Maximum Marks – 60   **Time – 45 minutes**

Instructions: -   1.   There are total 60 question in this section.

2.   All question have four choices out of which only one is correct.

3.   There is no negative marking.

1.   Find the unit place of 3674 x 8596 + 5699 x 1589

    a)   3   b)   4

    c)   5   d)   6

2.   What will be the highest three digit number which when divided by 3, 7 and 21 leaves remainder 2?

    a)   978   b)   982

    c)   983   d)   989

3.   Two persons A & B travelling towards each other from P & Q respectively which is 396 kms apart meet after 11 hours. Speed of A is 6 kms/hr more than B. Find the speed of B.

    a)   15   b)   18

    c)   21   d)   24

4.   Train travelling at a speed of 90 km/hr crosses a man standing on a platform in 8 seconds. Find the time taken by the train to cross the platform of length 250 kms.

    a)   15 sec   b)   16 sec

    c)   18 sec   d)   20 sec

5.   There are three numbers A, B and C. A is 50% of C and B is 75% of C, then A is what percentage of B?

a)   66.66%

b)   50%

c)   75%

d)   80%

6.   A = 36% B, B = 6% C. If C = 100 then A is equal to –

a)   2.18

b)   2.21

c)   2.16

d)   2.24

7.   A shopkeeper purchased two qualities of rice A & B. He bought 10 kg of rice A at Rs.35/kg and 20 kg rice B at Rs. 47/kg. Find the overall cost price per kgs if he mixes both types of rice.

a)   43

b)   42

c)   41

d)   40

8.   Sachin has a batting average of 99 in 80 innings. He was out for duck in his 80th innings. If he were to have a batting average of 100 how much should have been scored by him in his 80th match?

a)   80

b)   180

c)   99

d)   100

9.   A and B together can complete a particular task in 4 days. If A alone can complete the same task in 6 days, how many days will B take to complete the task if he works alone?

a)   8

b)   7

c)   12

d)   None of these

10. If the perimeter of a rectangle is 138 metres and the difference between the length and the breadth is 7 metres, what is the area of the rectangle?

a)   1216 square meters

b)   1147 square metres

c)   1184 square metres

d)   1178 square metres

11. What will come in place of question mark (?) in the following question?

25% of 84 × 24% of 85 =?

a)   144.4

b)   244.4

c) 428.4   d) 333.4

12. If in a triangle ABC, AB = AC, $\angle A = x + 15°$, $\angle B = 2x + 25°$ then value of $\angle C$

    a) 71°   b) 51°

    c) 61°   c) 41°

13. A point P is located outside the circle with centre O. A tangent from point P touches the circle at A and a secant from P cuts the circle at B and C respectively. PA =12cm PC= 16cm. Find the length of chord BC.

a) 12   b) 8

c) 9   d) None of these

14. If $\sin A + \sin^2 A = 1$ then what is the value of $\cos^2 A + \cos^4 A$?

    a) 0   b) 1

    c) -1   d) 2

15. The length of a rectangular field is increased by 30% and breadth is decreased by 30%. What is the per cent increase or decrease in its area?

    a) 9% increase   b) 21% decrease

    c) 21% increase   d) 9% increase

16. If $a + b + c = 9$, $ab + bc + ca = 26$, $a^3 + b^3 = 91$, $b^3 + c^3 = 72$ and $c^3 + a^3 = 35$, then what is the value of abc?

    a) 23   b) 24

    c) 25   d) 26

17. The value of x for which the expressions 19 - 5x and 19x + 5 become equal is _____.

    a) 7/24   b) 7/12

    c) 11/12   d) 11/24

18. If $x + y = 10$ and $x^2 + y^2 = 68$, then find xy

    a)   18   b)   24

    c)   17   d)   16

19. The mode and mean is given by 7 and 8, respectively. Then the median is:

a)   1/13

b)   13/3

c)   23/3

d)   33

20. If Mean of a, a+3, a+6, a+9 and a+12 is 10, then a is equal to;

a)   1

b)   2

c)   3

d)   4

Directions (21 – 25): Below each four pairs of words have been denoted by numbers (a), (b), (c), and (d). Find out which pair of words can be filled up in the blanks in the sentence in the same sequence to make the sentence meaningfully complete.

