Subject Matter Test – Section -A

1. A candidate attempted 12 questions and secured full marks in all of them. If he obtained 60% marks in the test and all questions carried equal marks, then what is the number of questions in the test?
   1. 36
   2. 30
   3. 25
   4. 20

2. A cuboid has six sides of different colours. The red side is opposite to black. The blue side is adjacent to white. The brown side is adjacent to blue. The red side is face down. Which one of the following would be the opposite to brown?
   1. Red
   2. Black
   3. White
   4. Blue

3. A man fills a basket with eggs in such a way that the number of eggs added on each successive day is the same as the number already present in the basket. This way the basket gets completely filled in 24 days. After how many days the basket was ¼th filled?
   1. 6
   2. 12
   3. 17
   4. 22

4. A person traveled a distance of 50 km in 8 hours. He covered a part of the distance on foot at the rate of 4 km per hour and a part on a bicycle at the rate of 10 km per hour. How much distance (in km) did he travel on foot?
   1. 10
   2. 20
   3. 30
   4. 40

5. Six books labeled as A, B, C, D, E and F, are placed side by side. Books B, C, E and F have green covers while others have yellow covers. Books A, B and D are new while the rest are old volumes. Books A, B and C are law reports while the rest are medical extracts. Which two books are old medical extracts and have green covers?
   1. B and C
   2. E and F
   3. C and E
   4. C and F

6. Half of the villagers of a certain village have their own houses. One – fifth of the villagers cultivate paddy. One – third of the villagers are literate. Four – fifth of the villagers are below twenty five. Then, which one of the following is certainly true?
   1. All the villagers who have their own houses are literate.
   2. Some villagers under twenty five are literate.
   3. A quarter of the villagers who have their own houses cultivate paddy.
   4. Half of the villagers who cultivate paddy are literate.

7. Assume that the hour and minute hands of a clock move without jerking. The clock shows a time between 8 o'clock and 9 o'clock. The two hands of the clock are one above the other. After how many minutes (nearest integer) will the two hands be again lying one above the other?
   1. 60
   2. 62
   3. 65
   4. 67

8. "Price is not the same thing as value. Suppose that on a day the price of everything viz., coal, bread, postage stamps, a day's labour, the rent of houses, etc. were to double. Prices then would certainly rise, but values of all things except one would not." The writer wants to say that if prices of all things were doubled, then
   1. The values of all things would remain constant.
   2. The values of the things sold would be doubled.
   3. The values of the things bought would be halved.
   4. The value of money only would be halved.

9. The average temperature for Wednesday, Thursday and Friday was 40 ^{0}C. The average for Thursday, Friday and Saturday was 41^{0}C. If temperature on Saturday was 42^{0}C, what was the temperature on Wednesday?
   1. 39° C
   2. 44° C
   3. 38° C
   4. 41° C

10. A person has 4 coins each of different denominations, say **Rupee 1**, 2 , 5 and 10. What is the number of different sums of money the person can form (using one or more coins at a time)?
    1. 6
    2. 15
    3. 12
    4. 11

11. Find the 15th term of the sequence 20, 15, 10....
    1. -45
    2. -55
    3. -50
    4. 0

12. On what dates of April, 2001 did Wednesday fall?
    1. 1st, 8th, 15th, 22nd, 29th
    2. 2nd, 9th, 16th, 23rd, 30th
    3. 3rd, 10th, 17th, 24th
    4. 4th, 11th, 18th, 25th

13. Two trains running in opposite directions cross a man standing on the platform in 27 seconds and 17 seconds respectively and they cross each other in 23 seconds. The ratio of their speeds is:
1. 1 : 3
2. 3 : 2
3. 3 : 4
4. None of these

14. A train passes a station platform in 36 seconds and a man standing on the platform in 20 seconds. If the speed of the train is 54 km/hr, what is the length of the platform?
1. 120 m
2. 240 m
3. 300 m
4. None of these

15. What is the least square number of soldiers that can be drawn up in troops of 12, 15, 18 and 20 soldiers?
1. 900
2. 400
3. 1600
4. 2500

16. Find the remainder when 73*75*78*57*197*37 is divided by 34.
1. 32
2. 30
3. 15
4. 28

17. The average weight of 8 persons increases by 2.5 kg, when a new person comes in place of one of them, weighing 65 kg. What might be the weight of new person?
1. 76 kg
2. 76.5 kg
3. 85 kg
4. None of these

18. The sum of the two digits of a number is 10. If the number is subtracted from the number obtained by reversing its digits, the result is 54. Find the number?
1. 34
2. 28
3. 12
4. 17

19. As per the agreement with a bank, a businessman had to refund a loan in some equal installments without interest. After paying 18 installments he found that 60 percent of his loan was refunded. How many installments were there in the agreement?
1. 22
2. 24
3. 30
4. 33

