1. Which of the following forecasting methods takes a fraction of forecast error into account for the next period forecast?

   (A) simple average method
   (B) moving average method
   (C) weighted moving average method
   (D) exponential smoothening method

2. Which type of motor is NOT used in axis or spindle drives of CNC machine tools?

   (A) induction motor
   (B) DC servo motor
   (C) stepper motor
   (D) linear servo motor

3. The percentage of carbon in Grey cast iron is in the range of

   (A) 0.25 to 0.75 percent
   (B) 1.25 to 1.75 percent
   (C) 3 to 4 percent
   (D) 8 to 10 percent

4. A correctly designed convergent–divergent nozzle working at a designed load is

   (A) always isentropic
   (B) always chocked
   (C) never chocked
   (D) never isentropic

5. A Carnot cycle refrigerator operates between 250 K and 300 K. Its coefficient of performance is

   (A) 6.0
   (B) 5.0
   (C) 1.2
   (D) 0.8

6. In which states of India, are most diamond mines found?

   (A) Bihar and Uttar Pradesh
   (B) Uttar Pradesh and Jharkhand
   (C) Madhya Pradesh
   (D) Uttar Pradesh and Madhya Pradesh

7. Find the least number of complete years in which a sum of money put out at 20% compound interest will be more than doubled.

   (A) 3
   (B) 4
   (C) 5
   (D) 6

8. A pair of words is given. Choose the appropriate pair from the options so as to maintain the same relationship.

   Coke : Coal

   (A) bread : eat
   (B) bread : dough
   (C) bread : flour
   (D) bread : slice

9. Fill in the blank with the best option.

_____ they are poor, they are happy.

(A) As (B) Though (C) Because (D) If

10. A company uses 2555 units of an item annually. Delivery lead time is 8 days. The reorder point (in number of units) to achieve optimum inventory is

(A) 7 (B) 8 (C) 56 (D) 60

11. In orthogonal turning of a low carbon steel bar of diameter 150 mm with uncoated carbide tool, the cutting velocity is 90 m/min. The feed 0.24 mm/rev and the depth of cut is 2 mm. The chip thickness obtained is 0.48 mm. If the orthogonal rake angle is zero and the principal cutting edge angle is 90°, the shear angle in degree is

(A) 20.56 (B) 26.56 (C) 30.56 (D) 36.56

12. Which one of the following is a criterion in the design of hydrodynamic bearings?

(A) sommerfeld number (B) rating life
(C) specific dynamic capacity (D) rotation factor

13. A Carnot cycle is having an efficiency of 0.75. If the temperature of the high temperature reservoir is 727°C, what is the temperature of low temperature reservoir?

(A) 23°C (B) –23°C (C) 0°C (D) 250°C

14. Kinematic viscosity of air at 20°C is given to be 1.6×10^{-5} m^2/s. Its kinematic viscosity at 70°C will be approximately

(A) 2.2×10^{-5} m^2/s (B) 1.6×10^{-5} m^2/s
(C) 1.2×10^{-5} m^2/s (D) 3.2×10^{-5} m^2/s
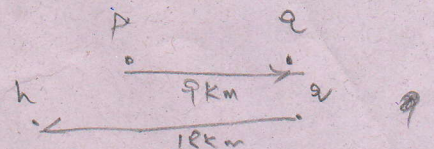
15. Which among the following soils is rich in minerals?

(A) black soil (B) alluvial soil (C) red soil (D) laterite soil

16. In 3 hours a boat can be rowed 9 km up stream or 18 km down stream. Find the speed of the water in the stream.

(A) 1 km/h (B) 1.5 km/h (C) 1.75 km/h (D) 2.25 km/h

17. A series of words is given. From the options choose the order of words which makes it meaningful.

1. Travel   2. Destination   3. Payment   4. Berth/Seat No.   5. Reservation
6. Availability of berth/seat

(A) 1, 2, 5, 4, 3, 6   (B) 2, 6, 3, 5, 4, 1   (C) 6, 2, 5, 4, 3, 1   (D) 5, 3, 4, 1 6, 2

18. Arrange the words to make a meaningful sentence.

P: handed   Q: she   R: the   S: package   T: me

(A) RSQPT   (B) TPRSQ   (C) RSPQT   (D) QPTRS

19. In an air-standard Otto cycle, the compression ratio is 10. The condition at the beginning of the compression process is 100 kPa and 27°C. Heat added at constant volume is 1500 kJ/kg, while 700 kJ/kg of heat is rejected during the other constant volume process in the cycle. (specific gas constant for air = 0.287 kJ/kg K).

The mean effective pressure (in kPa) of the cycle is

(A) 103   (B) 310   (C) 515   (D) 1032

20. In electro discharge machining (EDM), if the thermal conductivity of tool is high and the specific heat of workpiece is low, then the tool wear rate and material removal rate are expected to be respectively

(A) high and high   (B) low and low   (C) high and low   (D) low and high

21. A rotating disc of 1 m diameter has two eccentric masses of 0.5 kg each of radii of 50 mm and 60 mm at angular positions of 0° and 150°, respectively. A balancing mass of 0.1 kg is to be used to balance the rotor. What is the radial position of the balancing mass?