21. Mr. Srinivasan is ____ to become Chairman of the group _____ the retirement of his father.

    (a)   set, following   (b)   voted, subsequent
    (c)   selected, despite   (d)   approved, because

22. ____ to your error the ____ consignment has been delayed by a week.

    (a)   According, important   (b)   Duly, urgent
    (c)   Owing, entire   (d)   Added, crucial

23. On account of the ____ in sales the software firm has achieved an eight per cent ____ in net profit.

(a) surge, fall
(b) increase, rise
(c) decline, slope
(d) hike, loss

24. We are proud to say that today ____ 26 per cent of our total accounts are ____ by women and senior citizens.

(a) approximate, held
(b) nearly, authorized
(c) over, maintain
(d) above, open

25. The company has _____ special training to employees on _____ to trade online.

(a) announced, benefits
(b) offered, course
(c) imparted, risks
(d) sanction, skills

26. In the following question, out of the four alternatives, select the word similar in meaning to the word given.

Cynicism

a) Conviction
b) Bitterness
c) Credence
d) Intuition

27. In the following question, out of the four alternatives, select the word similar in meaning to the word given.

Pinnacle

a) Culmination
b) Nadir
c) Nethermost
d) Basal

28. In the following question, out of the four alternatives, select the word opposite in meaning to the word given.

Befuddle

a) Baffle
b) Daze
c) Fluster
d) Explicate

29. In the following question, a sentence has been given in Direct/Indirect speech. Out of the four alternatives suggested, select the one which best express the same sentence in Indirect/Direct speech.

John said, "There is a monkey outside the window."

    a)   John said that there was a monkey outside the window.

    b)   John said that there is a monkey outside the window.

    c)   John says that there was a monkey outside the window.

    d)   John says that there is a monkey outside the window.

30. In the following question, a sentence has been given in Direct/Indirect speech. Out of the four alternatives suggested, select the one which best express the same sentence in Indirect/Direct speech.

She said, "I will have cooked the food by the time they arrive".

    a) She said that she will have cooked the food by the time they would arrive.

    b) She said that she would cooked the food by the time they will arrive.

    c) She said that she would have cooked the food by the time they will arrive.

    d) She said that she would have cooked the food by the time they arrived.

In the following question Q31 – Q32, a sentence has been given in Active/Passive Voice. Out of the four alternatives suggested, select the one which best expresses the same sentence in Passive/Active Voice.

31.   **You'll be missing the sunshine in home.**

    a)   You'll miss the sunshine in home.

    b)   You would be missing the sunshine in home.

    c)   You'll are going to be missing the sunshine in home.

    d)   None of the above.

32.   **The presiding officer vetoed the committee's decision.**

    a)   The committee's decision is vetoed by the presiding officer.

b) The committee's decision was vetoed by the presiding officer.

c) The committee's decision has been vetoed by the presiding officer.

d) The committee's decision is being vetoed by the presiding officer.

33. In the following question, out of the four alternatives, select the alternative which best expresses the meaning of the idiom/phrase.

Tight - lipped

a) To have very thin lips

b) To be boisterous

c) To have a thin voice

d) Unwilling to speak about an event

34. Out of the four alternatives, choose the one which can be substituted for the given words/sentence.

To confirm with the help of evidence

a) Philanthropist

b) Bilingual

c) Refute

d) Corroborate

35. In the following question, one part of the sentence may have an error. Find out which part of the sentence has an error and click the button corresponding to it. If the sentence is free from error, click the "No error" option.

