

Booklet Serial No.

6155

**DO NOT BREAK THE SEAL OF THE BOOKLET UNTIL YOU ARE TOLD TO DO SO****SERIES : III****QUESTION BOOKLET****Subjects : General English, General Knowledge & Aptitude and Economics/  
Statistics/Mathematics****Full Marks : 350****Time Allowed : 2½ Hours***Read the following instructions carefully before you begin to answer the questions.***INSTRUCTIONS TO CANDIDATES**

1. This Booklet contains **175 questions** to be answered in a separate OMR Answer Sheet using Black Ballpoint Pen in the following three Parts :

**Part—A : General English : 25 questions**

**Part—B : General Knowledge and Aptitude : 50 questions**

**Part—C : [ Select any ONE subject from the following ] : 100 questions**  
**Economics/Statistics/Mathematics**

2. **All** questions are compulsory.
3. You will be supplied the Answer Sheet separately by the Invigilator. You must complete the details of particulars asked for.
4. Answer must be shown by completely blackening the corresponding circle in the Answer Sheet against the relevant question number by Black Ballpoint Pen. OMR Answer Sheet without marking Series shall not be evaluated.

**Example :**

Suppose the following question is asked :

**The Capital of Meghalaya is**

- (A) Guwahati  
(B) Kohima  
(C) Shillong  
(D) Delhi

You will have four alternatives in the Answer Sheet for your response corresponding to each question of the Question Booklet as below :

(A) (B) (C) (D)

In the above illustration, if your chosen response is alternative (C), i.e., Shillong, then the same should be marked on the Answer Sheet by blackening the relevant circle with a Black Ballpoint Pen only as below :

(A) (B) (C) (D)

**The example shown above is the only correct method of answering.**

5. Answer the questions as quickly and as carefully as you can. Some questions may be difficult and others easy. Do not spend too much time on any one question.
6. There will NOT be any negative marking for wrong answers.
7. The Answer Sheet must be handed over to the Invigilator before you leave the Examination Hall.
8. No Rough Work is to be done on the Answer Sheet. Space for Rough Work has been provided in the Question Booklet.

SEAL

## PART—A : GENERAL ENGLISH

( Marks : 50 )

Each question carries 2 marks :

**Directions : (Q. Nos. 1-5), In the following questions, out of the four alternatives given, choose the one which best conveys the meaning of the idioms/phrases given in the bold letters.**

### 1. To fly off the handle

- (A) to dislocate
- (B) to be indifferent
- (C) to lose one's temper
- (D) to let up

### 2. To rise like a Phoenix

- (A) to rise with anger
- (B) to rise with new life
- (C) to boast
- (D) to waste one's efforts

### 3. From hand to mouth

- (A) something repeated often
- (B) to survive without saving
- (C) work hard
- (D) to surrender

### 4. An axe to grind

- (A) difficult job
- (B) hard labour
- (C) punishment
- (D) selfish aim or motive

### 5. Take exception to

- (A) different
- (B) object to
- (C) difficult
- (D) to take with difficulty

**Directions : (Q. Nos. 6-10), In the following questions, some of the sentences have errors and some have none. Find out which part of a sentence (A), (B), (C), (D) has an error and select that part as an answer. If there is no error, then (D) is the answer.**

6. (A) He  
(B) always speaks  
(C) truthful  
(D) No error

7. (A) My best friend  
(B) is  
(C) coming for dinner  
(D) No error

8. (A) The Mary  
(B) and John  
(C) are twins  
(D) No error
9. (A) James told me that  
(B) he first went to the Mexico  
(C) and then to the Netherlands  
(D) No error
10. (A) *Bible*  
(B) said that we  
(C) must love one another  
(D) No error
11. The teacher gave a lucid explanation of the poem.  
(A) long  
(B) vague  
(C) clear  
(D) tedious
12. The two opposing parties have reached a stalemate.  
(A) deadlock  
(B) settlement  
(C) dilemma  
(D) solution
13. The security arrangements made for the visiting Prime Minister were impeccable.  
(A) flawless  
(B) grand  
(C) elaborate  
(D) tight
14. You should not get paranoid about what others think of you.  
(A) flattered by  
(B) influenced by  
(C) upset by  
(D) obsessed with
15. The workers tried their best to thwart the plans of the management.  
(A) embarrass  
(B) frustrate  
(C) embitter  
(D) hasten

**Directions : (Q. Nos. 11–15), In the following questions, out of four alternatives given, choose the one which best expresses the meaning of the underlined word.**

**Directions : (Q. Nos. 16–20), In the following questions, out of four alternatives given, choose the one which best expresses the opposite in meaning of the underlined word.**

16. Dwindling of resources was noticed after the war.  
(A) Increase  
(B) Paucity  
(C) Availability  
(D) Dearth

17. The boy was reprimanded for his behaviour.

- (A) encouraged
- (B) appreciated
- (C) praised
- (D) approved

18. The old man did not divulge the secret.

- (A) disguise
- (B) suppress
- (C) veil
- (D) conceal

19. The soldiers made sporadic raids into the enemy's territory.

- (A) rare
- (B) sharp
- (C) frequent
- (D) coordinated

20. The officer spoke in a terse manner.

- (A) pleasant
- (B) verbose
- (C) rude
- (D) concise

**Directions : (Q. Nos. 21-25), In the following questions, sentences are given with blanks to be filled with appropriate and suitable word/words. Four alternatives are suggested for each question. Choose the correct alternative out of the four.**

21. The man \_\_\_\_\_ a beard is my brother.

- (A) in
- (B) for
- (C) of
- (D) with

22. We have not met before, \_\_\_\_\_?

- (A) did we
- (B) have we
- (C) haven't we
- (D) didn't we

23. This is the \_\_\_\_\_ technology in the field of computer science.

- (A) last
- (B) later
- (C) latest
- (D) latter

24. She could not get the prize \_\_\_\_\_ she tried hard for it.

- (A) yet
- (B) although
- (C) when
- (D) and

25. Students will fail \_\_\_\_\_ they work hard.

- (A) until
- (B) though
- (C) unless
- (D) till

## PART—B : GENERAL KNOWLEDGE AND APTITUDE

( Marks : 100 )

Each question carries 2 marks :

26. Which of the following features of the Paramparagat Krishi Vikas Yojana is not correct?
- (A) It seeks to promote organic farming  
(B) Assistance will be given only to cluster farmers  
(C) Production of organic crops will be mainly meant for export  
(D) Expenditure on organic certification will be borne by the Government
27. The HRIDAY scheme of the Government of India is intended to
- (A) help poor heart patients  
(B) promote organic cultivation  
(C) provide 'Housing for All'  
(D) develop heritage cities
28. Among the tax revenues of the Union Government, the most important source is
- (A) Personal Income Tax  
(B) Goods and Services Tax  
(C) Corporate Tax  
(D) Customs Duty
29. Foreign Direct Investment (FDI) in India has shown a distinct preference for
- (A) Telecom Industry  
(B) The Core and Infrastructure Sectors  
(C) Service Sector  
(D) Fast Moving Consumer Goods (FMCG)
30. Which one of the following countries has the highest natural gas reserves?
- (A) Iran (B) India  
(C) Russia (D) Saudi Arabia
31. Which one of the following food additives is safe to use?
- (A) Aspartame  
(B) Monosodium glutamate  
(C) Sodium chloride  
(D) Sodium nitrate
32. Which of the following contributes maximum to the greenhouse effect?
- (A) Carbon dioxide  
(B) Water vapour  
(C) Methane  
(D) Nitrous oxide
33. During summer, we feel comfortable under a fan because it
- (A) throws cool air on us  
(B) sets the air in motion, thereby increasing the evaporation of sweat  
(C) produces convection currents  
(D) produces air which carries heat away from the body
34. As water freezes, its temperature
- (A) decreases (B) does not change  
(C) increases (D) fluctuates
35. To an astronaut, the outer space appears
- (A) white (B) black  
(C) blue (D) crimson

36. What was unique to Harappan Civilization in comparison to Egyptian and Mesopotamian Civilization?
- Pictographic script
  - Temples
  - Rectangular town planning
  - Drainage system
37. The Konark Temple in Odisha is dedicated to which of the following deities?
- Lakshmi
  - Siva
  - Kali
  - Surya
38. The first railway line running from Bombay to Thane was opened to traffic in
- 1850
  - 1853
  - 1869
  - 1905
39. The movement that came to an abrupt end because of the Chauri-chaura incident was the
- Wahabi Movement
  - Quit India Movement
  - Non-Cooperation Movement
  - Civil Disobedience Movement
40. The executive actions of the Union Government are carried out under the name of the
- Cabinet
  - Prime Minister
  - Chief Justice of India
  - President
41. What is a cyclone?
- A low-pressure system with clockwise winds in the northern hemisphere
  - A high-pressure system with anti-clockwise winds in the northern hemisphere
  - A low-pressure system with anti-clockwise winds in the northern hemisphere
  - A high-pressure system with clockwise winds in the northern hemisphere
42. Which is the substance obtained on a commercial scale from the sea water besides sodium chloride?
- Radium
  - Iodine
  - Thorium
  - Manganese
43. Trees shed their leaves in winter season to
- conserve heat
  - conserve water
  - take rest after the summer growth
  - conserve forest
44. Which is known as the home of the Asiatic lion?
- Gir National Park
  - Dudhwa National Park
  - Kanha National Park
  - Corbett National Park