(A) 50 mm   (B) 120 mm   (C) 150 mm   (D) 280 mm

22. The ratio of Euler's buckling loads of columns with same parameters having (i) both ends fixed and (ii) both ends hinged is

(A) 2   (B) 4   (C) 6   (D) 8

23. In electro-discharge machining, the tool is made of

(A) copper   (B) HSS   (C) cast iron   (D) plain carbon steel

24. Who among the following had plundered Kohinoor diamond from India?

(A) Mahmood of Ghazni
(B) Ahmed Shah Abdali
(C) Nadir Shah
(D) none of these

25. 0.9 per cent can be expressed as

(A) 0.9
(B) 0.09
(C) 0.009
(D) none of these

26. If SINGLE is coded as 66, what code is given to WINKLE?

(A) 76
(B) 66
(C) 78
(D) 74

27. Find the missing letters of the series:

cab_c_bdca_d_abd

(A) d, a, b, c
(B) c, c, a, a
(C) b, c, d, a
(D) a, b, c, d

28. Choose the synonym of the given word.
Quota

(A) reserved
(B) seat
(C) allocation
(D) marks

29. Vehicle manufacturing assembly line is an example of

(A) product layout
(B) process layout
(C) manual layout
(D) fixed layout

30. In open-die forging, a disc of diameter 200 mm and height 60 mm is compressed without any barreling effect. The final diameter of the disc is 400 mm. The true strain is

(A) 1.986
(B) 1.686
(C) 1.386
(D) 0.602

31. A solid cylinder (surface 2) is located at the centre of a hollow sphere (surface 1). The diameter of the sphere is 1 m, while the cylinder has a diameter and length of 0.5 m each. The radiation configuration factor F_{11} is

(A) 0.375
(B) 0.625
(C) 0.75
(D) 1

*   6   *

32. The mechanism used in a shaping machine is

   (A) a closed 4-bar chain having 4 revolute pairs
   (B) a closed 6-bar chain having 6 revolute pairs
   (C) a closed 4-bar chain having 2 revolute and 2 sliding pairs
   (D) an inversion of the single slider–crank chain

33. What is approximate percentage change in the life of a tool (t) with zero rake angle used in orthogonal cutting when its clearance angle (α) is changed from 10° to 7°?

   (A) 30% increase   (B) 30% decrease   (C) 70% increase   (D) 70% decrease

34. Zojila Pass is in which state?

   (A) Jammu and Kashmir   (B) Sikkim
   (C) Uttarakhand   (D) Assam

35. A can do a piece of work in 16 days, B in 24 days. With the help of a boy they finish it in 8 days. The boy will do it alone in

   (A) 32 days   (B) 40 days   (C) 48 days   (D) 96 days

36. Which letter group is different from the other three?

   (A) AERIE   (B) ADEUX   (C) ADMIT   (D) ABUSE

37. Ram ranks sixteenth from the top and fifteenth from the bottom in a certain examination. How many students are there in the class?

   (A) 30   (B) 31   (C) 32   (D) 33

38. Choose the antonym of the given word.

   Limpid

   (A) liquid   (B) opaque   (C) transparent   (D) solid

39. A turbo-charged four-stroke direct injection diesel engine has a displacement volume of 0.0259 m³ (25.9 litres). The engine has an output of 950 kW at 2200 rpm. The mean effective pressure in MPa is closest to

   (A) 2   (B) 1   (C) 0.2   (D) 0.1

7

40. A solid circular shaft of diameter 100 mm is subjected to an axial stress of 50 MPa. It is further subjected to a torque of 10 kNm. The maximum principal stress experienced on the shaft is closest to

   (A) 41 MPa   (B) 82 MPa   (C) 164 MPa   (D) 204 MPa

41. A project has six activities (A to F) with respective activity durations 7, 5, 6, 6, 8, 4 days. The network has three paths A–B, C–D and E–F. All the activities can be crashed with the same crash cost per day. The number of activities that need to be crashed to reduce the project duration by 1 day is

   (A) 1   (B) 2   (C) 3   (D) 6

42. Quality screw threads are produced by

   (A) thread milling   (B) thread chasing
   (C) thread cutting with single point tool   (D) thread casting

43. A static fluid can have

   (A) non-zero normal and shear stress.
   (B) negative normal stress and zero shear stress.
   (C) positive normal stress and zero shear stress.
   (D) zero normal stress and zero shear stress.

44. Who among the following Indian women wrestler created a history by qualifying for the London Olympics?

   (A) Sunita Kumari   (B) Geeta Kumari   (C) Namrata Gill   (D) Shweta Pandit

45. In how many ways a committee of 5 members can be selected from 6 men and 5 ladies, consisting of 3 men and 2 ladies

   (A) 25   (B) 50   (C) 100   (D) 200

46. The speed of a large plane is 1040 km/hr and the speed of a small plane is 416 km/hr. If the small plane flies 450 km, how much distance would the large plane have flown during the same time?

   (A) 1080 km   (B) 1125 km   (C) 1180 km   (D) 1200 km
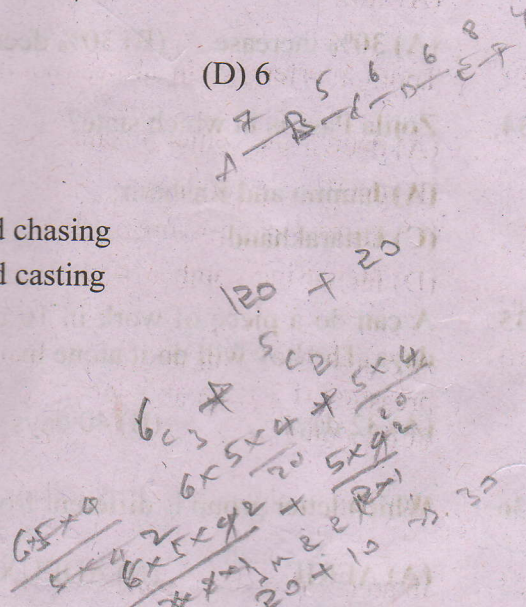
47. Select the related number from the given alternatives:

123 : 132 : : 235 : ?

(A) 235   (B) 253   (C) 352   (D) 252

48. Identify the type of word/s that is/are underlined.

He saw a parking space <u>between</u> two cars and drove into it.