Rohan had been playing (1) for his club since fifteen years, (2) but then his elbow got injured. (3) No error (4)

a) Rohan had been playing

b) for his club since fifteen years,

c) but then his elbow got injured.

d) No error

36. When was the Constitution of India amended for the first time?

a) 1951

b) 1952

c) 1950

d) 1953

37. Who wrote the book Indica?

a) Megasthenese

b) Aristotle

c) Chanakya

d) None of these

38. Soil contains decayed remains of living organisms. This is called _____.

a) Minerals

b) Biosphere

c) Saline Soil

d) Humus

39. Dairy comes under which sector of economic activity?

a) Tertiary sector

b) Primary sector

c) Secondary sector

d) Quaternary sector

40. Who is appointed as the first Lt. Governor of Union Territory of Ladakh?

a) Raj Manohar Joshi

b) G C Murmu

c) Satyapal Malik

d) R K Mathur

41. What phenomenon is responsible for twinkling of stars?

a) Diffraction

b) Refraction

c) Dispersion

d) Scattering of Light

42. What will be the power consumption of two 300 W bulbs, three 100 W fans and one 1200 W Refrigerator for continuous operation of 30 hours?

a) 54 kWh

b) 60 kWh

c) 63 kWh

d) None of these

43. What type of image is formed by the eye lens on the retina?

(a)   Real and erect
(b)   Virtual and inverted
(c)   Real and inverted
(d)   Virtual and erect

44.   The magnetic field is the strongest at

(a)   middle of the magnet.
(b)   north pole.
(c)   south pole.
(d)   both poles.

45.   The heating element of an electric iron is made up of:

(a)   copper
(b)   nichrome
(c)   aluminium
(d)   iron

46.   A zygote which has an X-chromosome inherited from the father will develop into

(a)   girl
(b)   boy
(c)   either boy or girl
(d)   X-chromosome does not influence the sex of a child.

47.   The ability of a cell to divide into several cells during reproduction in Plasmodium is called

(a)   budding
(b)   multiple fission
(c)   binary fission
(d)   reduction division

48.   Tomato is a natural source of which acid?

(a)   Acetic acid
(b)   Citric acid
(c)   Tartaric acid
(d)   Oxalic acid

49. Which of the following has more inertia – a rubber ball and a stone of same size?

a) Rubber ball

b) Stone

c) Both have equal inertia

d) Both have zero

50. A bus at rest starts moving with an acceleration of 0.1 m/s². What will be its speed after 2 minutes?

a) 15 m/s

b) 18 m/s

c) 9 m/s

d) 12 m/s

51. Select a figure from amongst the Answer Figures which will continue the same series as established by the five Problem Figures.

Problem Figures: Answer Figures:
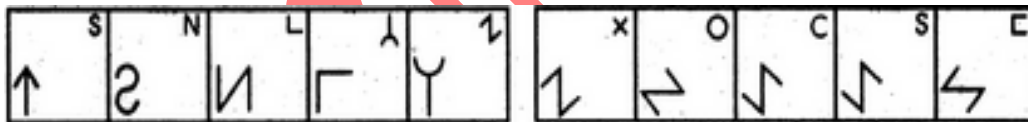
  A B C D C 1 2 3 4 5

    a) 4   b) 3

    c) 1   d) 2

52. Marathon is to race as hibernation is to

  a) winter   b) bear

  c) dream   d) sleep

53. Choose the correct order of letters which are required to form a correct meaningful word

VARSTE

a)   2,3,1,6,4,5

b)   3,2,4,5,6,1

c)   4,5,2,3,1,6

d)   6,3,4,5,2,1

54.   In these series, you will be looking at both the letter pattern and the number pattern. Fill the blank in the series.