45. The first postal stamp of India was released in 1837. Where was it released?  
 (A) Bombay (B) Dhaka  
 (C) Karachi (D) Yangon
46. What was the name of the first remote sensing satellite of India launched in 1988?  
 (A) INSAT-1  
 (B) APPLE  
 (C) IRS-1  
 (D) IRS-1A
47. AMRUT (Atal Mission for Rejuvenation and Urban Transformation) scheme was launched in  
 (A) 2012 (B) 2015  
 (C) 2017 (D) 2019
48. Who presides over the joint session of the Parliament?  
 (A) The President  
 (B) The Vice President  
 (C) The Speaker of the Lok Sabha  
 (D) The Deputy Chairman of the Rajya Sabha
49. Which agency is responsible for the estimation of poverty in India?  
 (A) NITI Aayog  
 (B) Rural Development Ministry  
 (C) Ministry of Food and Civil Supplies  
 (D) Finance Ministry
50. Demand pull factors for inflation can be  
 (A) development expenditure  
 (B) increase in the agricultural output  
 (C) increase in the industrial output  
 (D) a balanced budget
51. In a class, 72 students drink only tea, 50% of the students drink coffee, 25% of the students drink both tea and coffee and 5% of the students drink neither tea nor coffee. What is the total strength of the class?  
 (A) 120 (B) 140  
 (C) 160 (D) 180
52. *P*, *Q*, *R*, *S* and *T* sit around a table. *P* sits two seats to the left of *R* and *Q* sits two seats to the right of *R*. If *S* sits in between *Q* and *R*, who sits to the immediate right of *P*?  
 (A) *T* (B) *S*  
 (C) *Q* (D) *R*
53. Six persons *A*, *B*, *C*, *D*, *E* and *F* entered a lift in the ground floor and they get down in six different floors numbered 1 to 6. The ground floor is just below the first floor. The following information is given :  
 I. *D* should get down just before *A*.  
 II. *C* should not get down on any odd-numbered floor but has to get down after *A*.  
 III. No one got down after *B*.  
 IV. There is exactly one person getting down between *E* and *F*.  
 How many persons got down after *D*?  
 (A) 2 (B) 3  
 (C) 4 (D) 5
54. If *A*'s father is *B*, *C* is the father of *B* and *D* is *A*'s mother, then how is *C* related to *D*?  
 (A) Father  
 (B) Grandfather  
 (C) Father-in-law  
 (D) Husband

55. If water is called air, air is called green, green is called brown, brown is called steel, steel is called red, red is called rain, rain is called tree and tree is called road, what is the colour of human blood?  
 (A) Red (B) Water  
 (C) Rain (D) Tree
56. If ROSE is coded as 6821, CHAIR is coded as 73456 and PREACH is coded as 961473, what will be the code for SEARCH?  
 (A) 318826  
 (B) 214673  
 (C) 214763  
 (D) 216473
57. X started walking straight towards South. He walked a distance of 5 metres and then took a left turn and walked a distance of 3 metres. Then he took a right turn and walked a distance of 5 metres again. X is facing which direction now?  
 (A) North-East  
 (B) South  
 (C) North  
 (D) South-West
58. Abhay takes casual leave only on first working day of every month. The office has weekly offs on Saturday and Sunday. In a month of 30 days, the first working day happened to be Tuesday. What will be the day for his next casual leave?  
 (A) Wednesday  
 (B) Monday  
 (C) Friday  
 (D) Thursday
59. Rahul wants to buy 6 kg of tomatoes and 7 kg of potatoes which would cost him ₹ 190. In the market as tomatoes were very good, he decided to buy 2 kg more tomatoes and 6 kg less potatoes and spent only ₹ 170. What is the price of 1 kg of tomatoes?  
 (A) ₹ 10 (B) ₹ 15  
 (C) ₹ 20 (D) ₹ 25
60. A two-digit number is such that the sum of its digits is five times the difference of its digits. If the number exceeds the number formed by reversing its digits by 18, then find the number.  
 (A) 96 (B) 64  
 (C) 32 (D) 16
61. By selling a cycle at ₹ 1,200 a shopkeeper incurs a loss of 20%. At what price should he sell it to get a profit of 15%?  
 (A) ₹ 1,700 (B) ₹ 1,625  
 (C) ₹ 1,800 (D) ₹ 1,725
62. A stone is dropped from a height of 1 km. The distance it falls through varies directly with the square of the time taken to fall through that distance. If it travels 64 m in 4 seconds, find the distance it covers in the 5th second.  
 (A) 36 m (B) 24 m  
 (C) 28 m (D) 44 m
63. The population of a colony of ants increases by 20% everyday. If on Monday the population is 3000, on which day of the week is it 5184?  
 (A) Wednesday  
 (B) Tuesday  
 (C) Thursday  
 (D) Friday

64. If ₹ 2,000 amounts to ₹ 2,200 in 2 years under simple interest, what is the rate of interest per annum?  
 (A) 10% (B) 5%  
 (C) 15% (D) 20%
65.  $P$  and  $Q$  can do a certain work in 28 days and 56 days respectively.  $P$  works for 7 days, and then  $Q$  joins  $P$ . In how many more days can they complete the remaining work?  
 (A) 7 (B) 14  
 (C) 21 (D) 28
66. A filling tap can fill a tank in 6 hours and an emptying tap can empty the tank in 12 hours. If both the taps are opened simultaneously, in how many hours will the tank be filled?  
 (A) 6 (B) 12  
 (C) 18 (D) 24
67. A bag contains 2 kg of potatoes and 3 kg of tomatoes. If the cost of potatoes is ₹ 5 per kg and that of tomatoes is ₹ 8 per kg, then what is the average price per kilogram of the vegetables in the bag?  
 (A) ₹ 5 (B) ₹ 6.60  
 (C) ₹ 6.80 (D) ₹ 7
68. A total of 44 chocolates were distributed among 10 children such that each girl gets 5 chocolates and each boy gets 4 chocolates. What is the number of boys?  
 (A) 6 (B) 5  
 (C) 4 (D) 3
69. 6 litres of pure milk are added to 10 litres of a mixture of water and milk having 40% milk. What is the percentage of milk in the resulting solution?  
 (A) 46% (B) 62.5%  
 (C) 70% (D) 87.5%
70. The average of the marks scored by Anil in five out of six subjects in an examination is 54. If Anil's average mark in the six subjects together is 60, what is the score of Anil in the sixth subject?  
 (A) 66 (B) 65  
 (C) 90 (D) 85
71. If the time in a clock is 10 hours 40 minutes, then what time does its mirror image show?  
 (A) 1 hour 25 minutes  
 (B) 1 hour 15 minutes  
 (C) 1 hour 10 minutes  
 (D) 1 hour 20 minutes
72. What is the angle between the hands of the clock, when it shows 50 minutes past 5 o'clock?  
 (A)  $125^\circ$  (B)  $95^\circ$   
 (C)  $130^\circ$  (D)  $120^\circ$
73. Which year will have the same calendar as that of 2005?  
 (A) 2006 (B) 2008  
 (C) 2007 (D) 2011
74. If 2nd September, 2003 was Tuesday, what day of the week will be 2nd September, 2006?  
 (A) Monday  
 (B) Saturday  
 (C) Sunday  
 (D) Friday
75. In a class of 95 students, 40 play cricket, 50 play football and 10 play both cricket and football. How many of them play only cricket?  
 (A) 30 (B) 35  
 (C) 40 (D) 45

**PART—C**

( Marks : 200 )

[ Select any ONE subject from the following ]

**ECONOMICS**

Each question carries 2 marks :

76. The most simple and popular method of measuring economic development is to calculate the trend of gross national product (GNP) at  
(A) current prices  
(B) constant prices  
(C) Both (A) and (B)  
(D) None of the above
77. Who gave the statement, "Underdeveloped countries are the slums of the world economy"?  
(A) Ragnar Nurkse  
(B) A. K. Cairncross  
(C) Colin Clark  
(D) Jagdish Bhagwati
78. Which animal/bird is raised the most in the world?  
(A) Goat (B) Hen  
(C) Cow (D) Duck
79. The expenses on advertising is called  
(A) implicit cost  
(B) surplus cost  
(C) fixed cost  
(D) selling cost
80. Marginal propensity to consume lies between  
(A) 0 to 1  
(B) -1 to 0  
(C) -1 to 1  
(D) None of the above
81. Which one of the following is **not** included while estimating National Income through the income method?  
(A) Rent  
(B) Pension  
(C) Undistributed profit  
(D) Mixed income
82. Consumption function expresses the relationship between consumption and  
(A) savings  
(B) income  
(C) investment  
(D) price
83. As per the UN Report, how many people globally were living in Modern Slavery in 2021?  
(A) 50 million (B) 60 million  
(C) 70 million (D) 80 million
84. Credit creation power of the commercial banks gets limited by which of the following?  
(A) Banking habits of the people  
(B) Cash Reserve Ratio  
(C) Credit policy of the Central Bank  
(D) All of the above
85. The World Trade Organization has downgraded the global GDP forecast for FY 2022 to how much?  
(A) 3.1% (B) 2.8%  
(C) 2.5% (D) 2.0%

86. What is meant by 'autarky' in international trade?
- Monopoly in international trade
  - The imposition of restrictions on international trade
  - Removal of all restrictions from international trade
  - The idea of self-sufficiency and no international trade by a country
87. An individual demand curve slopes downward to the right because of the
- working of the law of diminishing the marginal utility
  - substitution effect of a decrease in price
  - income effect of fall in price
  - All of the above
88. One of the methods to find out Mode is
- $3 \text{ Median} + 2 \text{ Mean}$
  - $3 \text{ Median} - 3 \text{ Mean}$
  - $2 \text{ Median} - 3 \text{ Mean}$
  - $3 \text{ Median} - 2 \text{ Mean}$
89. The Heckscher-Ohlin approach to international trade provides important insights in
- gains from trade
  - effect of trade on production and consumption
  - effect of trade on the incomes of production factors
  - All of the above
90. When National Income is calculated concerning the base year, it is
- nominal National Income
  - net National Income
  - real National Income
  - gross National Income
91. Which of the following is known as the long-run average cost curve?
- Learning curve
  - Envelope curve
  - Equal product curve
  - Phillips curve
92. Isoquants are right-angled only when
- factors are perfect substitutes
  - factors are neutral
  - factors are perfect complements
  - factors are scarce
93. Parallel economy is an economy
- which runs side-by-side of the existing economy
  - which has the same characteristics as the main economy
  - which has a variety of parallel businesses
  - which has plentiful of black money
94. According to W. W. Rostow, how many stages of economic growth are there?
- Two
  - Three
  - Four
  - Five
95. Which of the following is **not** a correct statement?
- Welfare economics is based on value judgements.
  - Welfare economics is also called 'economics with a heart'.
  - Welfare economics focuses on questions about equity as well as efficiency.
  - The founder of welfare economics was Alfred Marshall.