(A) verb   (B) conjunction   (C) preposition   (D) adverb

49. Tooth interference in an external involute spur gear pair can be reduced by

(A) decreasing center distance between gear pair
(B) decreasing module
(C) decreasing pressure angle
(D) increasing number of gear teeth

50. A clutch has outer and inner diameters 100 mm and 40 mm respectively. Assuming a uniform pressure of 2 MPa and coefficient of friction of liner material 0.4, the torque carrying capacity of the clutch is

(A) 148 Nm   (B) 196 Nm   (C) 372 Nm   (D) 490 Nm

51. In an MRP system, component demand is

(A) forecasted
(B) established by the master production schedule
(C) calculated by the MRP system from the master production schedule
(D) ignored

52. During heat treatment of steel, the hardness of various structures in increasing order is

(A) martensite, fine pearlite, coarse pearlite, spherodite
(B) fine pearlite, coarse pearlite, spherodite, martensite
(C) coarse pearlite, fine pearlite, martensite, spherodite
(D) spherodite, coarse pearlite, fine pearlite, martensite

53. In ECM, the material removal is due to

(A) corrosion   (B) erosion   (C) fusion   (D) ion displacement

54. Two powerful earthquakes of 8.6 and 8.2 magnitude struck the coast of Sumatra on 12 April 2012. Sumatra is located in which of the following Asian country?

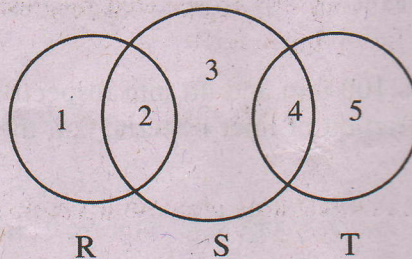(A) Indonesia   (B) Maldives   (C) Myanmar   (D) Sri Lanka

55. How many 10 digit numbers can be formed by using the digits 1 and 2?

(A) $10!$ (B) $^{10}C_2$ (C) $^{10}P_2$ (D) 2^{10}

56. If Rs 1200 maintains a family of 4 persons for 30 days, how long will Rs 2040 maintain a family of 6 persons?

(A) 28 days   (B) 30 days   (C) 32 days   (D) 34 days

57. Which number depicts those people who are both honest and rich?

R : Trader
S : Rich people
T : honest people

(A) 1   (B) 2   (C) 3   (D) 4

58. Choose the correct spelling.

(A) guard   (B) gaurd   (C) goard   (D) guerd

59. Cars arrive at a service station according to Poisson's distribution with a mean rate of 5 per hour. The service time per car is exponential with a mean of 10 minutes. At steady state, the average waiting time in the queue is

(A) 10 minutes   (B) 20 minutes   (C) 25 minutes   (D) 50 minutes

60. The shear strength of a sheet metal 300 Mpa. The blanking force required to produce a blank of 100 mm diameter from a 1.5 mm thick sheet is close to

(A) 45 kN   (B) 70 kN   (C) 141 kN   (D) 3500 kN
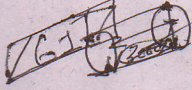
61. Twenty full depth involute profiled 19-tooth pinion and 37-tooth gear are in mesh. If the module is 5 mm, the center distance between the gear pair will be

   (A) 140 mm   (B) 150 mm   (C) 280 mm   (D) 300 mm

62. In the window air conditioner, the expansion device used is

   (A) capillary tube   (B) thermostatic expansion valve
   (C) automatic expansion valve   (D) float valve

63. Production Flow Analysis (PFA) is a method of identifying part families that uses data from

   (A) engineering drawing   (B) production inventory
   (C) bill of materials   (D) route sheets

64. Planning Commission of India on 18 January 2012 approved Rudrasagar development scheme. The scheme is related to which of the following state?

   (A) Tripura   (B) Assam   (C) Manipur   (D) Sikkim

65. In India, which of the following has the largest area under cultivation?

   (A) wheat   (B) cotton   (C) rice   (D) jute

66. If 17 men can build a wall 100 m long, 4 m high and $\frac{3}{4}$ m thick in 25 days, how many men will build a wall twice in length in half the time?

   (A) 34   (B) 51   (C) 68   (D) 76

67. Complete the series with the correct alternative from the options given:

   5, 10, 13, 26, 29, 58, 61, ____

   (A) 122   (B) 125   (C) 128   (D) 64

68. The crystal structure of austenite is

   (A) body centered cubic   (B) face centered cubic
   (C) hexagonal closed packed   (D) body centered tetragonal

69. A single-point cutting tool with 0.12 rake angle is used to machine a steel work-piece. The depth of cut, i.e. uncut thickness is 0.81 mm. The chip thickness under orthogonal machining condition is 1.8 mm. The shear angle is approximately

(A) 0.22   (B) 0.26   (C) 0.56   (D) 0.76

70. A 100 W electric bulb was switched on in a 2.5 m × 3 m × 3m size thermally insulated room having a temperature of 20°C. The room temperature at the end of 24 hours will be

(A) 321°C   (B) 341°C   (C) 450°C   (D) 470°C

71. Two 1 mm thick steel sheets are to be spot welded at a current of 5000 A. Assuming effective resistance to be 200 micro-ohms and current flow time of 0.2 second, heat generated during the process will be

(A) 0.2 joule   (B) 1 joule   (C) 5 joule   (D) 1000 joule

72. An item can be purchased for Rs 100. The ordering cost is Rs 200 and the inventory carrying cost is 10% of the item cost per annum. If the annual demand is 4000 units, then economic order quantity (in units) is

(A) 50   (B) 100   (C) 200   (D) 400

73. Which one of the following nations donated 1 million US dollars to Nalanda International University?

(A) China   (B) France   (C) UK   (D) USA

74. The scientist who first discovered that the earth revolves round the sun was

(A) Newton   (B) Copernicus   (C) Dalton   (D) Einstein

75. A wine merchant buys 10 casks of wine. If he sells it at Rs 5 a liter, he loses Rs 200 and if he sells it at Rs 6 a liter he gains Rs 150. Find the number of liters is a cask.

(A) 25   (B) 32   (C) 35   (D) 40

76. Choose the odd one out among the given words:
mirror, glass, reflect, copy, emulate

(A) glass   (B) reflect   (C) copy   (D) emulate

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77. Fill in the blank with the best option.