20. A family consists of two grandparents, two parents and three grandchildren. The average age of the grandparents is 67 years, that of the parents is 35 years and that of the grandchildren is 6 years. What is the average age of the family?
1. $28\frac{4}{7}$ years
2. $31\frac{5}{7}$ years
3. $32\frac{1}{7}$ years
4. None of these

21. A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?
1. 12 days
2. 15 days
3. 16 days
4. 18 days

22. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?
1. 360
2. 480
3. 720
4. None of these

23. Machine P can print one lakh books in 8 hours, machine Q can print the same number of books in 10 hours while machine R can print them in 12 hours. All the machines are started at 9 A.M. while machine P is closed at 11 A.M. and the remaining two machines complete work. Approximately at what time will the work (to print one lakh books) be finished?
1. 11:30 A.M.
2. 12 noon
3. 12:30 P.M.
4. 1:00 P.M.

24. A, B and C start at the same time in the same direction to run around a circular stadium. A completes a round in 252 seconds, B in 308 seconds and c in 198 seconds, all starting at the same point. After what time will they again meet at the starting point ?
1. 26 minutes and 18 seconds
2. 42 minutes and 36 seconds
3. 45 minutes
4. 46 minutes and 12 seconds

25. What will be the least number which, when doubled, will be exactly divisible by 12, 18, 21 and 30 ?
1. 196
2. 630
3. 1260
4. 2520

26. If $3\sqrt{5} + \sqrt{125} = 17.88$, then what will be the value of $\sqrt{80} + 6\sqrt{5}$?
1. 13.41
2. 20.46
3. 21.66
4. 22.35

27. A group of students decided to collect as many paise from each member of group as is the number of members. If the total collection amounts to Rs. 59.29, the number of the members in the group is:
1. 57
2. 67
3. 77
4. 87

28. A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. How much (in fraction of vessel size) of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup?
1. 1/3
2. 1/4
3. 1/5
4. 1/7

29. 3 pumps, working 8 hours a day, can empty a tank in 2 days. How many hours a day must 4 pumps work to empty the tank in 1 day?
1. 9
2. 10
3. 11
4. 12

30. In a camp, there is a meal for 120 men or 200 children. If 150 children have taken the meal, how many men may be catered with the remaining meal?
1. 20
2. 30
3. 40
4. 50

31. A milk vendor has 2 cans of milk. The first contains 25% water and the rest milk. The second contains 50% water. How much milk should he mix from each of the containers so as to get 12 litres of milk such that the ratio of water to milk is 3 : 5?
1. 4 litres, 8 litres
2. 6 litres, 6 litres
3. 5 litres, 7 litres
4. 7 litres, 5 litre

32. A train can travel 50% faster than a car. Both start from point A at the same time and reach point B 75 kms away from A at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. The speed of the car is:
1. 100 km /hr
2. 110 km /hr
3. 120 km /hr
4. 130 km /hr

33. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. The duration of the flight is:
1. 1 hour
2. 2 hours
3. 3 hours
4. 4 hours

34. It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the cars is:
1. 2 : 3
2. 3 : 2
3. 3 : 4
4. 4 : 3

35. A, B and C jointly thought of engaging themselves in a business venture. It was agreed that A would invest Rs. 6500 for 6 months, B, Rs. 8400 for 5 months and C, Rs. 10,000 for 3 months. A wants to be the working member for which, he was to receive 5% of the profits. The profit earned was Rs. 7400. Calculate the share of B in the profit.
1. Rs. 1900
2. Rs. 2660
3. Rs. 2800
4. Rs. 2840

36. A and B started a business in partnership investing Rs. 20,000 and Rs. 15,000 respectively. After six months, C joined them with Rs. 20,000. What will be B's share in total profit of Rs. 25,000 earned at the end of 2 years from the starting of the business?
1. Rs. 7500
2. Rs. 9000
3. Rs. 9500
4. Rs. 10,000

37. In a triangle PQR, the length of the side QR is less than twice the length of the side PQ by 2 cm. The length of the side PR exceeds the length of the side PQ by 10 cm. The perimeter is 40 cm. The length of the smallest side of the triangle PQR is :
1. 6 cm
2. 8 cm
3. 7 cm
4. 10 cm

38. A rectangular park 60 m long and 40 m wide has two concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. If the area of the lawn is 2109 sq. m, then what is the width of the road?
1. 2.91 m
2. 3 m
3. 5.82 m
4. None of these

39. A towel, when bleached, was found to have lost 20% of its length and 10% of its breadth. The percentage of decrease in area is:
1. 10%
2. 10.08%
3. 20%
4. 28%