96. Which Five-Year Plan focused on 'growth with social justice and equity'?
- (A) Sixth Five-Year Plan  
(B) Seventh Five-Year Plan  
(C) Eighth Five-Year Plan  
(D) Ninth Five-Year Plan
97. In which year was the Reserve Bank of India established?
- (A) 1935  
(B) 1938  
(C) 1945  
(D) 1948
98. Who was the first Indian Governor of the RBI?
- (A) C. D. Deshmukh  
(B) S. Mukherjee  
(C) Sachindra Ray  
(D) None of them
99. The symbol of the Reserve Bank of India is
- (A) Capital of Ashokan Pillar  
(B) Kuber with a purse of money  
(C) A dog sitting in a defensive state  
(D) Tiger before a Palm tree
100. Which telecom company is ready to roll out the world's most advanced 5G network across India?
- (A) Airtel  
(B) Vodafone  
(C) Adani  
(D) Reliance Jio
101. Which State has topped NITI Aayog's India Innovation Index 2022 among major States?
- (A) Haryana  
(B) Maharashtra  
(C) Telangana  
(D) Karnataka
102. What is the name of the new payments service launched by RBI?
- (A) 120Pay  
(B) 123Pay  
(C) 157Pay  
(D) 234Pay
103. What was India's rank on Henley Passport Index 2022?
- (A) 67  
(B) 80  
(C) 87  
(D) 104
104. Who has been appointed as the new CEO of NITI Aayog?
- (A) Kapil Dev Tripathi  
(B) Praveen K. Srivastava  
(C) Sudhirkumar Saxena  
(D) Parameswaran Iyer
105. Who among the following has been ranked 7th in the Titans category in the Time's 100 Most Influential 2022?
- (A) Mukesh Ambani  
(B) Deepika Padukone  
(C) Priyanka Chopra  
(D) Gautam Adani

- 106.** Indermit Gill was appointed as the Chief Economist of World Bank, becoming the second Indian to take up the post after which of the following?
- (A) Amartya Sen  
(B) Raghuram Rajan  
(C) Kaushik Basu  
(D) Gita Gopinath
- 107.** AGMARK is a guarantee for which of the following standards?
- (A) Quality  
(B) Weight  
(C) Size  
(D) Quantity
- 108.** To control credit, the RBI should
- (A) increase CRR and decrease bank rate  
(B) decrease CRR and reduce bank rate  
(C) increase CRR and increase bank rate  
(D) reduce CRR and increase bank rate
- 109.** Which bank has become the first in India to issue an Electronic Bank Guarantee?
- (A) ICICI Bank  
(B) HDFC Bank  
(C) Axis Bank  
(D) Yes Bank
- 110.** Which bank has launched India's first sticker-based debit card?
- (A) State Bank of India  
(B) IDFC Bank  
(C) HDFC Bank  
(D) Kotak Mahindra Bank
- 111.** Which is the first airline company in India to operate 1500 flights per day?
- (A) Indigo  
(B) Vistara  
(C) Air India  
(D) SpiceJet
- 112.** In which year UDAN Scheme was launched?
- (A) 2009 (B) 2014  
(C) 2016 (D) 2018
- 113.** The gradation and standardization of agricultural products are conducted through
- (A) Food Corporation of India  
(B) Indian Standards Institution  
(C) Central Statistical Organization  
(D) Directorate of Marketing and Inspection
- 114.** Which of the following is true about India's National Income?
- (A) Percentage share of agriculture is higher than services  
(B) Percentage share of industry is higher than agriculture  
(C) Percentage share of services is higher than industry  
(D) Percentage share of services is higher than agriculture and industry put together

115. In which year was the Kisan Credit Card introduced?
- (A) 1991  
(B) 1996  
(C) 1998  
(D) 2000
116. Which is **not** a type of loan available under Pradhan Mantri Mudra Yojana?
- (A) Purush  
(B) Kishore  
(C) Shishu  
(D) Tarun
117. Which of the following agricultural products is India's main import item?
- (A) Pulse  
(B) Oil seed  
(C) Edible oil  
(D) Sugar
118. Which State is the largest banana-producing State?
- (A) Tamil Nadu  
(B) Gujarat  
(C) Maharashtra  
(D) Andhra Pradesh
119. Which State is the largest e-waste-producing State in India?
- (A) Tamil Nadu  
(B) Karnataka  
(C) Maharashtra  
(D) Telangana
120. Paper currency was first started in India in which year?
- (A) 1787  
(B) 1861  
(C) 1878  
(D) 1834
121. In which year the Indian rupee was devalued two times within a month?
- (A) 1991  
(B) 1992  
(C) 1993  
(D) 1994
122. The 'Golden Revolution' is related to which of the following?
- (A) Precious minerals  
(B) Pulses  
(C) Jute  
(D) Horticulture and honey
123. Which committee was set up to review the concept of the poverty line?
- (A) S. Tendulkar Committee  
(B) Lakdawala Committee  
(C) Wanchoo Committee  
(D) Dutt Committee
124. Which of the following committees was set up for identification of BPL families in Urban India?
- (A) Tendulkar Committee  
(B) Saxena Committee  
(C) Lakdawala Committee  
(D) Hashim Committee

- 125.** Which of the following **does not** determine the supply of labour?
- (A) Nature of work
  - (B) Work-leisure ratio
  - (C) Size and age structure of the population
  - (D) Marginal productivity of labour
- 126.** The process of curing inflation by reducing the money supply is called
- (A) cost-push inflation
  - (B) demand-pull inflation
  - (C) disinflation
  - (D) reflation
- 127.** Gresham's law in economics relates to
- (A) supply and demand
  - (B) circulation of currency
  - (C) consumption of supply
  - (D) distribution of goods and services
- 128.** The term 'Green GDP' emphasizes on
- (A) the rapid growth of GDP
  - (B) increase in per capita income
  - (C) economic development
  - (D) sustainable development
- 129.** In calculating National Income, which of the following is included?
- (A) Services of housewives
  - (B) Pensions
  - (C) Income of smugglers
  - (D) Income of watchmen
- 130.** Indian agriculture is typically characterized as
- (A) land surplus and labour scarce economy
  - (B) land surplus and labour surplus economy
  - (C) land scarce and labour scarce economy
  - (D) land scarce and labour surplus economy
- 131.** Keynesian economics is primarily focused on which of the following?
- (A) National Income
  - (B) Company balance
  - (C) Resource allocation
  - (D) All of the above
- 132.** When a large number of investors in a country transfer investment elsewhere because of disturbed economic conditions, it is called
- (A) transfer of capital
  - (B) escape of capital
  - (C) outflow of capital
  - (D) flight of capital
- 133.** A mixed economy works primarily through the
- (A) market mechanism
  - (B) central allocative machinery
  - (C) market mechanism regulated by the government policy
  - (D) market mechanism guided by the government participation and planning

134. Who among the following has suggested a tax on expenditure?  
 (A) Dalton  
 (B) Kaldor  
 (C) Musgrave  
 (D) Gautam Mathur
135. Price theory is also known as  
 (A) macroeconomics  
 (B) development economics  
 (C) public economics  
 (D) microeconomics
136. The permission given to a bank customer to draw cheques in excess of his Current Account balance is called  
 (A) personal loan  
 (B) ordinary loan  
 (C) discounting a bill of exchange  
 (D) overdraft
137. Which of the following taxes is **not** collected by the Central Government?  
 (A) Income tax  
 (B) Customs duty  
 (C) Professional tax  
 (D) Excise duty
138. The break-even point is where  
 (A) average revenue equals total cost  
 (B) total revenue equals total cost  
 (C) marginal revenue equals marginal cost  
 (D) None of the above
139. The supply of agricultural products is generally  
 (A) elastic  
 (B) inelastic  
 (C) perfectly elastic  
 (D) perfectly inelastic
140. Imputed gross rent of owner-occupied building is a part of  
 (A) capital formation  
 (B) final consumption  
 (C) intermediate consumption  
 (D) consumer durable
141. Legal tender money refers to which of the following?  
 (A) Cheque  
 (B) Draft  
 (C) Bill of exchange  
 (D) Currency note
142. Purchasing power parity theory is related with  
 (A) interest rate  
 (B) bank rate  
 (C) wage rate  
 (D) exchange rate
143. All of the goods which are scarce and limited in supply are called  
 (A) luxury goods  
 (B) expensive goods  
 (C) capital goods  
 (D) economic goods
144. Which of the following is a better measurement of economic development?  
 (A) GDP  
 (B) Disposable income  
 (C) NNP  
 (D) Per capita income
145. Foreign currency which has a tendency of quick migration is called  
 (A) scarce currency  
 (B) soft currency  
 (C) gold currency  
 (D) hot currency