Ask him _____ he liked it.

(A) though   (B) that   (C) if   (D) when

78. The first pair of words provide a definite relationship. Complete the second pair from the options given, such that the same relationship is maintained.

Rain : Drop : : Snow : ?

(A) ice   (B) drop   (C) flake   (D) white

79. If a man gains 5% by selling nibs at the rate of 34 a rupee, how many a rupee must he sell them so as to gain 19 %?

(A) 33   (B) 31   (C) 30   (D) 29

80. How many bones are there in an adult human being

(A) 210   (B) 206   (C) 260   (D) 300

81. Which theory of failure will you use for aluminium components under steady loading?

(A) principal stress theory   (B) principal strain theory
(C) strain energy theory   (D) maximum shear stress theory

82. A lead–screw with half nuts in a lathe, free to rotate in both directions has

(A) V–threads   (B) whitworth threads
(C) buttress threads   (D) acme threads

83. For a product, the forecast and the actual sales for December 2002 were 25 and 20 respectively. If the exponential soothing constant (α) is taken as 0.2, then forecast sales for January 2003 would be

(A) 21   (B) 23   (C) 24   (D) 27

84. The main purpose of spheroidising treatment is to improve

(A) hardenability of low carbon steels   (B) machinability of low carbon steels
(C) hardenability of high carbon steels   (D) machinability of high carbon steels

85. Friction at the tool-chip interface can be reduced by

(A) decreasing the rake angle
(B) increasing the depth of cut
(C) decreasing the cutting speed
(D) increasing the cutting speed

86. Choose the antonym of the given word.
Gallant

(A) courageous   (B) weak   (C) cowardly   (D) majestic

87. Select the related number from the given alternatives:
4 : 19 : : 7 : ?

(A) 49   (B) 52   (C) 28   (D) 68

88. A sum of money was divided amongst 4 persons. Three of them received $\frac{1}{8}$, $\frac{2}{5}$ and $\frac{3}{16}$ of the whole respectively, while the fourth received Rs 46. What was the original sum?

(A) Rs 92   (B) Rs 138   (C) Rs 144   (D) Rs 160

89. Express 0.99 as a fraction in its lowest term.

(A) $\frac{9}{10}$ (B) $\frac{9}{100}$ (C) $\frac{9}{99}$ (D) $\frac{1}{11}$

90. Alex Paul Menon, who was abducted by Maoists on 21 April 2012 is the District Magistrate of which district of Chattisgarh?

(A) Sukma,   (B) Mungeli   (C) Surajpur   (D) Balrampur

91. The area moment of inertia of a square of size 1 unit about its diagonal is

(A) $\frac{1}{3}$ (B) $\frac{1}{4}$ (C) $\frac{1}{12}$ (D) $\frac{1}{6}$

92. In oxyacetylene gas welding, temperature at the inner core of the flame is around

(A) 3500° C   (B) 3200° C   (C) 2900° C   (D) 2550° C

93. A 600 mm × 30 mm flat surface of a plate is to be finish machined on a shaper. The plate has been fixed with the 600 mm side along the tool travel direction. If the tool over-travel at each end of the plate is 20 mm, average cutting speed is 8 m/min, feed rate is 0.3 mm/stroke and the ratio of the return time to cutting time of the tool is 1 : 2, the time required for machining will be

(A) 8 min   (B) 12 min   (C) 16 min   (D) 20 min

94. Internal gear cutting operation can be performed by

(A) milling   (B) shaping with rack cutter
(C) shaping with pinion cutter   (D) hobbing

95. Two pipes of inner diameter 100 mm and outer diameter 110 mm each joined by flash butt welding using 30 V power supply. At the interface, 1 mm of material melts from each pipe which has a resistance of 42.4 Ω. If the unit melt energy is 64.4 MJm^{-3}, then time required for welding in seconds is

(A) 1   (B) 5   (C) 10   (D) 20

96. Fill in the blank with the best option.

I don't have _____ furniture.

(A) many   (B) much   (C) lot   (D) few

97. A pair of words is given. Choose the appropriate pair from the options so as to maintain the same relationship.

Rudder : Ship

(A) sail : boat   (B) wheel : car   (C) shell : snail   (D) tail : bird

98. The average age of 600 students of a school is 10.75 years. With enrolment of 40 new students, the average age is reduced to 10.4375 years. Find the average age of the new students.

(A) 5.5 year   (B) 5.75 year   (C) 6.8 year   (D) 7.25 year

99. Indravati hydroelectric project belongs to which state?

(A) Tamil Nadu   (B) Orissa   (C) Karnataka   (D) Andhra Pradesh

100. In a pulverized–fuel–fired large power boiler, the heat transfer from the burning fuel to the walls of the furnace is

(A) by conduction only

(B) by convection only

(C) by conduction and convection

(D) predominantly by radiation

101. Large speed reductions (greater than 20) in one stage of a gear train are possible through

(A) spur gearing

(B) worm gearing

(C) bevel gearing

(D) helical gearing

102. Misrun is a casting defect which occurs due to

(A) very high pouring temperature of the metal

(B) insufficient fluidity of the molten metal

(C) absorption of gases by the liquid metal

(D) improper alignment of the mould flasks

103. Which of the following engineering materials is the most suitable candidate for hot chamber die casting?

(A) low carbon steel   (B) titanium   (C) copper   (D) tin

104. Water at 25°C is flowing through a 1.0 km long GI pipe of 200 mm diameter at the rate of 0.07 m³/s. If value of Darcy friction factor for this pipe is 0.02 and density of water is 1000 kg/m³, the pumping power (in kW) required to maintain the flow is

(A) 1.8   (B) 17.4   (C) 20.5   (D) 41.0

Direction for Q. 105–114: Read the passage carefully and answer the questions.