40. What is the unit digit in $\{(341)^{491} \times (625)^{317}\}$?
1. 0
2. 2
3. 3
4. 5

41. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 o'clock, the true time is:
1. $59\frac{7}{12}$ min. past 3
2. 4 pm
3. $58\frac{7}{11}$ min. past 3
4. $2\frac{3}{11}$ min. past 4

42. A man has Rs. 480 in the denominations of one-rupee notes, five-rupee notes and ten-rupee notes. The number of notes of each denomination is equal. What is the total number of notes that he has ?
1. 45
2. 60
3. 75
4. 90

43. Find out the wrong number in the given sequence of numbers.
582, 605, 588, 611, 634, 617, 600
1. 634
2. 611
3. 605
4. 600

44. In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected is:
1. 21/46
2. 25/117
3. 1/50
4. 3/25

45. A boat running upstream takes 8 hours 48 minutes to cover a certain distance, while it takes 4 hours to cover the same distance running downstream. What is the ratio between the speed of the boat and speed of the water current respectively?
1. 2 : 1
2. 3 : 2
3. 8 : 3
4. Cannot be determined

46. Two ships are sailing in the sea on the two sides of a lighthouse. The angle of elevation of the top of the lighthouse is observed from the ships are 30° and 45° respectively. If the lighthouse is 100 m high, the distance between the two ships is:
1. 173 m
2. 200 m
3. 273 m
4. 300 m

47. In a 500 m race, the ratio of the speeds of two contestants A and B is 3 : 4. A has a start of 140 m. Then, A wins by:
1. 60 m
2. 40 m
3. 20 m
4. 10 m

48. Insert the missing number in the following series:
7, 26, 63, 124, 215, 342, (....)
1. 481
2. 511
3. 391
4. 421

49. Three pipes A, B and C can fill a tank from empty to full in 30 minutes, 20 minutes, and 10 minutes respectively. When the tank is empty, all the three pipes are opened. A, B and C discharge chemical solutions P,Q and R respectively. What is the proportion of the solution R in the liquid in the tank after 3 minutes?
1. 5/11
2. 6/11
3. 7/11
4. 8/11

50. Study the table carefully to answer the question that follows:

Number of Pass and Fail Students, of five different classes, in a year from various schools

Schools	CLASSES									
	VI		VII		VIII		IX		X	
	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
A	64	12	56	12	82	9	60	14	86	10
B	55	18	64	16	88	7	64	11	73	12
C	53	16	80	10	58	12	63	9	63	18
D	62	11	62	14	64	13	61	7	53	17
E	70	15	76	17	78	10	52	13	79	9
F	58	8	72	13	72	14	45	12	75	11

What is the average number of fail students from class IX from all the schools together?
1. 19
2. 17
3. 13
4. 11

Section- B

51. In ASA system, if the tool nomenclature is 8-6-5-5-10-15-2, then the side rake angle will be :

1. 5°
2. 6°
3. 8°
4. 10°

52. Cutting tool material 18–4–1 HSS has which one of the following compositions :

1. 18% W, 4% Cr, 1% V
2. 18% Cr, 4% W, 1%V
3. 18% W, 4% Ni, 1%V
4. 18% Cr, 4% Ni, 1% V

53. Directional solidification in casting can be improved by using :

1. Chills and chaplets
2. Chills and padding
3. Chaplets and padding
4. Chills, chaplets and padding

54. In a CNC machine tool, encoder is used to sense and control :

1. Table position
2. Table velocity
3. Spindle speed
4. Coolant flow

55. During machining on a Lathe, excess metal is removed in the form of chips as in the case of turning. Which of the following conditions are required for continuous ribbon like chip to be formed in turning?

A. At a higher cutting speed
B. At a lower cutting speed
C. A brittle material
D. A ductile material

Select the correct answer amongst the following:

1. A and C
2. A and D
3. B and C
4. B and D

56. Match list-I (Process) with list-II (Products or raw material) and select the correct answer using the codes given below the list :

List – I	List – II
A. Die casting	1. Phenol formaldehyde
B. Shell molding	2. C.I. pipes
C. CO_2 molding	3. Non-ferrous alloys
D. Centrifugal casting	4. Sodium silicate

Codes	A	B	C	D
1.	3	1	4	2
2.	1	3	4	2
3.	1	3	2	4
4.	3	1	2	4

57. In the 3–2–1 principle of fixture 3 refers to number of :

1. Setups possible
2. Clamps required
3. Locating position
4. Positions on primary face

58. A given steel test specimen is studied under metallurgical microscope (magnification used is 100X). In that different phases are observed one of them is Fe_3C. The observed phase Fe_3C is also known as :

1. Ferrite
2. Austenite
3. Cementite
4. Martensite

59. For a general two dimensional stress system, what are the co-ordinates of the centre of Mohr's circle ?

1. $\frac{\sigma_x-\sigma_y}{2}, 0$
2. $0, \frac{\sigma_x+\sigma_y}{2}$
3. $\frac{\sigma_x+\sigma_y}{2}, 0$
4. $0, \frac{\sigma_x-\sigma_y}{2}$