146. The demand curve for a Giffen good is  
 (A) upward rising  
 (B) downward falling  
 (C) parallel to the quantity axis  
 (D) parallel to the price axis
147. Who said, "Supply creates its own demand"?  
 (A) J. B. Say  
 (B) J. S. Mill  
 (C) J. M. Keynes  
 (D) P. Samuelson
148. What does ECS in banking transactions stand for?  
 (A) Excess Credit Supervisor  
 (B) Extra Cash Status  
 (C) Exchange Clearing Standard  
 (D) Electronic Clearing Service
149. Which of the following is the classification of industries on the basis of raw materials?  
 (A) Small-scale and Large scale  
 (B) Primary and Secondary  
 (C) Basic and Consumer  
 (D) Agro-based and Mineral-based
150. Which of the following items is characterized by the highest income elasticity of demand among others?  
 (A) Car  
 (B) Milk  
 (C) Paddy  
 (D) Tobacco
151. Which one of the following is **not** a sign of economic development?  
 (A) Changing structure of GDP in favour of industry  
 (B) Larger share of GDP coming from primary sector  
 (C) Larger capital inflows  
 (D) Institutional changes in an economy
152. Which among the following is best described as opportunity cost?  
 (A) Difference between the return on chosen option and the return on best forgone option  
 (B) Difference between two chosen options  
 (C) Difference between the return in this year and the previous year  
 (D) None of the above
153. Which of the following is considered as transfer payment?  
 (A) College fees  
 (B) Bank loan  
 (C) Bonus of employees  
 (D) Unemployed allowance by the government
154. Which of the following is **not** a method of calculating National Income?  
 (A) Income method  
 (B) Expenditure method  
 (C) Output method  
 (D) Value method
155. What is subtracted from personal income to get personal disposable income?  
 (A) Direct tax  
 (B) Indirect tax  
 (C) Subsidy  
 (D) None of the above

- 156.** What is the income elasticity of demand for inferior goods?
- (A) Equal to 1
  - (B) Greater than 1
  - (C) Less than 0
  - (D) Greater than 0
- 157.** Which among the following are complementary goods?
- (A) Petrol and Car
  - (B) iPhone and Android Phone
  - (C) Milk and Sweet
  - (D) Shoes and Sandals
- 158.** In public budgets, zero-based budgeting was first introduced in
- (A) UK
  - (B) USA
  - (C) France
  - (D) Sweden
- 159.** Malthusian theory of population explored the relationship between
- (A) optimum growth and resources
  - (B) population growth and development
  - (C) food supply and technology
  - (D) food supply and population growth
- 160.** Human Development Index was developed by
- (A) Friedman
  - (B) Amartya Sen
  - (C) Montek Singh
  - (D) Mahbub-ul-Haq
- 161.** In which of the following market structures is the degree of control over the price of its product by a firm very large?
- (A) Imperfect competition
  - (B) Perfect competition
  - (C) Monopoly
  - (D) Both (A) and (B)
- 162.** An individual demand curve slopes downward to the right because of the
- (A) working of the law of diminishing utility
  - (B) substitution effect of decrease in price
  - (C) income effect of fall in price
  - (D) All of the above
- 163.** The supply of a good refers to
- (A) stock available for sale
  - (B) total stock in the warehouse
  - (C) actual production of the good
  - (D) quantity of the good offered for sale at a particular price
- 164.** Demand for factors of production is
- (A) derived demand
  - (B) joint demand
  - (C) composite demand
  - (D) None of the above
- 165.** Fisher's ideal index number is
- (A) arithmetic mean of Laspeyres and Paasche's index
  - (B) harmonic mean of Laspeyres and Paasche's index
  - (C) geometric mean of Laspeyres and Paasche's index
  - (D) None of the above

- 166.** In which of the following probability distributions, mean is equal to variance?  
 (A) Binomial distribution  
 (B) Poisson distribution  
 (C) Normal distribution  
 (D) None of the above
- 167.** The number of times a unit of money changes hands in the course of a year is called  
 (A) supply of money  
 (B) purchasing power of money  
 (C) velocity of money  
 (D) value of money
- 168.** According to Joseph Schumpeter, profit is the reward for  
 (A) innovation  
 (B) uncertainty bearing  
 (C) risk-taking  
 (D) management
- 169.** An economic theory is  
 (A) an axiom  
 (B) a proposition  
 (C) a hypothesis  
 (D) a tested hypothesis
- 170.** What does a good with positive externalities known as?  
 (A) Giffen good  
 (B) Public good  
 (C) Merit good  
 (D) Snob good
- 171.** What is the shape of the average fixed cost (AFC) curve?  
 (A) U-shaped  
 (B) Horizontal up to a point and then rising  
 (C) Sloping down towards the right  
 (D) Rectangular hyperbola
- 172.** If demand is unitary elastic, a 25% increase in price will result in  
 (A) 25% change in total revenue  
 (B) no change in quantity demanded  
 (C) 25% increase in quantity demanded  
 (D) 25% decrease in quantity demanded
- 173.** What does fiscal policy mean?  
 (A) Policy relating to money and banking in a country  
 (B) Policy relating to non-banking financial institutions  
 (C) Policy relating to government spending, taxation and borrowing  
 (D) Policy relating to financial matters of international trade
- 174.** Under the Industrial Policy of 1991  
 (A) the mandatory convertible clause is applicable to all term loans  
 (B) the mandatory convertible clause is applicable to term loans of more than 10 years  
 (C) the mandatory convertible clause is applicable to term loans of less than 10 years  
 (D) the mandatory convertible clause is no longer applicable
- 175.** Balance of payments on Capital Account includes  
 (A) balances of private direct investments  
 (B) private portfolio investments  
 (C) government loans to foreign governments  
 (D) All of the above

## STATISTICS

Each question carries 2 marks :

76. For a symmetrical distribution, the coefficient of skewness is  
(A) 1 (B) 3  
(C) 0 (D) -1
77. Classical probability is measured in terms of  
(A) an absolute value  
(B) ratio  
(C) Both (A) and (B)  
(D) None of the above
78. The definition of statistical probability was originally given by  
(A) De Moivre (B) Laplace  
(C) von-Mises (D) Feller
79. An event consisting of those elements which are not in  $A$  is called  
(A) primary event  
(B) derived event  
(C) simple event  
(D) complementary event
80. The probability of the intersection of two mutually exclusive events is always  
(A) infinity  
(B) zero  
(C) one  
(D) None of the above
81. If  $A$  is an event, the conditional probability of  $A$ , given  $A$ , is equal to  
(A) zero  
(B) one  
(C) infinity  
(D) None of the above
82. One of the two events is certain to happen. The chance of one event is one-fifth of the other. The odds in favour of the other is  
(A) 1 : 6 (B) 6 : 1  
(C) 5 : 1 (D) 1 : 5
83. For Bernoulli distribution with probability  $p$  of a success and  $q$  of a failure, the relation between mean and variance that holds is  
(A) mean < variance  
(B) mean > variance  
(C) mean = variance  
(D) None of the above
84. Student's  $t$ -distribution is given by  
(A) G. W. Snedecor  
(B) R. A. Fisher  
(C) W. S. Gosset  
(D) None of them
85. If sample size  $n = 2$ , the Student's  $t$ -distribution reduces to  
(A) normal distribution  
(B)  $F$ -distribution  
(C) Cauchy distribution  
(D) None of the above
86. If sample size  $n > 30$ , the Student's  $t$ -distribution tends to  
(A) normal distribution  
(B)  $F$ -distribution  
(C) Cauchy distribution  
(D) None of the above
87. In finite difference context, an argument holds value of  
(A) independent variable  
(B) dependent variable  
(C) Both (A) and (B)  
(D) None of the above

88. The term 'regression' was first used by  
(A) Newton (B) Pearson  
(C) Galton (D) Spearman
89. If the population value follows normal distribution, then to have 95% confidence interval for estimate for a two-tailed test, we use  
(A)  $Z = 1.645$  (B)  $Z = 2.05$   
(C)  $Z = 1.96$  (D)  $Z = 2.58$
90. Sample is subset of  
(A) sample space  
(B) population  
(C) statistic  
(D) parameter
91. In method of least squares, the principle is to minimize  
(A) sum of errors  
(B) squares of errors  
(C) sum of squares of errors  
(D) None of the above
92. The vertical axis in case of an ogive, shows.  
(A) cumulative frequencies  
(B) absolute frequencies  
(C) frequency densities  
(D) None of the above
93. A normal curve is  
(A) leptokurtic  
(B) mesokurtic  
(C) Both (A) and (B)  
(D) None of the above
94. Karl Pearson's coefficient of skewness of distribution is 0.64, its mean is 82 and mode is 50. The standard deviation is  
(A) 50 (B) 22  
(C) 24 (D) 48
95. Absence of symmetry in a distribution is called  
(A) kurtosis  
(B) skewness  
(C) dispersion  
(D) Both (A) and (B)
96. The first moment about origin is  
(A) variance  
(B) mean  
(C) standard deviation  
(D) raw moment
97. If one of the regression coefficients is greater than unity, then the other must be less than  
(A) 0 (B) +1  
(C) -1 (D) 0.5
98. Correlation coefficient is the \_\_\_\_ of the regression coefficient.  
(A) HM (B) GM  
(C) median (D) mode
99. Best average to compute index number is  
(A) GM (B) median  
(C) mode (D) HM
100. There are \_\_\_\_ components of time series.  
(A) 3 (B) 4  
(C) 5 (D) 2
101.  $NRR = 1$ , means population will be  
(A) unstable (B) stable  
(C) increasing (D) decreasing
102. Which of the following measurement scales is required for the valid calculation of Karl Pearson's correlation coefficient?  
(A) Interval  
(B) Ratio  
(C) Both (A) and (B)  
(D) None of (A) and (B)