SCD, TEF, UGH, _____, WKL

a)   CMN   b)   VIJ

c)   IJT   d)   UJI

55.   Introducing a boy, a girl said, "He is the son of the daughter of the father of my uncle." How is the boy related to the girl?

a)   Brother   b)   Nephew

c)   Uncle   d)   Son-in-law

56.   How many dots lie opposite to the face having three dots, when the given figure is folded to form a cube?
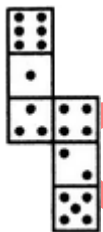
a)   2   b)   3

c)   5   d)   6

57.   Find out which of the figures (1), (2), (3) and (4) can be formed from the pieces given in figure (X).
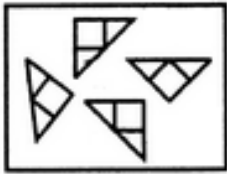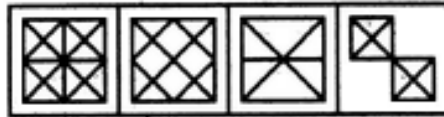
a) 2   b) 3

c) 1   d) 4

58.   Which of the following diagrams indicates the best relation between Travelers, Train and Bus ?

a)

b)

c)

d)
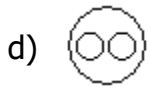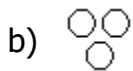
59.   In a certain code language,

'134' means 'good and tasty';

'478' means 'see good pictures' and

'729' means 'pictures are faint'.
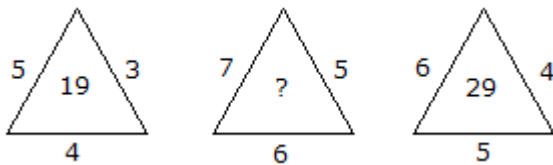
Which of the following digits stands for 'see'?

a) 1   b) 9

c) 8   d) None of these

60. Which one will replace the question mark ?

	a)	24		b)	36
	c)	29		d)	41

Section V (Mechanical)

Maximum Marks – 50   **Time – 30 minutes**

Instructions: -   1.   There are total 50 question in this section.
2.   All question have four choices out of which only one is correct.
3.   There is no negative marking.

1.   Forces which meet at one point but their lines of action do not lie in one plane are called
(A) Coplanar concurrent forces   (B) Coplanar noncurrent forces
(C) Non-coplanar concurrent forces   (D) None of these

2.   A bob of simple pendulum oscillating in air is made to oscillate in oil. The time period will
(A) Increase   (B) Decrease   (C) Not change   (D) None of these

3.   In actual machines mechanical advantage is
(A) Equal to velocity ration   (B) Greater than velocity ratio
(C) Less than velocity ration   (D) None of these

4.   The condition for irreversibility of self locking of a machine is that its efficiency should be
(A) <50%   (B) >50%   (C) =50%   (D) None of these

5.   If total of four pulleys are arranged in the first system, mechanical advantage is (neglecting friction)
(A) 3   (B) 4   (C) 8   (D) None of these

6. When a projectile is thrown with velocity u, making an angle θ with the horizontal, the total time of flight is

(A) $\frac{2u\sin\theta}{g}$ 　　(B) $\frac{2u\sin\theta}{2}$ 　　(C) 2u sinθ 　　(D) None of these

7. Abrasive selected for grinding tool steel and high speed steel is

(A) Diamond 　　(B) Al_2O_3 　　(C) SiC 　　(D) None of these

8. In grinding operation, for grinding harder material

(A) Softer grade is used 　　　　(B) High grade is used
(C) Medium grade is used 　　　　(D) None of these

9. Welding units operate at what power factor?

(A) 0.3 　　(B) 0.6 　　(C) 0.8 　　(D) None of these

10. The maximum twisting moment a shaft can resist, is the product of permissible shear stress and _____

(A) Moment of inertia 　　　　(B) Polar moment of inertia
(C) Polar modulus 　　　　(D) None of these

11. Bernoulli equation is applied for

(A) Ideal fluid 　　(B) Real fluid 　　(C) Viscous fluid 　　(D) None of these

12. A Venturi meter is used for the measurement of

(A) Pressure 　　(B) Discharge 　　(C) Volume 　　(D) None of these

13. In a simple machine if the mechanical advantage is 40 and the velocity ratio is 50 then its efficiency is

(A) 80% 　　(B) 85% 　　(C) 75% 　　(D) None of these

14. The maximum stress which a material can withstand before it fractures is called.

(A) Yield point stress 　　　　(B) Allowable stress
(C) Breaking stress 　　　　(D) None of these