60. Which of the following is true (μ=Poisson's ratio) :

1. $0 < \mu < \frac{1}{2}$
2. $1 < \mu < -1$
3. $1 < \mu < 0$
4. $\infty < \mu < -\infty$

61. A steel rod of 100 cm long and 1 sq cm cross sectional area has a young's modulus of elasticity 2×10^6 kgf/cm^2. It is subjected to an axial pull of 2000 kgf. The elongation of the rod will be :
1. 0.05 cm
2. 0.1 cm
3. 0.15 cm
4. 0.20 cm

62. When a body is immersed in a fluid, the buoyant force experienced by it, is proportional to
1. Volume of the body
2. Volume of the fluid displaced
3. Weight of the body
4. Velocity of immersion

63. Which one of the following forecasting techniques is most suitable for making long range forecast?
1. Time series analysis
2. Regression analysis
3. Exponential smoothing
4. Market surveys

64. A hollow shaft of the same cross-section area and material as that of a solid shaft, transmits :
1. Same torque
2. Lesser torque
3. More torque
4. None

65. Which key is preferred for the condition where a large amount of impact torque is to be transmitted in both direction of rotation?
1. Woodruff key
2. Feather key
3. Gib head key
4. Tangent key

66. The maximum distortion energy theory of failure is suitable to predict the failure of which one of the following types of materials ?
1. Brittle materials
2. Ductile materials
3. Plastics
4. Composite materials

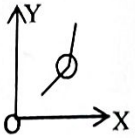
67. In the assembly design of shaft, pulley and key, the weakest member is
1. Pulley
2. Key
3. Shaft
4. None

68. A gas turbine works on which one of the following cycles ?
1. Brayton
2. Rankine
3. Stirling
4. Otto

69. Sensitiveness of a governor is defined as :
1. $\frac{\text{Range of speed}}{2\times\text{mean speed}}$
2. $\frac{\text{Mean speed}}{\text{Range of speed}}$
3. Mean speed × Range of speed
4. $\frac{\text{Range of speed}}{\text{Mean spead}}$

70. What is the relationship between elastic constants E, G and K ?
1. $E = \frac{KG}{9K+G}$
2. $E = \frac{9KG}{K+G}$
3. $E = \frac{9KG}{K+3G}$
4. $E = \frac{9KG}{3K+G}$

71. The two-link system, shown in the given figure, is constrained to move with planar motion. It possesses :



1. 2 – degrees of freedom
2. 3 – degrees of freedom
3. 4 – degrees of freedom
4. 6 – degrees of freedom

72. If, m = mass of the ball of the governor, w = angular velocity of the governor, g = acceleration due to gravity, then the height of Watt's governor is given by :
1. $\frac{g}{2w^2}$
2. $\frac{g}{w^2}$
3. $\frac{\sqrt{2g}}{w^2}$
4. $\frac{2g}{w^2}$

73. Material handling is considered as
1. Economically waste it should be eliminated
2. Economically waste but cannot be eliminated
3. Economically profitable so should be increased
4. It does not cost in any way

74. In reaction turbines, the draft tube is used :
1. For the safety of the turbine
2. To convert the kinetic energy of flow by a gradual expansion of the flow cross-section
3. To destroy the undesirable eddies
4. For none of the above purpose

75. Newton's law of viscosity depends upon the :
1. Stress and strain in a fluid
2. Shear stress, pressure and velocity
3. Shear stress and rate of strain
4. Viscosity and shear stress

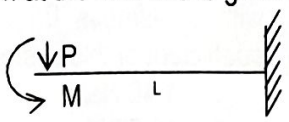
76. At the point of boundary layer separation :
1. Shear stress is maximum
2. Shear stress is zero
3. Velocity is negative
4. Density variation is maximum

77. Which of the following is used as GO & NO GO gauge in measurement?
1. Slip gauge
2. Snap gauge
3. Angle gauge
4. Sprit level

78. Which one of the following moulding processes does not require use of core ?
1. Sand moulding
2. Shell moulding
3. Centrifugal casting
4. Plaster moulding

79. If H is the total head at inlet and h is the head lost due to friction, the efficiency of power transmission through a straight pipe is given by :
1. $\frac{H-h}{H}$
2. $\frac{H}{H+h}$
3. $\frac{H-h}{H+h}$
4. $\frac{H}{H-h}$

80. The given figure shows a cantilever of span 'L' subjected to a concentrated load 'P' and a moment 'M' at the free end. Deflection at the free end is given by :



1. $\frac{PL^2}{2EI}+\frac{ML^2}{3EI}$
2. $\frac{ML^2}{2EI}+\frac{PL^3}{3EI}$
3. $\frac{ML^2}{3EI}+\frac{PL^3}{2EI}$
4. $\frac{ML^2}{2EI}+\frac{PL^2}{48EI}$