- 103.** Index numbers are also known as  
 (A) economic barometer  
 (B) sign and guide posts  
 (C) Both (A) and (B)  
 (D) nominal
- 104.** Index numbers are expressed in terms of  
 (A) percentages  
 (B) ratios  
 (C) absolute value  
 (D) All of the above
- 105.** Base period for an index number should be  
 (A) a year only  
 (B) a normal period  
 (C) a period at distant past  
 (D) None of the above
- 106.** If the index number is independent of the units of measurements, then it satisfies  
 (A) time reversal test  
 (B) factor reversal test  
 (C) unit test  
 (D) All of the above
- 107.** If the unit of measurement of a commodity changes, the value of index number  
 (A) also changes  
 (B) remains same  
 (C) increases  
 (D) decreases
- 108.** Chance or random variation in the manufactured product is  
 (A) controllable  
 (B) not controllable  
 (C) Both (A) and (B)  
 (D) None of the above
- 109.** Variation due to assignable causes in the product occurs due to  
 (A) faulty process  
 (B) carelessness of operators  
 (C) poor quality of raw materials  
 (D) All of the above
- 110.** Main tools of SQC are  
 (A) Shewhart chart  
 (B) acceptance sampling plan  
 (C) All of the above  
 (D) None of the above
- 111.** Control charts consist of  
 (A) three control lines  
 (B) upper and lower control limits  
 (C) the level of the process  
 (D) All of the above
- 112.** The graph of the proportion of defectives in the lot against ASN is  
 (A) OC curve  
 (B) ASN curve  
 (C) power curve  
 (D) All of the above
- 113.** OC curve helps in distinguishing between  
 (A) good and bad lots  
 (B) good and bad sampling plan  
 (C) good and bad product  
 (D) All of the above

- 114.** The maximum limit of percentage defectives in a finally accepted product is called  
 (A) Acceptance Quality Level (AQL)  
 (B) Average Outgoing Quality Limit (AOQL)  
 (C) Lot Tolerance Percentage Defective (LTPD)  
 (D) All of the above
- 115.** In India, the collection of vital statistics started for the first time in  
 (A) 1986 (B) 1989  
 (C) 1946 (D) 1886
- 116.** Sample Registration System (SRS), the scheme of sample registration of births and deaths was conducted on a pilot basis during  
 (A) 1969–1970 (B) 1949–1950  
 (C) 1964–1965 (D) 1960–1970
- 117.** Life table is also named as  
 (A) mortality table  
 (B) survival table  
 (C) life expectancy table  
 (D) All of the above
- 118.** A population maintaining a constant growth rate is said to be  
 (A) stable population  
 (B) stationary population  
 (C) mobile population  
 (D) None of the above
- 119.** Local control is a device to maintain  
 (A) homogeneity among blocks  
 (B) homogeneity within blocks  
 (C) Both (A) and (B)  
 (D) Neither (A) nor (B)
- 120.** The maximum possible number of orthogonal contrast among four treatments is  
 (A) four (B) three  
 (C) two (D) one
- 121.** With the help of contrasts, one can estimate the  
 (A) linear effect  
 (B) quadratic effect  
 (C) cubic effect  
 (D) All of the above
- 122.** Completely randomized design is mostly used in  
 (A) field experiments  
 (B) experiments on animals  
 (C) pot experiments  
 (D) All of the above
- 123.** A randomized block design has  
 (A) two-way classification  
 (B) one-way classification  
 (C) three-way classification  
 (D) no classification
- 124.** A Latin square design controls  
 (A) two-way variation  
 (B) three-way variation  
 (C) multiway-variation  
 (D) no variation
- 125.** The Newton's Gauss forward formula and Newton's formula of advancing differences differ in respect of  
 (A) the choice of origin  
 (B) finite difference table  
 (C) use of finite differences  
 (D) All of the above
- 126.** Lagrange's formula is useful for  
 (A) interpolation  
 (B) extrapolation  
 (C) inverse interpolation  
 (D) All of the above

- 127.** Data are simply the numerical results of any scientific
- (A) analysis
  - (B) researches
  - (C) observations
  - (D) measurements
- 128.** Which of the following represents data?
- (A) A single value
  - (B) Only two values in a set
  - (C) A group of values in a set
  - (D) None of the above
- 129.** Statistics deals with
- (A) qualitative information
  - (B) quantitative information
  - (C) Both (A) and (B)
  - (D) None of (A) and (B)
- 130.** Data taken from the publication, 'Agricultural Situation in India' will be considered as
- (A) primary data
  - (B) secondary data
  - (C) Both (A) and (B)
  - (D) None of (A) and (B)
- 131.** Relative error is always
- (A) positive
  - (B) negative
  - (C) positive and negative both
  - (D) zero
- 132.** Which of the following can be classified as hypothetical population?
- (A) All labourers of a factory
  - (B) Female population of a country
  - (C) Population of real numbers between 0 and 100
  - (D) Students of the world
- 133.** If the actual value of a unit is 415 and its estimated value is 400, the absolute error is
- (A) -15
  - (B) 15
  - (C) 0.0375
  - (D) -0.0361
- 134.** The statistical law(s) based on trial and error method is/are
- (A) law of statistical regularity
  - (B) law of inertia of large numbers
  - (C) Both laws (A) and (B)
  - (D) None of (A) and (B)
- 135.** In an exclusive type distribution, the limits excluded are
- (A) lower limits
  - (B) upper limits
  - (C) either of the lower or upper limit
  - (D) lower limit and upper limit both
- 136.** A series showing the sets of all values in classes with their corresponding frequencies is known as
- (A) grouped frequency distribution
  - (B) simple frequency distribution
  - (C) cumulative frequency distribution
  - (D) None of the above

137. The class interval of the continuous grouped data  
10-19, 20-29, 30-39, 40-49  
is  
(A) 9 (B) 10  
(C) 14.5 (D) 4.5
138. A grouped frequency distribution with uncertain first or last classes is known as  
(A) exclusive class distribution  
(B) inclusive class distribution  
(C) open-end distribution  
(D) discrete frequency distribution
139. A simple table represents  
(A) only one factor or variable  
(B) always two factors or variables  
(C) two or more number of factors or variables  
(D) All of the above
140. In an individual series, each variate value has  
(A) same frequency  
(B) frequency one  
(C) varied frequency  
(D) frequency two
141. The following frequency distribution  

$$\begin{array}{ccccccccc} x : & 12 & 17 & 24 & 36 & 45 & 48 & 52 \\ f : & 2 & 5 & 3 & 8 & 9 & 6 & 1 \end{array}$$
is classified as  
(A) continuous distribution  
(B) discrete distribution  
(C) cumulative frequency distribution  
(D) None of the above
142. Which of the following is a one-dimensional diagram?  
(A) Bar diagram  
(B) Pie chart  
(C) Cylinder  
(D) All of the above
143. Ogives for more than type and less than type distribution intersect at  
(A) mean (B) median  
(C) mode (D) origin
144. In case of frequency distribution with classes of unequal widths, the heights of bars of a histogram are proportional to  
(A) class frequency  
(B) class intervals  
(C) frequencies in percentage  
(D) frequency densities
145. Histogram can be used only when  
(A) class intervals are all equal  
(B) class intervals are equal or unequal  
(C) class intervals are unequal  
(D) frequencies
146. If the grouped data has open-end classes, one cannot calculate  
(A) median (B) mode  
(C) mean (D) quartiles
147. The correct relationship between AM, GM and HM is  
(A)  $AM = GM = HM$   
(B)  $GM > AM > HM$   
(C)  $HM \geq GM \geq AM$   
(D)  $AM \geq GM \geq HM$
148. Geometric mean of two numbers  $\frac{1}{16}$  and  $\frac{4}{25}$  is  
(A)  $\frac{1}{10}$  (B) 0.01  
(C) 10 (D) 100
149. Geometric mean is good measure of central value if the data are  
(A) categorical  
(B) on ordinal scale  
(C) in ratios or proportions  
(D) None of the above

150. What percentage of values is less than 3rd decile?  
 (A) 30 percent (B) 70 percent  
 (C) 40 percent (D) 10 percent
151. If the AM of a set of two observations is 9 and its GM is 6, then the HM of the set of observations is  
 (A) 4 (B) 54  
 (C) 3 (D) 1.5
152. If the two observations are 10 and -10, then their harmonic mean is  
 (A) 10 (B) 0  
 (C) 5 (D)  $\infty$
153. The second quartile is also known as  
 (A) lower quartile  
 (B) median  
 (C) mode  
 (D) third decile
154. In case of weighted mean, the accuracy or utility of the mean  
 (A) decreases  
 (B) increases  
 (C) is unaffected  
 (D) None of the above
155. Given the following less than type frequency distribution of income per month :
- | Income (₹) less than | No. of persons |
|----------------------|----------------|
| 1,500                | 100            |
| 1,250                | 80             |
| 1,000                | 70             |
| 750                  | 55             |
| 500                  | 32             |
| 250                  | 12             |
- The median class of income is  
 (A) 750-1000  
 (B) 1000-1250  
 (C) 250-500  
 (D) 500-750
156. For the distribution given in Question No. 155, the modal class is  
 (A) 250-500  
 (B) 500-750  
 (C) 750-1000  
 (D) None of the above
157. For the distribution given in Question No. 155, the upper quartile class is  
 (A) 500-750 (B) 750-1000  
 (C) 1000-1250 (D) 1250-1500
158. For the distribution given in Question No. 155, 30th percentile class is  
 (A) 250-500  
 (B) 500-750  
 (C) 750-1000  
 (D) None of the above
159. Mean of a set of values is based on  
 (A) all values  
 (B) 50 percent values  
 (C) first and last value  
 (D) maximum and minimum value
160. Seven persons gambled sitting on a table. Four persons lost on an average ₹ 55 whereas the other three gained on an average ₹ 70. Is the information worth believing?  
 (A) Yes  
 (B) No  
 (C) Not certain  
 (D) None of the above
161. Sum of the absolute deviations about median is  
 (A) zero (B) maximum  
 (C) minimum (D) one

