$
(b) $y-9x+19=0$
(c) $9x-y+19=0$
(d) None of the above

128. Let $f(x)$ be differentiable in [a, b] and let $f'(c)=0$ for some $c, a<c<b$. Then

(a) f has a maximum at $X=C$
(b) f has a minimum at $X=C$
(c) f has neither a maximum nor a minimum at $X=C$
(d) f may have a maximum at $X=C$

129. For $f(x)=10x^6-24x^5+15x^4-40x^3+108$ the stationary points, i.e. the points where $f'(x)=0$, are $x=0$ and $x=2$. Then

(a) $f(2)$ is a maximum
(b) $f(0)$ is a maximum
(c) $f(2)$ is a minimum
(d) $f(0)$ is a minimum

130. For the conclusion of Rolle's theorem to hold for the function $f(x)$ in the interval [a,b]

(a) $f(a)$ and $f(b)$ must be of opposite signs
(b) $f(a)\neq 0$
(c) $f(b)\neq 0$
(d) $f(a)$ and $f(b)$ must be equal

131. The formula for L'Hospital's rule is

(a) $\lim\limits_{x\to a}\dfrac{f(x)}{g(x)}=\lim\limits_{x\to a}\dfrac{f'(x)}{g'(x)}$
(b) $\lim\limits_{x\to a}\dfrac{f(x)}{g(x)}=\dfrac{f'(a)}{g'(a)}$
(c) $\lim\limits_{x\to a}\dfrac{f(x)}{g(x)}=\lim\limits_{x\to a}\dfrac{f'(x)}{g(x)}$
(d) None of the above

132. The value of $\lim\limits_{x\to 1}\dfrac{1+\log x-x}{1-2x+x^2}$ is equal to

(a) 0
(b) $\dfrac{1}{2}$
(c) $-\dfrac{1}{2}$
(d) 1

133. The partial derivative of $f(x,y)=3x^3+x^2y-2xy+27y+3$ with respect to *x* at the point $(0,-3)$ is

(a) 6
(b) 5
(c) 4
(d) 3

134. If $u=e^{xyz}$ then $\dfrac{\partial^2 u}{\partial y\partial x}$ is equal to

(a) $xe^{xyz}(1+xyz)$
(b) $ye^{xyz}(1+xyz)$
(c) $ze^{xyz}(1+xyz)$
(d) None of the above

135. If $u=f(x,y)$ is a homogeneous function of degree 2 in *x*, *y*, then

(a) $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=u$
(b) $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=2u$
(c) $x\dfrac{\partial u}{\partial x}-y\dfrac{\partial u}{\partial y}=u$
(d) $x\dfrac{\partial u}{\partial x}-y\dfrac{\partial u}{\partial y}=2u$

136. Choose the correct statement from the options below:

(a) A continuous function is integrable and differentiable

(b) A continuous function is integrable but may not be differentiable

(c) If a continuous function is integrable then it must be differentiable

(d) None of the above

137. $\int \frac{2+x}{x} dx =$

(a) $2\log x + x + C$

(b) $\log(x+2) + x + C$

(c) $2\log(x+2) + C$

(d) None of the above

138. If $y = \int (x^3 + 2x^{\frac{5}{2}} + 5x^{\frac{3}{2}} + 10x) dx$ and $y = 0$ when $x = 0$ then

(a) $y = \frac{1}{4}x^4 + \frac{4}{7}x^{\frac{7}{2}} + 2x^{\frac{5}{2}} + 5x^2 + 1$

(b) $y = \frac{1}{4}x^4 - \frac{4}{7}x^{\frac{7}{2}} - 2x^{\frac{5}{2}} + 5x^2$

(c) $y = \frac{1}{4}x^4 - \frac{4}{7}x^{\frac{7}{2}} - 2x^{\frac{5}{2}} + 5x^2 + 1$

(d) $y = \frac{1}{4}x^4 + \frac{4}{7}x^{\frac{7}{2}} + 2x^{\frac{5}{2}} + 5x^2$

139. Let *u* and *v* be two functions of x. Then the formula for integration by parts is given by

(a) $\int uvdx = u\int vdx + v\int udx$

(b) $\int uvdx = u\int vdx - v\int udx$

(c) $\int uvdx = u\int vdx - \int\left(\frac{du}{dx}\int vdx\right)dx$

(d) $\int uvdx = u\int vdx + \int\left(\frac{du}{dx}\int vdx\right)dx$

140. $\int \frac{2xdx}{(x-1)(x+1)} =$

(a) $\log(x-1) + \log(x+1) + C$

(b) $\log(x+1) - \log(x-1) + C$

(c) $\log(x-1) - \log(x+1) + C$

(d) None of the above

141. $\int \sin^2 x dx =$

(a) $-\cos^2 x + C$

(b) $\frac{1}{2}(x + \cos 2x) + C$

(c) $\frac{1}{2}(x - \sin 2x) + C$

(d) $\frac{1}{2}(x + \sin 2x) + C$

142. $\int_0^2 [x] dx =$

(a) 0

(b) 1

(c) 2

(d) Does not exist

143. Which of the following is not correct?

(a) $\int_0^{\frac{\pi}{2}} \sin x dx = \int_0^{\frac{\pi}{2}} \cos x dx$

(b) $\int_0^{\pi} \cos x dx = 2\int_0^{\frac{\pi}{2}} \cos x dx$

(c) $\int_0^{\pi} \sin x dx = 2\int_0^{\frac{\pi}{2}} \sin x dx$

(d) None of the above

144. Let $a < c < b$. Then

(a) $\int_a^b f(x)dx < \int_a^c f(x)dx + \int_c^b f(x)dx$

(b) $\int_a^b f(x)dx > \int_a^c f(x)dx + \int_c^b f(x)dx$

(c) $\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$

(d) None of the above

145. $\int_{-5}^{5} (x^3 + 5\sin^5 x)dx =$

(a) 0

(b) 10

(c) 15

(d) 20

146. The area bounded by the straight line $x - 2y + 2 = 0$, *x*-axis, *y*-axis and the line $x = 4$ is equal to

(a) 4 square units

(b) 6 square units

(c) 8 square units

(d) 10 square units

147. The order of the differential equation $\frac{d^2y}{dx^2}-\left(\frac{dy}{dx}\right)^2=1$ is

(a) 1
(b) 2
(c) 4
(d) 0

148. The degree of the differential equation $\sqrt{1+\left(\frac{dy}{dx}\right)^2}=x^2$ is

(a) 1
(b) 2
(c) 4
(d) $\frac{1}{2}$

149. The order and degree of the differential equation of the family of circles touching the *x*-axis at the origin, are respectively

(a) 1, 1
(b) 1, 2
(c) 2, 1
(d) 2, 2

150. If $y(t)$ is a solution of $(1+t)\frac{dy}{dt}-ty=1$ and $y(0)=-1$ then $y(1)$ is

(a) $-\frac{1}{2}$
(b) $e+\frac{1}{2}$
(c) $e-\frac{1}{2}$
(d) $\frac{1}{2}$

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Space for Rough Work

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