81. A centrifugal pump is started with its delivery valve kept :
1. Fully open
2. Fully closed
3. Partially open
4. 50% open

82. The frictional head loss in a turbulent flow through a pipe varies :
1. Directly as the average velocity
2. Directly as the square of the average velocity
3. Inversely as the square of the average velocity
4. Inversely as the square of the internal diameter of the pipe

83. A Pelton wheel is ideally suited for :
1. High head and low discharge
2. High head and high discharge
3. Low head and low discharge
4. Medium head and medium discharge

84. If the stream function is given by $\psi = 3xy$, then the velocity at a point (2, 3) will be :
1. 7.21 unit
2. 10.82 unit
3. 18 unit
4. 54 unit

85. The work done in compressing a gas isothermally is given by :
1. $\frac{r}{r-1}P_1V\left[\left(\frac{P_2}{P_1}\right)^{\frac{r-1}{r}}-L\right]$
2. $mRT_1 \ln\frac{P_2}{P_1}$
3. $m\,C_p(T_2-T_1)$
4. $mRT_1\left(1-\frac{T_2}{T_1}\right)$

86. Which one of the following statements applicable to a perfect gas will also be true for an irreversible process?
1. dQ = du + pdv
2. dQ = Tds
3. Tds = du+pdv
4. None of these

87. A composite wall consists of two layers of different material having conductivities k_1 and k_2. For equal thickness of the two layers, the equivalent thermal conductivity of the slab will be:
1. $k_1 + k_2$
2. k_1k_2
3. $\frac{2k_1+k_2}{k_1+k_2}$
4. $\frac{k_1+k_2}{k_1\,k_2}$

88. If the temperature of a solid surface changes from 27°C to 627°C, then how many times its emissive power will increase?
1. 3
2. 9
3. 27
4. 81

89. Waste heat can be effectively used in which one of the following refrigeration system ?
1. Vapour compression cycle
2. Vapour absorption cycle
3. Air refrigeration cycle
4. Vortex refrigeration system

90. Heat is mainly transferred by conduction, convection and radiation in :
1. Insulated pipes carrying hot water
2. Refrigerator freezer coil
3. Boiler furnaces
4. Condensation of steam in a condenser

91. The refrigerant used for absorption refrigerators, is a mixture of water and :
1. Carbon dioxide
2. Sulphur dioxide
3. Lithium bromide
4. Freon 12

92. The most commonly used method for the design of duct size is the :
1. Velocity reduction method
2. Equal fraction method
3. Static region method
4. Dual or double duct method

93. A mass of 1 kg is attached to the end of a spring with a stiffness 0.7N/mm. The critical damping coefficient of this system is :
1. 1.40 Ns/m
2. 18.52 Ns/m
3. 52.92 Ns/m
4. 529.2 Ns/m

94. In order to draw the acceleration diagram, it is necessary to determine the Coriolis component of acceleration in the case of :
1. Crank and slotted lever quick return mechanism
2. Slider – crank mechanism
3. Four bar mechanism
4. Pantograph

95. The piston rod and the cross head in a steam engine are usually connected by means of :
1. Cotter joint
2. Knuckle joint
3. Ball joint
4. Universal joint

96. In case of "VED" analysis of inventory control "E" stands for
1. Easily available items
2. Essential items
3. Extra-ordinary items
4. Extra items

97. In a single speed reduction, a large velocity ratio is required. The best transmission is through :
1. Spur gear drive
2. Helical gear drive
3. Bevel gear drive
4. Worm gear drive

98. When a nut is tightened by placing a washer below it, the bolt will be subjected to :
1. Compression only
2. Tension only
3. Shear only
4. Compression and shear both

99. In CPM, the crash cost slope is determined by :
1. $\frac{\text{Crash cost}}{\text{Normal cost}}$
2. $\frac{\text{Crash cost} - \text{Normal cost}}{\text{Normal time} - \text{Crash time}}$
3. $\frac{\text{Normal cost}}{\text{Crash cost}}$
4. $\frac{\text{Normal cost} - \text{Crash cost}}{\text{Normal time} - \text{Crash time}}$

100. Eutectic reaction for Iron-carbon system occurs at :
1. 600 °C
2. 723 °C
3. 1130 °C
4. 1493 °C

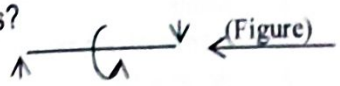
101. Gibb's phase rule is given by :- p = number of phases, F = number of degree of freedom; c = number of components.
1. $F = c + p$
2. $F = c + p - 2$
3. $F = c - p - 2$
4. $F = c - p + 2$