- 162.** If for values of  $X$ ,  $AM = 25$ ,  $HM = 9$ , then the GM is  
 (A) 17 (B) 15  
 (C) 5.83 (D) 16
- 163.** The second quartile of the following set of data  
 0, 1, -1, -2, 6, 4, 5, 8, 12, 10, 11  
 is  
 (A) 4 (B) 5  
 (C) 6 (D) 8
- 164.** For comparison of two different series, the best measure of dispersion is  
 (A) range  
 (B) mean deviation  
 (C) standard deviation  
 (D) None of the above
- 165.** Mean deviation is minimum when deviations are taken from  
 (A) mean (B) median  
 (C) mode (D) zero
- 166.** If a constant value 5 is subtracted from each observation of a set, the variance is  
 (A) reduced by 5  
 (B) reduced by 25  
 (C) unaltered  
 (D) increased by 25
- 167.** The average wages of workers of a factory is ₹ 550 per month and the standard deviation of wages is ₹ 110. The coefficient of variation is  
 (A) 30% (B) 15%  
 (C) 500% (D) 20%
- 168.** If the mean of a series is 10 and its CV is 40%, the variance of series is  
 (A) 4  
 (B) 8  
 (C) 12  
 (D) None of the above
- 169.** Which measure of dispersion can be calculated in case of open-end intervals?  
 (A) Range  
 (B) Standard deviation  
 (C) Coefficient of variation  
 (D) Quartile deviation
- 170.** If each of a series is multiplied by 10, the CV will be increased by  
 (A) 5% (B) 10%  
 (C) 15% (D) 0%
- 171.** In case of positive skewed distribution, the extreme values lie in the  
 (A) left tail (B) right tail  
 (C) middle (D) anywhere
- 172.** If mean and mode of frequency distribution is 16, the median of the distribution is  
 (A) zero (B) 16  
 (C) 32 (D) 8
- 173.** The value of coefficient of kurtosis can be  
 (A) less than 3  
 (B) more than 3  
 (C) equal to 3  
 (D) All of the above
- 174.** For a distribution, if coefficient of kurtosis is less than zero, the frequency curve is  
 (A) leptokurtic  
 (B) platykurtic  
 (C) mesokurtic  
 (D) Any of the above
- 175.** If all values in a sample is same, then variance is  
 (A) 0  
 (B) 1  
 (C) Cannot be calculated  
 (D) All of the above

## MATHEMATICS

Each question carries **2** marks :

**76.** For the Clairaut's equation

$$y = px + f(p)$$

where  $p = \frac{dy}{dx}$

- (A) the singular solution is obtained from the complete solution
- (B) the singular solution represents the envelope of the family of straight lines represented by the complete solution
- (C) the singular solution represents the envelope of the family of circles represented by the complete solution
- (D) None of the above

**77.** The singular solution of the equation

$$y = px + p^2$$

- (A) does not exist
- (B) is the  $p$ -eliminant of  $y = px + p^2$  and  $p = c$
- (C) is the  $p$ -eliminant of  $y = px + p^2$  and  $x + 2p = 0$
- (D) None of the above

**78.** The equation  $\frac{dy}{dx} + Py = Qy^n$ , where  $P, Q$  are the functions of  $x$ , can be solved by putting

- (A)  $z = y^{n-1}$       (B)  $z = y^{-n}$
- (C)  $z = y^{1-n}$       (D)  $z = y^n$

**79.** If  $H$  is a subgroup of a finite group  $G$ , then  $O(H) \mid O(G)$ . This result is due to

- (A) Wilson      (B) Cayley
- (C) Fermat      (D) Lagrange

**80.** A non-empty subset  $H$  of a group  $\langle G, \cdot \rangle$  is a subgroup of  $G$ , if and only if

- (A)  $\forall a \in H, b \in H \Rightarrow ab \in H$
- (B)  $\forall a \in H \Rightarrow a^{-1} \in H$
- (C)  $\forall a \in H, b \in H \Rightarrow ab^{-1} \in H$
- (D) None of the above

**81.** If  $f : \mathbb{Z} \rightarrow \mathbb{Z}$  is defined by  $f(x) = 2x$ , then

- (A)  $f$  is 1-1 and onto
- (B)  $f$  is 1-1 but not onto
- (C)  $f$  is onto but not 1-1
- (D)  $f$  is neither 1-1 nor onto

**82.** If  $p$  is a prime number such that  $p \nmid a$ , then  $a^{p-1}$  is divisible by  $p$ . This result is due to

- (A) Wilson      (B) Fermat
- (C) Euler      (D) Lagrange

**83.** The remainder obtained on dividing  $18^{12}$  by 13 is

- (A) 1      (B) 3
- (C) 5      (D) 0

84. If  $\phi(m)$  is the Euler's  $\phi$  function, then  
 (A)  $\phi(m) = m - 1$   
 (B)  $\phi(m)$  is the number of positive integers less than  $m$  and co-prime to  $m$   
 (C)  $\phi(m) = m^2$   
 (D)  $\phi(m)$  is the number of positive divisors of  $m$
85. If  $G$  is a finite group and  $a \in G$ , then  
 (A)  $O(a) = O(G)$   
 (B)  $a^{O(G)} = e$   
 (C)  $a^{O(G)-1} = e$   
 (D) None of the above
86. If  $G$  is a cyclic group of order 8 generated by  $a$ , then  
 (A)  $O(a) = 8$  (B)  $O(a) = 4$   
 (C)  $O(a) = 2$  (D)  $O(a) = 1$
87. If  $G$  is a cyclic group of order  $n$  generated by  $a$ , then the number of generators of  $G$  is  
 (A) 1  
 (B)  $n$   
 (C)  $m$ , where  $m$  is a positive integer such that  $m$  is relatively prime to  $n$   
 (D)  $m$ , where  $m$  is a positive integer such that  $m$  divides  $n$
88. If  $G$  is an infinite cyclic group, then the number of generators of  $G$  is  
 (A) 1  
 (B) 2  
 (C) infinite  
 (D) None of the above
89. The equation  $a^2(y^2 + z^2) = b^2x^2$  represents  
 (A) a plane (B) a sphere  
 (C) a cylinder (D) a cone
90. The angle between the line of intersection of  $x + y + z = 0$  and the cone  $4yz - zx - 3xy = 0$  is  
 (A)  $\frac{\pi}{6}$  (B)  $\frac{\pi}{3}$   
 (C)  $\frac{2\pi}{3}$  (D)  $\frac{\pi}{2}$
91. To a central conic, the number of normals that can be drawn through any given point is  
 (A) 3 (B) 4  
 (C) 6 (D) 8
92. The surface generated by a straight line which is parallel to a fixed straight line and intersects a given curve, is  
 (A) a cylinder (B) a cone  
 (C) a sphere (D) a conic
93. The equation  $fyx + gzx + hxy = 0$  represents  
 (A) a cone passing through the three axes  
 (B) a sphere  
 (C) a cylinder  
 (D) None of the above
94. If a right circular cone has three mutually perpendicular generators, then the semi-vertical angle is given by  
 (A)  $30^\circ$  (B)  $\tan^{-1} \sqrt{3}$   
 (C)  $\tan^{-1} \sqrt{2}$  (D)  $45^\circ$

95. The lines  $y = mx$  and  $y = m'x$  are conjugate diameters of the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

if

- (A)  $mm' = \frac{a^2}{b^2}$  (B)  $mm' = -\frac{a^2}{b^2}$   
 (C)  $mm' = \frac{b^2}{a^2}$  (D)  $mm' = -\frac{b^2}{a^2}$
96. The sum of the eccentric angles of co-normal points of an ellipse is  
 (A) an even multiple of  $\pi$   
 (B) an odd multiple of  $\pi$   
 (C) an even multiple of  $\pi/2$   
 (D) an odd multiple of  $\pi/2$
97. The diameter of a parabola which is defined as the locus of the mid-points of a system of parallel chords of the parabola is  
 (A) a line lying at infinity  
 (B) its axis  
 (C) a line parallel to the directrix  
 (D) a line parallel to its axis
98. If by shifting the origin to the point  $(a, 0)$ , the equation of the parabola  $y^2 = 4ax$  becomes  
 (A)  $y^2 = 4ax + 4a^2$   
 (B)  $y^2 = 4ax - 4a^2$   
 (C)  $y^2 = 4ax + 4a$   
 (D)  $y^2 = 4ax - 4a$
99. A body is projected with velocity of 80 feet/sec. It will be 96 feet below the point of projection after  
 (A) 2 sec (B) 3 sec  
 (C) 5 sec (D) 6 sec

100. A particle is executing SHM and takes 2 sec in moving from one end to the other. Then the acceleration of the particle at any point is

- (A)  $-\frac{\pi}{2}x$  (B)  $-\pi x$   
 (C)  $-\pi^2 x$  (D)  $-\frac{\pi^2}{4}x$

101. The greatest horizontal range when the velocity of projection is 48 feet/sec is

- (A) 60 feet (B) 72 feet  
 (C) 96 feet (D) 144 feet

102. A ball drops from a height of 9 feet on a floor and rebounds to a height of 4 feet. The coefficient of restitution is

- (A)  $\frac{2}{3}$  (B)  $\frac{4}{9}$   
 (C)  $\frac{3}{2}$  (D)  $\frac{9}{4}$

103. A particle is projected with a velocity of 80 feet/sec at an elevation of  $45^\circ$ . The time of flight is

- (A) 10 sec (B) 7 sec  
 (C) 5 sec (D) 2 sec

104. A particle makes SH oscillations of period  $2\pi$  sec. If the amplitude is 4 feet, the maximum velocity is

- (A) 8 feet/sec (B) 4 feet/sec  
 (C)  $2/\pi$  feet/sec (D)  $\pi$  feet/sec

105. Conservative forces have the property that

- (A) work done by them depends on the path of displacement  
 (B) work done depends only on the initial and final positions  
 (C) work done by them is independent of the path of displacement  
 (D) None of the above