15. Charge in enthalpy of a system is the heat supplied at
(A) Constant pressure (B) Constant temperature
(C) Constant volume (D) None of these

16. Two balls of same material and finish have their diameters in the ratio of 2:1 and both are heated to same temperature and allowed to cool by radiation. Rate of cooling by big ball as compared to smaller one will be in the ratio of
(A) 1:1 (B) 2:1 (C) 1:2 (D) None of these

17. A ideal gas at 27°C is heated at constant pressure till its volume becomes three times. The temperature of gas then will be
(A) 81°C (B) 900°C (C) 627°C (D) None of these

18. An object having 10 kg mass weights 9.81 kg on a spring balance. The value of 'g' at this place is ___.
(A) 10 m/sec^2 (B) 9.81 m/sec^2 (C) 10.2 m/sec^2 (D) None of these

19. Oxygen to acetylene ratio in case of carburising flame is _____.
(A) 0.5: 1 (B) 0.9: 1 (C) 1: 1 (D) None of these

20. Uniformly distributed load of 5 kN acts on a simply supported beam of length 10 m. What are the reactions at end points of the beam?
(A) 12.5 kN (B) 25 kN (C) 50 kN (D) None of these

21. During a tensile test on a specimen of 1 cm^2 cross-section, maximum load observed was 8 tonnes and area of cross-section at neck was 0.5 cm^2. Ultimate tensile strength of specimen is
(A) 4 tonnes/ cm^2 (B) 8 tonnes/ cm^2 (C) 16 tonnes/ cm^2 (D) None of these

22. The difference between two specific heats, C_p & C_v for a gas represents ___.
(A) Increase in kinetic energy of gas molecules (B) Increase in potential energy of gas molecules
(C) External work done (D) None of these

23. Metals are good heat conductors because _____.
(A) Of free electrons present (B) Their atoms are relatively far apart
(C) Their atoms collide frequently (D) None of these

24.   When a body floating in a liquid is displaced slightly, it oscillates about _____.
(A) Centre of gravity of body   (B) Centre of pressure (C) Metacentre   (D)   None of these

25.   Coining is the operation of _____.
(A) Cold forging   `   (B) Hot forging   (C) Cold extrusion   (D)   None of these

26.   Efficiency of the Carnot engine is given as 80%. If the cycle direction be reversed, what will be the value of coefficient of performance of reversed Carnot cycle?
(A) 1.25   (B) 0.25   (C) 0.5   (D) None of these

27.   A bucket of water weighing 10 kg is pulled up from a 20 m deep well by a rope weighing 1 kg/m length, then the work done is _____.
(A) 200 kg-m   (B) 400 kg-m   (C) 500 kg-m   (D) None of these

28.   What is the maximum distance traveled by a block moving upwards on an inclined plane of 30° with velocity of 20 m/s, if coefficient of friction is 0.23 between the block and inclined plane?
(A) 29.19 m   (B) 22.56 m   (C) 17.32 m   (D) None of these

29.   A circular disc rolls down an inclined plane, the fraction of its total energy associated with its rotation is _____.
(A) 1/2   (B) 1/3   (C) 1/4   (D) None of these

30.   A body radiates heat at the rate of 4 cal/m^2/s, when its temperature is 227°C. what is the heat radiated by the same body when its temperature is 727°C?
(A) 8 cal/m^2/s   (B) 16 cal/m^2/s   (C) 64 cal/m^2/s   (D) None of these

31.   Alloy steel containing 36% nickel is called _____.
(A) Invar   (B) Stainless steel   (C) High speed steel (D) None of these

32.   The ratio of actual cycle efficiency to that of ideal cycle efficiency is called _____.
(A) Effectiveness   (B) Work ratio   (C) Efficiency ratio (D) None of these

33. Following relationship defines the Gibb's free energy G
(A) G = H + TS   (B) G = H – TS   (C) G = U + TS   (D) None of these