102. Which of the following process has very high material removal rate efficiency?
1. Electron beam machining
2. Electro chemical machining
3. Electric discharge machining
4. Plasma arc machining

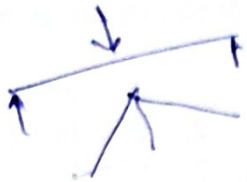
103. In the forging operation, fullering is done to :
1. Draw out the material
2. Bend the material
3. Upset the material
4. Extrude the material

104. Flow process chart contains :
1. Inspection and operation
2. Inspection, operation and transportation
3. Inspection, operation, transportation and delay
4. Inspection, operation, transportation, delay and storage

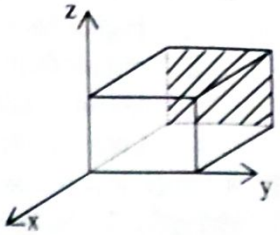
105. A beam is simply supported at its ends and is loaded by a couple at its mid-span as shown in figure. Shear force diagram is given by which of the following figures?



1. 
2. 
3. 
4. 



106. The set of miller indices of the plane shown in the given figure is :



1. $(\bar{1}00)$
2. (100)
3. (101)
4. (110)

107. Match list-I with list-II and select the correct answer using the codes given below the lists:

List – I	List – II
A. Cam and follower	1. Grubler's rule
B. Screw pair	2. Grashof's linkage
C. 4-bar mechanism	3. Pressure angle
D. Degree of freedom of Planar mechanism	4. Single degree of freedom

Codes	A	B	C	D
1.	3	4	2	1
2.	1	2	4	3
3.	1	4	2	3
4.	3	2	4	1

108. Match list-I with list-II and select the correct answer :

List – I	List – II
A. Dynamic viscosity	1. Pa
B. Kinematic viscosity	2. m^2/s
C. Torsional stiffness	3. Ns/m^2
D. Modulus of rigidity	4. Nm
	5. N/m

Codes	A	B	C	D
1.	3	2	4	1
2.	5	2	4	3
3.	3	4	2	3
4.	5	4	2	1

109. Match list-I (law) with list-II (equation) and select the correct answer using the codes given below the list :

List – I	List – II
A. Stefan-Boltzmann law	1. $q = hA(T_1 - T_2)$
B. Newton's law of cooling	2. $E = \sigma E_O$
C. Fourier's law	3. $q = \frac{KA}{L} hA(T_1 - T_2)$
D. Kirchoff's law	4. $q = \sigma A(T_1^4 - T_2^4)$
	5. $q = kA(T_1 - T_2)$

Codes	A	B	C	D
1.	4	1	3	2
2.	4	5	1	2
3.	2	1	3	4
4.	2	5	1	4

110. Match list-I with list-II and select the correct answer using the codes given below the list :

List – I	List – II
A. Momentum transfer	1. Thermal diffusivity
B. Mass transfer	2. Kinematic viscosity
C. Heat transfer	3. Diffusion coefficient

Codes	A	B	C
1.	2	3	1
2.	1	3	2
3.	3	2	1
4.	1	2	3

111. Plastic parts are generally made by

1. Investment casting
2. Injection molding
3. Shell molding
4. Continuous casting

112. Power consumption in metal cutting is mainly due to :

1. Tangential component of the force
2. Longitudinal component of the force
3. Normal component of the force
4. Friction at the metal-tool interface

113. The method of determination of indicated power of multi cylinder SI engine is by the use of :

1. Morse test
2. Prony brake test
3. Motoring test
4. Heat balance test

114. The COP of a heat pump β_{hp} and the COP of a refrigerator β_{ref} are related as :

1. $\beta_{hp} + \beta_{ref} = 1$
2. $\beta_{hp} - \beta_{ref} = 1$
3. $\beta_{ref} - \beta_{hp} = 1$
4. $\beta_{hp} - \beta_{ref} = 0$

115. By higher octane number of *SI* fuel, it is meant that the fuel has :
1. Higher heating value
2. Higher flash point
3. Lower volatility
4. Larger ignition delay

116. In some carburettors, meter rod and economiser device is used for :
1. Cold starting
2. Idling
3. Power enrichment
4. Acceleration

117. A carnot engine rejects 30% of absorbed heat to a sink at 30°C. The temperature of heat source is :
1. 100°C
2. 433°C
3. 737°C
4. 1010°C

118. Availability function for a closed system is expressed as :
1. $\phi = u + p_0 V - T_0 s$
2. $\phi = du + p_0 dv - T_0 ds$
3. $\phi = du + p_0 dv - T_0 ds$
4. $\phi = u + p_0 V + T_0 s$