- 106.** For a given velocity of projection, the horizontal range is maximum when the angle of projection is  
 (A)  $90^\circ$  (B)  $60^\circ$   
 (C)  $45^\circ$  (D)  $30^\circ$
- 107.** If a point moves along a circle with constant speed, then its angular velocity about any point on the circle is  
 (A) same that about the centre  
 (B) half that about the centre  
 (C) twice that about the centre  
 (D) None of the above
- 108.** Two balls impinge directly and after impact their velocities are interchanged. Then the coefficient of restitution is  
 (A) 1 (B)  $\frac{1}{2}$   
 (C)  $\frac{1}{3}$  (D)  $\frac{1}{4}$
- 109.** If a ball is dropped from a height on a fixed plane and rebounds to half of the original height, then the coefficient of restitution is  
 (A) 1 (B)  $\frac{1}{2}$   
 (C)  $\frac{1}{\sqrt{2}}$  (D) 2
- 110.** The position of a moving particle at any time  $t$  is given by  $x = a \cos \omega t$ ,  $y = a \sin \omega t$ . Then the acceleration of the particle at any time  $t$  is given by  
 (A)  $a\omega^2$   
 (B)  $a^2\omega^2$   
 (C)  $a^2\omega$   
 (D) None of the above
- 111.** A square matrix  $A$  is skew-symmetric if and only if  
 (A)  $A^t = -A$   
 (B)  $A^t = A$   
 (C)  $A^t = A^{-1}$   
 (D) None of the above
- 112.** If  $A$  is a real skew-symmetric matrix such that  $A^2 + I = 0$ , then  
 (A)  $A$  is nilpotent  
 (B)  $A$  is orthogonal  
 (C)  $A$  is identity matrix  
 (D) None of the above
- 113.** The relation 'equivalent to' in the set of all matrices is  
 (A) reflexive only  
 (B) symmetric only  
 (C) transitive only  
 (D) an equivalence relation
- 114.**  $A, B$  are two square matrices of order  $n$ . Then  $AB$  is symmetric if  
 (A)  $AB = BA$   
 (B)  $AB = -BA$   
 (C)  $AB$  is always symmetric  
 (D) None of the above
- 115.** The remainder obtained when  $x^3 - 3ax^2 + 3a^2x + 5a^3$  is divided by  $x - a$  is  
 (A)  $a^3$  (B)  $2a^3$   
 (C)  $3a^3$  (D)  $6a^3$

116. Given that  $3 + \sqrt{-5}$  is a root of  $2x^3 - 15x^2 + 46x - 42 = 0$ . Then what will be its other roots?
- (A) One is real and one is complex  
(B) Both are complex  
(C) Both are real  
(D) None of the above
117. Which of the following properties does an equation of odd degree possess?
- (A) It always has an imaginary root  
(B) It always has a real root  
(C) All roots are imaginary  
(D) None of the above
118. If a cubic equation has multiple roots, then they must be
- (A) rational roots  
(B) irrational roots  
(C) imaginary roots  
(D) None of the above
119. The de Moivre's form of  $1 + i$  is
- (A)  $\cos \frac{\pi}{4} + i \sin \frac{\pi}{4}$   
(B)  $\sqrt{2} \left[ \cos \frac{\pi}{4} + i \sin \frac{\pi}{4} \right]$   
(C)  $\cos 0 + i \sin \frac{\pi}{2}$   
(D) None of the above
120. The moment of inertia of a rod of length  $2a$  of mass  $M$  about an axis through one end perpendicular to the rod is
- (A)  $\frac{1}{3}Ma^2$  (B)  $\frac{2}{3}Ma^2$   
(C)  $\frac{4}{3}Ma^2$  (D)  $Ma^2$
121. If  $A, B, C$  are the moments of inertia of a rigid body (which is not a plane lamina) about the coordinate axes, then
- (A)  $C = A + B$   
(B)  $B = A + C$   
(C)  $A = B + C$   
(D)  $A + B + C = \text{constant}$
122. A force of magnitude  $F$  and a couple of moment  $G$  are acting on a rigid body. Then their resultant is
- (A) a couple of moment  $G$   
(B) a force of magnitude  $F$   
(C) a couple of moment  $\sqrt{G^2 + F^2}$   
(D) a force of magnitude  $\sqrt{G^2 + F^2}$
123. A body of mass 4 lb rests in limiting equilibrium on an inclined plane whose slope is  $30^\circ$ . Then the coefficient of friction is
- (A)  $\frac{1}{\sqrt{2}}$  (B)  $\frac{1}{\sqrt{3}}$   
(C)  $\frac{1}{\sqrt{6}}$  (D) 1
124. The centre of gravity of a triangle formed by three rods  $AB, BC$  and  $CA$  is at
- (A) the in-centre of the  $\triangle ABC$   
(B) the centroid of the  $\triangle ABC$   
(C) the in-centre of the triangle formed by joining the mid-points of the sides of the  $\triangle ABC$   
(D) the ortho-centre of the  $\triangle ABC$

125. If a particle is placed at each vertex of a triangle, the mass of which being proportional to the length of the opposite side, then the centre of mass will be at

- (A) the in-centre of the triangle
- (B) the centroid of the triangle
- (C) the ortho-centre of the triangle
- (D) None of the above

126. If  $\lim_{n \rightarrow \infty} a_n = 1$ , then the sequence

$$\left\{ \frac{3a_n + 11}{7a_{n-2} - 2} \right\}$$

converges to

- (A)  $-\frac{3}{2}$
- (B)  $-\frac{11}{2}$
- (C)  $\frac{3}{7}$
- (D)  $\frac{14}{5}$

127. A function  $f$  is defined by  $f(x) = x^2$  in  $[-1, 1]$ . Then  $f(x)$  is

- (A) uniformly continuous in  $[-1, 1]$
- (B) not continuous in  $[-1, 1]$
- (C) not bounded in  $[-1, 1]$
- (D) None of the above

128. The value of  $\lim_{x \rightarrow 1} \frac{x-1}{\log x}$  is

- (A) 0
- (B) -1
- (C) 1
- (D) Does not exist

129. The infinite series  $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} n}{2n+1}$

- (A) converges
- (B) diverges
- (C) oscillates
- (D) None of the above

130. The value of  $\lim_{x \rightarrow 0} \frac{x - |x|}{x}$  is

- (A) 1
- (B) -1
- (C) 0
- (D) Does not exist

131. The straight lines  $\vec{r} = \vec{a} + \alpha \vec{b}$  and  $\vec{r} = \vec{c} + \beta \vec{d}$  intersect, if

- (A)  $(\vec{c} - \vec{a}) \times \vec{d} = \vec{0}$
- (B)  $\vec{a} \times \vec{b} = \vec{c} \times \vec{d}$
- (C)  $(\vec{a} \times \vec{b}) + (\vec{b} \times \vec{c}) + (\vec{c} \times \vec{d}) = \vec{0}$
- (D)  $(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d}) = \vec{0}$

132. If  $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ , then  $\text{curl } \vec{r}$  is equal to

- (A) 0
- (B) 1
- (C)  $\frac{x+y}{x-y} \hat{k}$
- (D)  $\frac{\vec{r}}{|\vec{r}|}$

133. A unit vector normal to the surface  $x^2 + 2y^2 + z^2 = 7$  at  $(1, -2, 2)$  is

- (A)  $\frac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$
- (B)  $\frac{\hat{i} + 2\hat{j} + 2\hat{k}}{\sqrt{3}}$
- (C)  $\frac{\hat{i} + 4\hat{j} + 2\hat{k}}{\sqrt{21}}$
- (D)  $\frac{\hat{i} + 2\hat{j} + \hat{k}}{\sqrt{7}}$

134. The vector function  $\vec{f}(t)$  is of constant direction, if and only if

- (A)  $\vec{f} \cdot \frac{d\vec{f}}{dt} = 0$   
 (B)  $\vec{f} \times \frac{d\vec{f}}{dt} = 0$   
 (C)  $\frac{d\vec{f}}{dt} = 0$   
 (D) None of the above

135. The normal to the plane  $2x - y + 3z = 0$  is parallel to the vector

- (A)  $2\hat{i} - \hat{j} + 3\hat{k}$  (B)  $\hat{i} - 2\hat{j} + 3\hat{k}$   
 (C)  $3\hat{i} - 2\hat{j} + \hat{k}$  (D)  $\hat{i} + \hat{j} + \hat{k}$

136. If  $(\vec{a} \times \vec{b}) \times \vec{c} = \vec{a} \times (\vec{b} \times \vec{c}) = 0$ , then the three vectors  $\vec{a}, \vec{b}, \vec{c}$

- (A) are mutually perpendicular to each other  
 (B) are parallel to each other  
 (C) form a right-angled triangle  
 (D) are coplanar

137.  $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$  is equal to

- (A) 1 (B) 0  
 (C)  $e$  (D)  $\frac{1}{e}$

138. The infinite series  $1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$  is

- (A) absolutely convergent  
 (B) conditionally convergent  
 (C) divergent  
 (D) oscillatory

139. The value of  $\int_{-1}^1 (x + |x|) dx$  is

- (A) 0 (B) -1  
 (C) 1 (D) Does not exist

140. The improper integral  $\int_{-1}^1 \frac{dx}{|x|}$

- (A) does not exist  
 (B) exists and its value is 0  
 (C) exists and its value is 1  
 (D) oscillates