Many people who are looking to get a pet dog get a puppy. There are many reasons why people get puppies. After all, puppies are cute, friendly, and playful. But even though puppies make good pets, there are good reasons why you should consider getting an adult dog instead.

When you get a puppy, you have to teach it how to behave. You have to make sure that the puppy is housebroken so that it does not go to the bathroom inside the house. You have to teach the puppy not to jump up on your guests or chew on your shoes. You have to train the puppy to walk on a leash. This is a lot of work.

On the other hand, when you get an adult dog, there is a good chance that it will already know how to do all of the previously mentioned things. Many adult dogs have already been housebroken. Many adult dogs will not jump on or chew things that you do not want them to jump on or chew. Many adult dogs will be able to walk on a leash without pulling you to the other side of the street.

Puppies also have a lot of energy and want to play all of the time. This can be fun, but you might not want to play as much as your puppy does. Puppies will not always sleep through the night or let you relax as you watch television.

On the other hand, most adult dogs will wait on you to play. What is more, they will sleep when you are sleeping and are happy to watch television on the couch right beside you. There is one last reason why you should get an adult dog instead of a puppy. When most people go to the pound to get a dog, they get a puppy. This means that many adult dogs spend a lot of time in the pound, and some never find good homes. So if you are looking to get a dog for a pet, you should think about getting an adult dog. They are good pets who need good homes.

105. The author apparently thinks that puppies are

(A) bad pets because they take too much work to own
(B) friendly, playful, and a lot of work
(C) not as cute as adult dogs
(D) not as playful as adult dogs

106. As used in paragraph 2, which is the best synonym for *behave*?

(A) listen　　　　(B) understand　　　　(C) train　　　　(D) act

107. The main purpose of paragraph 2 is to explain how puppies

(A) are very immature　　　　(B) do not make good pets
(C) can be very destructive　　　　(D) are a lot of work

108. As used in paragraph 3, which is the best example of a dog that is *housebroken*?

(A) Spot goes outside to use the bathroom
(B) Rex always breaks things inside of the house
(C) Rover never jumps on guests
(D) Muffin chews on people's shoes

109. According to the passage, why are adult dogs easier to take care of than puppies?

　　I.　Puppies need to learn how to walk nicely on a leash.
　　II.　Adult dogs have less energy than puppies do.
　　III.　It is harder for adult dogs to find a home than it is for puppies.

(A) I only　　　　(B) I and II only　　　　(C) II and III only　　　　(D) I, II, and III

110.   Based on information in the passage, which of the following statements is false?

   (A) Puppies have a lot of energy
   (B) Puppies need a lot of attention
   (C) Adult dogs do not like to play
   (D) Adult dogs do not need eat very much

111.   As used in paragraph 4, which is the best synonym for *relax*?

   (A) work   (B) leave   (C) play   (D) rest

112.   The author begins paragraphs 3 and 5 with the phrase, "On the other hand." This phrase is used to

   (A) highlight an example
   (C) contradict a later statement
   (B) contrast previous information
   (D) support the upcoming paragraph

113.   In the final paragraph, the author says, "many adult dogs spend a lot of time in the pound, and some never find good homes." Based on what you have read in the passage, why is this most likely the case?

   (A) People see adult dogs as unhappy and dangerous, while they see puppies as cute and friendly.
   (B) People understand that most adult dogs still need to a lot of training before they understand how to behave properly.
   (C) People think that puppies are cute and playful and do not always think about how much work it will take to train them.
   (D) People do not want to get a dog that does not have much time left to live.

114.   Based on information in the passage, it can be understood that someone who owns a puppy must be very

   (A) strict   (B) serious   (C) careful   (D) responsible

115.   The first pair of words provide a definite relationship. Complete the second pair from the options given, such that the same relationship is maintained.
   Axe : Woodman : : Awl : ?

   (A) plumber   (B) tailor   (C) cobbler   (D) painter

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116. A bookseller sells a book at a profit of 10%. If he had bought it at 4% less and sold it for Rs 6 more, he would have gained $18\frac{3}{4}$%. What did it cost him?

(A) Rs 118   (B) Rs 136   (C) Rs 142   (D) Rs 150

117. Where is the Vallabhbhai Patel Stadium located?

(A) Kolkata   (B) Mumbai   (C) Chennai   (D) Delhi

118. Port Blair is located on which of the following Islands?

(A) North Andaman   (B) Middle Andaman

(C) South Andaman   (D) None of these

119. The minimum number of teeth on the pinion to operate without interference in standard full height involute teeth gear mechanism with 20° pressure angle is

(A) 14   (B) 12   (C) 18   (D) 32

120. In PERT analysis a critical activity has

(A) maximum float   (B) zero float   (C) maximum cost   (D) minimum cost

121. A 4 mm thick sheet is rolled with 300 mm diameter rolls to reduce thickness without any changes in its width. The friction coefficient at the work-roll interface is 0.1. The minimum possible thickness of the sheet that can be produced in a single pass is

(A) 1.0 mm   (B) 1.5 mm   (C) 2.5 mm   (D) 3.7 mm

122. The effective number of lattice points in the unit cell of simple cubic, body centered cubic, and face centered cubic space lattices, respectively, are

(A) 1, 2, 2   (B) 1, 2, 4   (C) 2, 3, 4   (D) 2, 4, 4

123. The values of enthalpy of steam at the inlet and outlet of a steam turbine in a Rankine cycle are 2800 kJ/kg and 1800 kJ/kg respectively. Neglecting pump work, the specific steam consumption in kg/kW-hour is

(A) 3.60   (B) 0.36   (C) 0.06   (D) 0.01

124. Arrange the words to make a meaningful sentence.

P: been   Q: I've   R: Paris   S: to   T: before

(A) SRQPT   (B) RTQPS   (C) QPSRT   (D) QPTSR

125. A series of words is given. From the options choose the order of words which makes it meaningful.

1. Protect   2. Pressure   3. Relief   4. Rain   5. Flood

(A) 2, 4, 3, 1, 5   (B) 2, 5, 4, 1, 3   (C) 2, 4, 5, 1, 3   (D) 3, 2, 4, 5, 1

126. A carriage driving in a fog passed a man who was walking at 3 km/h in the same direction. He could see the carriage for 4 minutes and it was visible to him up to 100 m. What is the speed of the carriage?