119. Which of the following consists of spark plug?
1. SI engine
2. CI engine
3. Gas turbine
4. Steam engine

120. Which of the following is boiler mounting ?
1. Air pre-heater
2. Economizer
3. Fusible plug
4. Steam trap

121. In a long cylindrical rod of radius R and a surface heat flux of q_0, the uniform internal heat generation rate is :
1. $\frac{2q_0}{R}$
2. $2q_0$
3. $\frac{q_0}{R}$
4. $\frac{2q_0}{R^2}$

122. Propulsion efficiency of a jet engine is given by (where u is flight velocity and v is jet velocity relative to aircraft):
1. $\frac{2u}{v-u}$
2. $\frac{v+u}{2u}$
3. $\frac{2u}{v+u}$
4. $\frac{v-u}{2u}$

123. Given that –
Pr = Prandtl number Nu = Nussett number
Sh = Sherwood number Re = Reynold number
Sc = Schmidt number & Gr = Grashoff number
The functional relationship for free convective mass transfer is given as :
1. Nu = f (Gr , Pr)
2. Sh = f (Sc, Gr)
3. Nu = f (Re, Pr)
4. Sh = f (Re, Sc)

124. Match list-I with list-II and select the correct answer using the codes given below the list :

List – I	List – II
A. Lancashire	1. High pressure water tube
B. Cornish	2. Horizontal double fire tube
C. La-Mont	3. Vertical multiple fire tube
D. Cochran	4. Low pressure inclined water tube
	5. Horizontal single five tube

Codes	A	B	C	D
1.	2	5	1	3
2.	2	4	3	1
3.	1	5	2	3
4.	5	4	1	3

125. Breakeven point (BEP) indicates
1. Recovery of fixed cost
2. Recovery of variable cost
3. Recovery of both of above costs
4. Recovery of fixed, variable costs and margin of profit

126. PERT is
1. Program evaluation and review technique
2. Event oriented.
3. Able to consider uncertainty in execution timings.
4. Concerned with all of the above

127. Ratio of actual indicated work to hypothetical indicated work in a steam engine is the :
1. Indicated thermal efficiency
2. Friction factor
3. Mechanical efficiency
4. Diagram factor

128. Which of the following method gives uniform depreciation?
1. Straight line method
2. Declining balance method
3. Sum of years digit method
4. None of the above

129. Which of the following operation does not based on metal deformation?
1. Coining
2. Bending
3. Rolling
4. None of the above

130. Which control chart is used to measure "variability of variability" within the samples?
1. X-bar chart
2. R chart
3. C chart
4. U chart

131. Which of the following is the commercial unit used to measure electricity consumption?
1. Kilowatt-hour
2. Kilowatt
3. Joule per second
4. Mega watts

132. The difference between latest finish time and earliest finish time of activity is called
1. Total float
2. Free float
3. Independent float
4. None of the above

133. Hot rolling of mild steel is carried out
1. Between 100 to 150°C.
2. By the roller heated upto 150°C.
3. Above recrystallization temperature
4. None of the above

134. Which of the following is not a work holding device?
1. Vee block
2. Chuck
3. Steady rest
4. None of the above

135. Area under the Normal Distribution curve within $\pm 3\sigma$ limits equals to
1. 99.97%
2. 99.93%
3. 99.03%
4. None of the above

136. Metal property by virtue of which it can be drawn into sheets is called
1. Ductility
2. Malleability
3. Flexibility
4. None of the above

137. In acceptance sampling "Producer's risk" is :
1. A situation of workers dispute.
2. Unavailability of customers.
3. Probability of that a customer does not make payment.
4. Probability of rejection of a good lot.

138. Flatness of a surface can be measured by
1. Profile projector
2. Slip gauges
3. Coordinate measuring machine
4. Talysurf

139. Mohr's circle can be used to determine following stress on inclined surface
1. Normal stress
2. Principal stress
3. Tangential stress
4. All of the above

140. Which of the following is not a surface finishing operation
1. Lapping
2. Annealing
3. Polishing
4. Grinding

141. Flywheel maintains consistency of power transmission due to
1. Its light weight
2. Its high moment of inertia.
3. Its speed of rotation
4. Its capability to be rotated by wind power.

142. A lead screw with half nut mechanism in a lathe, free to rotate in both directions, has
1. V-threads
2. Whitworth threads
3. Acme threads
4. British Standard threads

143. In a blanking operation, the clearance is provided on
1. The die
2. The punch
3. Both die & punch equally
4. None of the above

144. Negative rake angle tool is recommended to machine
1. Ductile material at high speed
2. Brittle material at high speed
3. Ductile material at low speed
4. Very hard and ductile material at high speed

145. Corrosion resistance of stainless steel is due to
1. Chromium
2. Carbon
3. Sulphur
4. Iron

146. In centrifugal casting, the impurities are
1. Uniformly distributed
2. Forced towards the outer surface
3. Trapped near the mean radius of the casting
4. Collected at the centre of the casting