34. Pressure in Pascal at a depth of 1 m below the free surface of a body of water will be equal to _____.
(A) 1 Pa   (B) 98.1 Pa   (C) 9810 Pa   (D) None of these

35. A rotating mass having moment of inertia of 30 kgm2 rotates at 800 rpm and is travelling in a curve of 170 metre radius at a speed of 240 km/hr. It will experience a gyroscopic reaction of _____.
(A) 10 m kgf   (B) 100 m kgf   (C) 1000 m kgf   (D) None of these

36. A body is resting on a plane inclined at angle 30° to horizontal. What force would be required to slide it down, if the coefficient of friction between body and plane is 0.3?
(A) 0   (B) 1 kg   (C) 5 kg   (D) None of these

37. A body is thrown vertically upwards with a velocity of 980 cm/sec, then the time the body will take to reach the ground will be
(A) 1 second   (B) 2 seconds   (C) 2.5 seconds   (D) None of these

38. The dimensions of coefficient of viscosity are
(A) $M^1L^{-1}T^{-1}$ (B) $M^{-1}L^1T^{-1}$ (C) $M^{-1}L^1T^1$ (D) None of these

39. If two concurrent forces A and B acting on a point are 200 N and 300 N. What is the magnitude of resultant force, if it makes an angle of 50° with each force?
(A) 471.08N   (B) 455.12N   (C) 400.56N   (D) None of these

40. Uniformly distributed load of 5 kN acts on a simply supported beam of length 10 m. What are the reactions at end points of the beam?
(A) 12.5 kN   (B) 25 kN   (C) 50 kN   (D) None of these

41. In 5 second a body covers a distance of 50 m and in 10 seconds it covers 80 m with uniform acceleration. What is the distance traveled in 15 seconds?
(A) 100 m   (B) 110 m   (C) 1000 m   (D) None of these

42. A boat sails across a river with a velocity of 10 km/hr. If resultant boat velocity is 14 km/hr, then what is the velocity of river water?
(A) 17.20 km/hr   (B) 10 km/hr   (C) 9.79 km/hr   (D) None of these

43. The elongation of a bar is 0.5 mm, when a tensile stress of 200 N/mm^2 acts on it. Determine original length of a bar if modulus of elasticity is 150 x 10^3.
(A) 375.93 mm   (B) 300 mm   (C) 360 mm   (D) None of these

44. A trolley wire weighs 1.2 kg per meter length. The ends of the wire are attached to two poles 20 meters apart. If the horizontal tension is 1500 kg find the dip in the middle of the span
(A) 2.5 cm   (B) 3.0 cm   (C) 4.0 cm   (D) None of these

45. The resultant of the following three couples 20 kg force, 0.5 m arm, +ve sense 30 kg force, 1 m arm, -ve sense 40 kg force, 0.25 m arm, +ve sense having arm of 0.5 m will be
(A) 20 kg, -ve sense   (B) 20 kg, + ve sense   (C) 10 kg, + ve sense
        (D) None of these

46. A piece of metal of specific gravity 7 floats in mercury of specific gravity 13.6. What fraction of its volume is under mercury?
(A) 0.5   (B) 0.4   (C) 0.515   (D) None of these

47. The mass of 2.5 m^3 of a certain liquid is 2 tonnes. Its mass density is
(A) 200 kg/m^3 (B) 400 kg/m^3 (C) 800 kg/m^3 (D) None of these

48. A man of 60 kg moves in a lift of constant velocity 5 m/s. What is the reactive force acting on the man by the elevator?
(A) 888 N   (B) 588 N   (C) 288 N   (D) None of these

49. A flywheel on a motor goes from rest to 1000 rpm in 6 sec. The number of revolutions made is nearly equal to
(A) 25   (B) 50   (C) 100   (D) None of these

50. The dynamic viscosity of a liquid is 1.2×10^{-4} Ns/m^2, whereas, the density is 600 kg/m^3. The kinematic viscosity in m^2/s is
(A) 72×10^{-3} (B) 20×10^{-8} (C) 7.2×10^3 (D) None of these