(A) 3.5 km/h   (B) 4 km/h   (C) 4.25 km/h   (D) 4.5 km/h

127. Light year is a unit of

(A) time   (B) velocity   (C) distance   (D) speed

128. Ambient air drybulb temperature is 45°C and wet bulb temperature is 27°C. Select the lowest possible condensing temperature from the following for an evaporative cooled condenser.

(A) 25°C   (B) 30°C   (C) 42°C   (D) 48°C

129. What is the speed of sound in neon gas at a temperature of 500 K (Gas constant of neon is 0.4210 kJ/kgK)?

(A) 492 m/s   (B) 460 m/s   (C) 592 m/s   (D) 543 m/s

130. In case of one dimensional heat conduction in a medium with constant properties, T is a temperature at position x, at time t. Then $\dfrac{\partial T}{\partial t}$ is proportional to

(A) $\dfrac{T}{x}$ (B) $\dfrac{\partial T}{\partial x}$ (C) $\dfrac{\partial^2 T}{\partial x \partial t}$ (D) $\dfrac{\partial^2 T}{\partial x^2}$

131. Which one of the following is a solid state joining process?

(A) gas tungsten arc welding

(B) resistance spot welding

(C) friction welding

(D) submerged arc welding

132. Minimum shear strain in orthogonal turning with a cutting tool of zero rake angle is

(A) 0.0   (B) 0.5   (C) 1.0   (D) 2.0

133. Choose the antonym of the given word.
Talkative

(A) babbling   (B) silent   (C) taciturn   (D) vocal

134. In a certain code LIBERATE is written as 56423172. How TRIBAL will be written in this code?

(A) 736415   (B) 673451   (C) 476315   (D) 743615

135. Find out the missing term in the number series.

2, 6, 12, 20, ?, 42, 56, 72

(A) 24   (B) 30   (C) 32   (D) 36

136. A train 130 m long travelling at 45 km/h takes 30 seconds to cross a bridge. The length of the bridge is

(A) 245 m   (B) 275 m   (C) 225 m   (D) 195 m

137. Which the lightest gas among the following?

(A) Ozone   (B) Helium   (C) Hydrogen   (D) Carbon dioxide

138. Lumped heat transfer analysis of a solid object suddenly exposed to a fluid medium at a different temperature is valid when

(A) Biot number < 0.1

(B) Biot number > 0.1

(C) Fourier number < 0.1

(D) Fourier number > 0.1

139. A 2 kW, 40 litre water heater is switched on for 20 minutes. The heat capacity C_p for water is 4.2 kJ/kg-K. Assuming all the electrical energy has gone into heating the water, increase of the water temperature in degree centigrade is

(A) 2.7   (B) 4.0   (C) 14.3   (D) 25.25

140. A mould has a downsprue whose length is 20 cm and the cross sectional area at the base of the downsprue is 1 cm^2. The downsprue feeds a horizontal runner leading into the mould cavity of volume 1000 cm^3. The time required to fill the mould cavity will be

(A) 4.05 s   (B) 5.05 s   (C) 6.05 s   (D) 7.25 s

141. In a machine shop, pins of 15 mm diameter are produced at rate of 1000 per month and the same is consumed at a rate of 500 per month. The production and consumption continue simultaneously till the maximum inventory is reached. Then inventory is allowed to reduce to zero due to consumption. The lot size of production is 1000. If backlog is not allowed, the maximum inventory level is

(A) 400   (B) 500   (C) 600   (D) 700

142. A hydraulic turbine develops 1000 kW power for a head of 40 m. If the head is reduced to 20 m, the power developed (in kW) is

(A) 177   (B) 354   (C) 500   (D) 707

143. Choose the correct spelling.

(A) guage   (B) gage   (C) gauge   (D) gaige

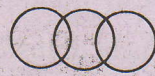144. Which of the following alternatives shows the relationship between a family, sons and daughters?
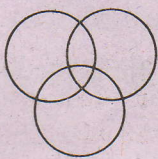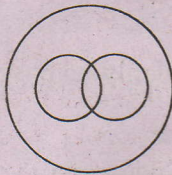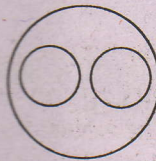
     (A)   (B)   (C)   (D)

$\frac{8 + 10}{16} \Rightarrow \frac{18}{16} \Rightarrow \frac{9}{8}$

145. What is the HCF of $\frac{1}{2}$ and $\frac{5}{8}$?

(A) $\frac{1}{8}$
(B) $\frac{2}{5}$
(C) $\frac{5}{8}$
(D) $\frac{5}{16}$

146. In how many ways can 10 books be arranged on a shelf so that a particular pair of books shall be never together?

(A) 8!
(B) 9!
(C) 2 × 9!
(D) 8 × 9!