147. The aim of statistical quality control in industrial applications is to have

1. Quality improvement
2. Recording of data related to quality
3. Cost reduction
4. All of the above

148. A Project consists of three parallel paths with mean duration and variances of (10,4); (12,4); (12,9) respectively. According to the standard PERT assumptions, the distribution of project duration is

1. Beta with mean 10 and standard deviation 2
2. Beta with mean 12 and standard deviation 2
3. Normal with mean 10 and standard deviation 3
4. Normal with mean 12 and standard deviation 3

149. Consistency of a process is checked with the help of preferably by

1. Sigma chart
2. X bar chart
3. Cause effect chart
4. None of the above

150. Dynamometer is a device, which is used to measure

1. Speed of machine
2. RPM of a machine
3. Weight of the machine
4. None of the above

151. The units of energy in SI units

1. Joule
2. Watt
3. Joule/sec.
4. Watt/sec.

152. One micron is equal to

1. 0.0001 mm
2. 0.001 mm
3. 0.001 A°
4. None of the above

153. Moulding sand should posses which property

1. Collapsibility
2. Flow ability
3. Cohesion
4. All of the above

154. Interchangeability is possible due to

1. Standardization
2. Proper fastening methods
3. Temporary joints
4. None of the above

155. In case of triple start threads

1. Lead = 3 × pitch
2. Pitch = 3 × lead
3. There are three different types of threads
4. None of the above

156. Wax pattern is compulsorily used in

1. Shell moulding
2. Investment casting
3. Injection moulding
4. All of the above

157. Milling cutter is mounted on the part of a milling machine called

1. Dividing head
2. Spindle
3. Bracket
4. Arbor

158. Steel balls are manufactured by

1. Machining
2. Cold heading
3. Casting
4. Upsetting

159. Mercury does not wet the glass due to

1. Its cohesion is zero
2. Its surface tension is zero
3. Its adhesion is zero
4. It is a solid metal at room temperature.

160. An object having 10 Kg mass and weights as 9.81 kg on a spring balance. The value of "g" at that place is:

1. 9.81 m/s²
2. 10 m/s²
3. 0.981 m/s²
4. 98.1 m/s²

161. Which of the following is a general gas equation?

1. $PV^n = C$
2. $PV = C$
3. $PV = RT$
4. $PV = mRT$

162. While machining cast iron which of its elements turns hands black

1. Iron
2. Sulphur
3. Graphite
4. Nickel

163. A fixed gear having 200 teeth to be mesh with another gear having 50 teeth. The two gears are connected by an arm. The number of turns made by the smaller gear for one revolution of arm about the centre of the bigger gear is :
1. 2/4
2. 3
3. 4
4. 5

164. The supply at three sources is 50, 40 and 60 units respectively whilst the demand at the four destinations 20, 30, 10 and 50 units. In solving this transportation problem
1. A dummy source of capacity 40 is needed
2. A dummy destination of demand 40 is needed
3. No solution exists as problem is infeasible
4. No solution exists as problem is degenerate

165. The ratio of standard deviation and square root of number of observations is called
1. RMS value
2. Variance
3. Optimum value
4. Standard error

166. Which of the following characteristics is possessed by Nickel?
1. Paramagnetic
2. Ferromagnetic
3. Non-magnetic
4. Die electric

167. LVDT converts
1. Linear displacement to electrical signal
2. Strain to electrical signal
3. Electrical signal to mechanical force
4. Low voltage to high voltage

168. An initial feasible solution of an optimization problem is
1. All basic variables are equal to zero
2. At least one basic variable should have optimum value.
3. All basic variables should have real values
4. None of the above

169. Which of the following is not a heat treatment process?
1. Tempering
2. Nitriding
3. Honing
4. Quenching

170. Which instrument is used to measure the inclination of a plane surface precisely?
1. Snap gauge
2. Sine bar
3. Angle plate
4. 1 and 2 both

171. A pattern is made slightly larger in dimension to give:
1. Rapping allowance
2. Shrinkage allowance
3. Draft allowance
4. None of the above

172. In case of arc welding with reverse polarity
1. Electrode is kept as positive pole
2. Electrode is kept as negative pole
3. Electrode is kept as neutral pole
4. Electrode is kept as alternating changing pole

173. Problem of scavenging appears in case of
1. Petrol engine
2. Diesel engine
3. Four stroke engine
4. Two stroke engine

174. Which of the following is a casting defect?
1. Blow hole
2. Slag inclusion
3. Pour short
4. All above are casting defects

175. Core prints are used for
1. Correct drawing of core
2. Taking original prints of a drawing
3. Correct positioning of core
4. Photo graphs of a core

176. Gate in a mould connects
1. Sprue base with mould cavity
2. Riser with mould cavity
3. Pouring basin with mould cavity
4. Pouring basin with runner