141. The improper integral  $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$

- (A) exists and its value is  $\frac{\pi}{2}$   
 (B) does not exist  
 (C) exists and its value is  $\pi$   
 (D) None of the above

142. The infinite series  $\sum_{n=0}^{\infty} x^n$  is

- (A) convergent for  $|x| > 1$   
 (B) convergent for  $|x| < 1$   
 (C) convergent for  $|x| = 1$   
 (D) divergent for  $|x| < 1$

143. The sequence  $\{S_n\}$ , where

$$S_n = \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{n+n}$$

- (A) converges to  $\log_e 2$   
 (B) converges to 0  
 (C) converges to 1  
 (D) diverges to  $\infty$

144. The function

$$f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$$

is not defined at  $x = 0$ . The value which should be assigned to  $f(x)$  at  $x = 0$  so that it becomes continuous at  $x = 0$ , is

- (A)  $a - b$   
 (B)  $a + b$   
 (C)  $\log a + \log b$   
 (D) None of the above

145. A function  $f(x)$  is defined by  $f(x)=x$  when  $0 < x < 1$  and  $f(x)=2-x$  when  $1 \leq x \leq 2$ . Then  $f'(1)$
- (A) exists and is equal to 1  
 (B) exists and is equal to -1  
 (C) exists and is equal to 0  
 (D) does not exist
146. The antiderivative of  $\frac{e^{5x} + e^x}{e^{3x}}$  is
- (A)  $\frac{e^{4x} - 1}{2e^{2x}}$   
 (B)  $\frac{e^{2x} + e^{-2x}}{2}$   
 (C)  $e^{2x} - e^{-2x}$   
 (D) None of the above
147. The value of  $\int_0^{\pi/4} \tan^6 x \, dx$  is
- (A)  $\frac{\pi}{4}$  (B)  $-\frac{\pi}{4}$   
 (C)  $\frac{13}{15}$  (D)  $\frac{13}{15} - \frac{\pi}{4}$
148. The function  $f(x) = \frac{x}{x+1}$  is
- (A) monotonically increasing for all  $x > 0$   
 (B) monotonically decreasing for all  $x > 0$   
 (C) monotonically increasing for all  $x < 0$   
 (D) monotonically decreasing for all  $x < 0$
149. The sequence  $\{S_n\}$ , where  $S_n = 2 + (-1)^n$ , is
- (A) convergent (B) bounded  
 (C) unbounded (D) divergent
150. The series  $1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$
- (A) converges only for  $x > 0$   
 (B) converges only for  $x < 0$   
 (C) converges only for  $x < 1$   
 (D) converges for all values of  $x$
151. The projection of  $\hat{i} - 2\hat{j} + \hat{k}$  on the vector  $4\hat{i} - 4\hat{j} + 7\hat{k}$  is
- (A)  $\frac{5\sqrt{3}}{10}$  (B)  $2\frac{1}{9}$   
 (C)  $\frac{9}{19}$  (D)  $\frac{\sqrt{6}}{19}$
152. The section of the sphere  $x^2 + y^2 + z^2 - 4x + 6y - 7z = 13$  by the plane  $3x - 2y + z = 0$  is
- (A) a great circle  
 (B) a small circle  
 (C) a point  
 (D) None of the above
153. If for an even function  $f(x)$ ,  $\int_0^1 f(x) \, dx = 3$ , then the value of  $\int_{-1}^0 f(x) \, dx$  is
- (A) 3  
 (B) -3  
 (C) 0  
 (D) None of the above
154. The value of the integral  $\int_0^{\pi} \cos^7 x \, dx$  is
- (A) 0 (B)  $\pi$   
 (C)  $\pi^7$  (D)  $7\pi$
155. The straight line  $\frac{x-1}{2} = \frac{y+3}{-1}, z=3$  is
- (A) parallel to  $-\hat{i} + 2\hat{j} + 3\hat{k}$   
 (B) perpendicular to  $-3\hat{i} - 6\hat{j} + 5\hat{k}$   
 (C) parallel to  $\hat{i} - 2\hat{j} + \hat{k}$   
 (D) None of the above

156. The line of intersection of two planes, where the first containing the vectors  $\hat{i}$  and  $\hat{j}$  and the second containing  $\hat{i}$  and  $\hat{k}$ , is

- (A) parallel to  $\hat{i}$   
 (B) parallel to  $\hat{i} + \hat{j} + \hat{k}$   
 (C) perpendicular to  $2\hat{i} + \hat{j} + \hat{k}$   
 (D) parallel to  $2\hat{i} + \hat{j} + \hat{k}$

157. If  $\vec{b}$  is a vector perpendicular to a unit vector  $\vec{a}$ , then  $(\vec{a} \times \vec{b}) \times \vec{a}$  equals to

- (A)  $\vec{a}$  (B)  $\vec{b}$   
 (C)  $\vec{a} - \vec{b}$  (D) zero vector

158. The derivative  $\frac{d}{dt} \left( \vec{r} \times \frac{d\vec{r}}{dt} \right)$  is equal to

- (A)  $\vec{r} \times \frac{d^2\vec{r}}{dt^2}$  (B)  $\frac{d^2\vec{r}}{dt^2}$   
 (C)  $2\vec{r} \cdot \frac{d\vec{r}}{dt}$  (D) zero vector

159. If  $\phi(x, y, z)$  is a scalar-valued function, then curl (grad  $\phi$ ) is

- (A) the scalar zero  
 (B) the zero vector  
 (C)  $\phi(x, y, z)$   
 (D) None of the above

160. The equation  $x^3 - 2x - 4 = 0$  has

- (A) a real root between 0 and 3  
 (B) a real root between 3 and 4  
 (C) a real root between -1 and 0  
 (D) no real root

161. The equation of the line through (1, 0, 1) and (1, 1, 0) is

- (A)  $x = 1, y + z = 1$   
 (B)  $x + y + z = 1, x = 0$   
 (C)  $x + y = 1, z = 1$   
 (D) None of the above

162. The directional derivative

$$f(x, y) = x^2 + y^2$$

at (1, 0) in the direction  $\vec{a} = \hat{i} - \hat{j}$  is

- (A) 2 (B) 0  
 (C) -2 (D) 1

163. The angle between the planes  $4x - 4y + 7z = 5$  and  $2x + y + 2z = 7$  is

- (A)  $30^\circ$   
 (B)  $60^\circ$   
 (C)  $\cos^{-1} \frac{2}{3}$   
 (D) None of the above

164. If  $y = a \cos 3x$  is a solution of  $(D^2 + 4)y = 10 \cos 3x$ , then the value of  $a$  is

- (A) -2  
 (B) 2  
 (C) 0  
 (D) None of the above

165. The complementary function of the equation

$$\frac{d^2x}{dt^2} - 4 \frac{dx}{dt} + 4x = 2e^{2t}$$

is

- (A)  $A + Bt$   
 (B)  $e^{2t}(A + Bt)$   
 (C)  $Ae^{2t} + B$   
 (D) None of the above

166. The general solution of  $(D+1)^2 y = 0$  is

- (A)  $y = A \cos x + B \sin x$   
 (B)  $y = e^{-x}(A + Bx)$   
 (C)  $y = Ax + B$   
 (D) None of the above

167. If  $f(x) = 4x^2$ , then the value of  $C$  in  $[-1, 3]$  such that

$$f'(C) = \frac{f(3) - f(-1)}{4}$$

is

- (A) 0 (B) 2  
(C) 1 (D) infinite

168. If  $z(x+y) = x^2 + y^2$ , then  $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y}$  is equal to

- (A)  $2z$   
(B) 0  
(C)  $-z$   
(D) None of the above

169. If  $f(x, y) = \frac{x^3 + y^3}{x^3 - y^3}$ ,  $(x, y) \neq (0, 0)$ ;  
 $f(0, 0) = 0$ , then

- (A)  $f_x(0, 0) = 1$   
(B)  $f_y(0, 0) = -1$   
(C)  $f_x(0, 0) = f_y(0, 0)$   
(D)  $f_x(0, 0)$  does not exist

170. If  $u = \cos^{-1} \frac{x+y}{\sqrt{x} + \sqrt{y}}$ , then  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$  is equal to

- (A) 0  
(B)  $-\frac{1}{2} \cot u$   
(C)  $2\sqrt{x} + 2\sqrt{y}$   
(D) None of the above

171. If  $u = f(x+2y) + g(x-2y)$ , then

- (A)  $u_x = 2u_y$   
(B)  $u_x = u_y$   
(C)  $u_{xx} = \frac{1}{4} u_{yy}$   
(D) None of the above

172. The area bounded by  $y = x$  and  $y = x^2$  is equal to

- (A) 1 sq. unit (B)  $\frac{1}{6}$  sq. unit  
(C)  $\frac{1}{3}$  sq. unit (D)  $\frac{1}{4}$  sq. unit

173. The value of  $\int_0^{\pi/2} \int_0^{\pi/2} \cos(x+y) dx dy$  is

- (A) 0 (B) 2  
(C) -1 (D) -2

174. If we change the order of integration of

$$\int_0^1 dx \int_x^{\sqrt{x}} f(x, y) dy$$

- (A)  $\int_0^1 dy \int_{y^2}^y f(x, y) dx$   
(B)  $\int_0^1 dy \int_{x^2}^x f(x, y) dx$   
(C)  $\int_{x^2}^x dy \int_0^1 f(x, y) dx$   
(D)  $\int_{x^2}^x dx \int_0^1 f(x, y) dy$

175. The area in the first quadrant of the circle  $x^2 + y^2 = a^2$  is given by the integral

- (A)  $\int_0^a \int_0^{\sqrt{a^2 - x^2}} dx dy$   
(B)  $\int_0^a \int_0^a y dx dy$   
(C)  $\int_0^a \int_0^a \frac{a^2}{4} dx dy$   
(D) None of the above