147. Virat Kohli has been slated the vice captain of Indian cricket team, he represents which of the following states?

(A) Delhi
(B) Uttar Pradesh
(C) Gujarat
(D) Rajsthan

148. Two plates of the same metal having equal thickness are to be butt welded with electric arc. When the plate thickness changes, welding is achieved by

(A) adjusting the current
(B) adjusting the duration of current
(C) changing the electrode size
(D) changing the electrode coating

149. The S–N curve for steel becomes asymptotic nearly at

(A) 10^3 cycles
(B) 10^4 cycles
(C) 10^6 cycles
(D) 10^9 cycles

150. In a Pelton wheel, the bucket peripheral speed is 10 m/s, the water jet is 25 m/s and volumetric flow rate of the jet is 0.1 m³/s. If the jet deflection angle is 120° and the flow is ideal, the power developed is

(A) 7.5 kW
(B) 15.0 kW
(C) 22.5 kW
(D) 37.5 kW

151. Moist air at a pressure of 100 kPa is compressed to 500 kPa and then cooled to 35°C in an aftercooler. The air at the entry to the aftercooler is unsaturated and becomes just saturated at the exit of the aftercooler. The saturation pressure of water at 35°C is 5.628 kPa. The partial pressure of water vapour (in kPa) in the moist air entering the compressor is closest to

(A) 0.57
(B) 1.13
(C) 2.26
(D) 4.52

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152. The material property which depends only on the basic crystal structure is

(A) fatigue strength

(B) work hardening
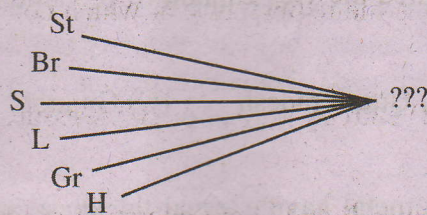
(C) fracture strength

(D) elastic constant

153. Identify the type of word/s that is/are underlined.
She ran <u>along</u> the corridor and up the stairs to the second floor.

(A) verb   (B) conjunction   (C) preposition   (D) adverb

154. Insert the three letters in the brackets that can be prefixed by all of the letters on the left.

(A) rad   (B) ort   (C) ear   (D) and

155. If 6 men or 9 boys can reap a field in 8 days, in how many days will 8 men and 6 boys reap the same field?

(A) $3\frac{1}{2}$ days   (B) 4 days   (C) $4\frac{1}{2}$ days   (D) 5 days

156. In how many ways can a party of 4 men and 4 women be seated at circular table so that no two women are adjacent?

(A) (24×24) (B) $2 \times 4!$ (C) 144   (D) 4^4

157. Union Rural development Ministry of India roped in which National award winning actor as the brand ambassador for improving the state of sanitation in the country?

(A) Shabana Azmi

(B) Ananya Chatterjee

(C) Vidya Balan

(D) Konkona Sen Sharma

158. A gas having a negative Joule–Thompson coefficient ($\mu < 0$), when throttled, will

(A) become cooler.

(B) become warmer.

(C) remain at the same temperature.

(D) either be cooler or warmer depending on the type of gas.

159. The dimensional limits on a shaft of 25h7 are

(A) 25.000, 25.021 mm

(B) 25.000, 24.979 mm

(C) 25.000, 25.007 mm

(D) 25.000, 24.993 mm

160. Dew point temperature is the temperature at which condensation begins when the air is cooled at constant

(A) volume   (B) entropy   (C) pressure   (D) enthalpy

161. Two identical ball bearings P and Q are operating at loads 30 kN and 45 kN respectively. The ratio of the life of bearing P to the life of bearing Q is

(A) $\dfrac{81}{16}$ (B) $\dfrac{27}{8}$ (C) $\dfrac{9}{4}$ (D) $\dfrac{3}{2}$

162. The maximum velocity of a one-dimensional incompressible fully developed viscous flow, between two fixed parallel plates, is 6 m s^{-1}. The mean velocity (in m s^{-1}) of the flow is

(A) 2   (B) 3   (C) 4   (D) 5

163. Choose the synonym of the given word

Hackneyed

(A) carriage   (B) stale   (C) cart   (D) fresh

164. Find the missing letters of the series:

AYBZC, DWEXF, GUHVI, JSKTL, ?

(A) MQORN   (B) QMONR   (C) MQNRO   (D) NQMOR

165. Two towns A and B are 60 km apart. A school has to be built to serve 150 students from A and 50 students from B. If the total distance to be travelled by all the students is to be as less as possible, where should the school be built?

(A) in town B   (B) 45 km from B   (C) in town A   (D) 45 km from A

166. A certain sum of money doubles itself in 8 years at simple interest. It will treble itself in

(A) 12 years   (B) 16 years   (C) 24 years   (D) 32 years

167. Which festival is celebrated in North India when Pongal is celebrated in Tamil Nadu?

(A) Holi   (B) Makar Sankranti   (C) Diwali   (D) Dushera

168. At a production machine, parts arrive according to a Poisson process at the rate of 0.35 parts per minute. Processing time for parts have exponential distribution with mean of 2 minutes. What is the probability that a random part arrival finds that there are already 8 parts in the system (in machine + in queue)?

(A) 0.0247   (B) 0.0576   (C) 0.0173   (D) 0.082

169. Maximum shear stress developed on the surface of a solid circular shaft under pure torsion is 240 MPa. If the shaft diameter is doubled then the maximum shear stress developed corresponding to the same torque will be

(A) 120 MPa   (B) 60 MPa   (C) 30 MPa   (D) 15 MPa

170. A venturimeter of 20 mm throat diameter is used to measure the velocity of water in a horizontal pipe of 40 mm diameter. If the pressure difference between the pipe and throat sections is found to be 30 kPa then, neglecting frictional losses, the flow velocity is

(A) 0.2 m/s   (B) 1.0 m/s   (C) 1.4 m/s   (D) 2.0 m/s

171. A hole is specified as $40^{0.050}_{0.000}$ mm. The tolerance on the shaft is 0.04 mm. The maximum clearance in mm between the hole and the shaft is

(A) 0.04   (B) 0.05   (C) 0.10   (D) 0.11

172. Two streams of liquid metal, which are not hot enough to fuse properly, result in a casting defect known as

(A) cold shut   (B) swell   (C) sand wash   (D) scab

173. Choose the synonym of the given word.

Lurid

(A) shocking   (B) clear   (C) glowing   (D) angry

174. How many such pairs of letters are there in the word "APPREHENSION" each of which has as many letters between them in the word as there are between them in the English alphabet?

(A) 4   (B) 5   (C) 6   (D) 7

175. Some statements are followed by one or more inferences. The inferences may be correct or incorrect. From the options choose the one which contains the correct inferences.

Statements: All scientists working in America are talented. Some Indian scientists are working in America.

Inferences:

1. All talented scientists are Indian.
2. None of the Indian scientists is talented.
3. Some Indian scientists are talented.
4. Some talented Indian scientists have migrated to America.

(A) 1 and 4   (B) 2 only   (C) 3 and 4   (D) 4 only

176. If we divide 581 in three parts such that 4 times the first may be equal to 6 times the second and 11 times the third, then the three parts are in the ratio of

(A) 4 : 6 : 11   (B) 11 : 6 : 4   (C) $\frac{1}{4} : \frac{1}{6} : \frac{1}{11}$ (D) none of these

177. In which state of India was the first paper mill was started?

(A) West Bengal   (B) Bihar   (C) Orissa   (D) Assam

178. Which of the following materials requires the largest shrinkage allowance, while making a pattern for casting?

(A) aluminium   (B) brass   (C) cast iron   (D) plain carbon steel

179. An ideal air standard Otto cycle has a compression ratio of 8.5. If the ratio of the specific heats (γ) is 1.4, then what is the thermal efficiency (in percentage) of the Otto cycle?

(A) 57.5   (B) 45.7   (C) 52.5   (D) 95

180. For a typical sample of ambient air (at 35°C, 75% relative humidity and standard atmospheric pressure), the amount of moisture in kg per kg of dry air will be approximately

(A) 0.002   (B) 0.027   (C) 0.25   (D) 0.75

181. A 200 × 100 × 50 mm steel block is subjected to a hydrostatic pressure of 15 MPa. The Young's modulus and Poisson's ratio of the material are 200 GPa and 0.3 respectively. The change in the volume of the block in mm^3 is

(A) 85   (B) 90   (C) 100   (D) 110

182. An irreversible heat engine extracts heat from a high temperature source at a rate of 100 kW and rejects heat to a sink at a rate of 50 kW. The entire work output of the heat engine is used to drive a reversible heat pump operating between a set of independent isothermal heat reservoirs at 17°C and 75°C. The rate (in kW) at which the heat pump delivers heat to its high temperature sink is

(A) 50   (B) 250   (C) 300   (D) 360

183. Which set of letters when sequentially placed at the gaps in the given word shall complete it?

____ST____OL____GY

(A) ORA   (B) RAO   (C) ARO   (D) AOR

184. What is the smallest number that must be added to 6156 to make it a perfect square?

(A) 244   (B) 88   (C) 90   (D) 85

185. Dandi March was from the

(A) Sabarmati Ashram to Dandi   (B) Dandi to Sabarmati Ashram
(C) Bardoli to Dandi   (D) Sabarmati to bardoli

186. India became free from bird flu,___.

(A) H5N1   (B) H4N1   (C) H5N2   (D) H3N3

187. Two helical tensile springs of the same material and also having identical mean coil diameter and weight, have wire diameters d and $d/2$. The ratio of their stiffness is

(A) 1   (B) 4   (C) 64   (D) 128

188. Environment friendly refrigerant R134 is used in the new generation domestic refrigerators. Its chemical formula is

(A) $CHClF_2$ (B) $C_2Cl_3F_3$ (C) $C_2Cl_2F_4$ (D) $C_2H_2F_4$

189. A ring gauge is used to measure

(A) outside diameter but not roundness
(B) roundness but not outside diameter
(C) both outside diameter and roundness
(D) only external threads

190. While cooling a cubical casting of side 40 mm undergoes 3%, 4% and 5% volume shrinkage during liquid state, phase transition and solid state, respectively. The volume of the metal compensated from the riser is

(A) 2%   (B) 7%   (C) 8%   (D) 9%

191. In a CNC program block, N002 G02 G91 X40 Z40 …, G02 AND G91 refer to

(A) circular interpolation in counterclockwise direction and incremental dimension
(B) circular interpolation in counterclockwise direction and absolute dimension
(C) circular interpolation in clockwise direction and incremental dimension
(D) circular interpolation in clockwise direction and absolute dimension

192. Choose the odd one out among the given words:

drowse, slumber, catnap, snore, doze

(A) drowse   (B) catnap   (C) snore   (D) doze

193. At an examination, in which full marks were 500, A got 10% less than B, B 25% more than C and C 20% less than D. If A got 360, what percentage marks did D get?

(A) 64%   (B) 78%   (C) 80%   (D) 82%

194. World Environment day is observed on

(A) 5th June   (B) 10th June   (C) 20th January   (D) 5th December

195. Which one of the following state governments launched Panch Parmeshwar scheme?

(A) Madhya Pradesh   (B) Bihar
(C) UP   (D) Kerala

196. The cutting force in punching and blanking operations mainly depends on

(A) the modulus of elasticity of metal   (B) the shear strength of metal
(C) the bulk modulus of metal   (D) the yield strength of metal

197. During the execution of a CNC part program block
NO20   GO2   X45.0   Y25.0   R5.0
The type of tool motion will be

(A) circular interpolation–clockwise
(B) circular interpolation–counterclockwise
(C) linear interpolation
(D) rapid feed

198. A steel bar of 40 mm × 40 mm square cross-section is subjected to an axial compressive load of 200 kN. If the length of the bar is 2 m and E = 200 GPa, the elongation of the bar will be

(A) 1.25 mm   (B) 2.70 mm   (C) 4.05 mm   (D) 5.40 mm

199. The crank radius of a single-cylinder I.C. engine is 60 mm and the diameter of the cylinder is 80 mm. The swept volume of the cylinder in 3 cm is

(A) 48   (B) 96   (C) 302   (D) 603

200. A thin cylinder of inner radius 500 mm and thickness 10 mm is subjected to an internal pressure of 5 MPa. The average circumferential (hoop) stress in MPa is

(A) 100   (B) 250   (C) 500   (D) 1000