2016
Paper I
MECHANICAL AND PRODUCTION ENGINEERING AND AUTOMOBILE ENGINEERING
(Degree Standard)

Time Allowed : 3 Hours]

[Maximum Marks : 300

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

IMPORTANT INSTRUCTIONS

1. This Booklet has a cover (this page) which should not be opened till the invigilator gives signal to open it at the commencement of the examination. As soon as the signal is received you should tear the right side of the booklet cover carefully to open the booklet. Then proceed to answer the questions.

2. This Question Booklet contains **200** questions. Prior to attempting to answer the candidates are requested to check whether all the questions are there in series without any omission and ensure there are no blank pages in the question booklet. In case any defect in the Question Paper is noticed it shall be reported to the Invigilator within first 10 minutes.

3. Answer **all** questions. **All** questions carry equal marks.

4. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.

5. An Answer Sheet will be supplied to you separately by the Invigilator to mark the answers.

6. You will also encode your Register Number, Subject Code, Question Booklet Sl. No. etc. with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, action will be taken as per commission's notification.

7. Each question comprises *four* responses (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.

8. In the Answer Sheet there are **four** circles Ⓐ, Ⓑ, Ⓒ and Ⓓ against each question. To answer the questions you are to mark with Blue or Black ink Ball point pen ONLY ONE circle of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. *e.g.* If for any item, Ⓑ is the correct answer, you have to mark as follows :

Ⓐ ● Ⓒ Ⓓ

9. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.

10. The sheet before the last page of the Question Booklet can be used for Rough Work.

11. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

12. Do not tick-mark or mark the answers in the Question booklet.

1. When the stroke is equal to the bore, the engine is called a

   (A) V-engine   (B) Inline engine

   (C) Square engine   (D) Rectangular engine

2. A Carnot engine rejects 30% of absorbed heat to a sink at 30° C. The temperature of the heat source is

   (A) 100°C   (B) 433°C

   (C) 737°C   (D) 1010°C

3. An engine working between positive temperatures

   (A) can be a heat pump

   (B) can be a heat pump only if frictionless machine is used

   (C) must be a heat pump

   (D) cannot be a heat pump

4. A cyclic machine is used to transfer heat from a reservoir at 1000 K to a reservoir at 400 K. It draws in 325 kJ of heat from the higher temperature reservoir while supplying 125 kJ of heat to a lower temperature. The efficiency of carnot cycle is

   (A) 0.8   (B) 0.9

   (C) 0.6   (D) 0.55

5. A gas contained in a cylinder is compressed, the work required for compression being 5000 kJ. During the process, heat interaction of 2000 kJ causes the surroundings to be heated. The changes in internal energy of the gas during the process is

   (A) −7000 kJ   (B) −3000 kJ

   (C) +3000 kJ   (D) +7000 kJ

6. Additives are added in the lubricants to have

   (A) detergent-dispersant characteristics

   (B) pour point depression

   (C) antifoam characteristics

   (D) all of the above

7. Which one of the following is the correct expression for the propulsion efficiency of a jet plane (neglecting the mass of fuel)? where $V_j \rightarrow$ Jet velocity and $V_a \rightarrow$ flight speed

(A) $\eta_p = \dfrac{2}{\left(\dfrac{V_a}{V_j}\right) + 1}$

(B) $\eta_p = \dfrac{2}{\left(\dfrac{V_j}{V_a}\right) + 1}$

(C) $\eta_p = \dfrac{2}{\left(\dfrac{V_a}{V_j}\right) - 1}$

(D) $\eta_p = \dfrac{2}{\left(\dfrac{V_j}{V_a}\right) - 1}$

8. Coefficient of compressibility (B) of a fluid is the ratio between

(A) Relative change in volume and change in pressure

(B) Increase in pressure and relative change in volume

(C) Change in heat and change in temperature

(D) Change in temperature and heat energy applied

9. The relative jet exit velocity from a rocket is 2700 m/s. The forward flight velocity is 1350 m/s. What is the propulsive efficiency of the unit?

(A) 66.66%

(B) 50%

(C) 33.33%

(D) 90%

10. The curved lines on a psychrometric chart indicates

(A) Dry bulb temperature

(B) Wet bulb temperature

(C) Specific humidity

(D) Relative humidity

11. Which of the following refrigerant has the higher Global Warming Potential (GWP)?

(A) R-12

(B) R-22

(C) R-134 a

(D) R-717

12. The liquid refrigerant is sub-cooled in order to

(A) Eliminate the chances of vapour getting into the throttle valve

(B) Reduce compressor overheating

(C) Avert checking of evaporator tubes

(D) Enhance the cooling effect

13. In viscous flow, the velocity distribution across the section of a pipe is

   (A) Cubic law   (B) Parabolic only

   (C) Triangle   (D) Rectangle

14. The ratio of inertia force of flowing fluid to viscous force of the fluid is known as

   (A) Weber's number   (B) Froude's number

   (C) Euler's number   (D) Reynold's number

15. Match List I (Phenomena) with List II (Causes) and select correct answer using codes given below :

List I (Phenomena)		List II (Causes)
(a) Shock wave	1.	Surface tension
(b) Flow separation	2.	Vapour pressure
(c) Capillary rise	3.	Compressibility
(d) Cavitation	4.	Adverse pressure gradient

	(a)	(b)	(c)	(d)
(A)	3	4	1	2
(B)	4	3	1	2
(C)	3	4	2	1
(D)	1	2	3	4

16. For pumping viscous oil, which pump will be used

   (A) Reciprocating pump   (B) Centrifugal pump

   (C) Screw pump   (D) Cope pump

17. A single acting reciprocating pump has a plunger of diameter 250 mm and stroke of 350 mm. If the speed of the pump is 60 rpm and it delivers 16.5 litres/sec. Find the slip of the pump.

   (A) 4.07%   (B) 1.4%

   (C) 0.714%   (D) 100%

18. The wavelength for maximum emissive power is given by the law

(A) Kirchhoff's law (B) Steafan-Boltzmaan law

(C) Fourier's law (D) Wien's law

19. The temperature variation with time, in the lumped parameter model is

(A) Exponential (B) Sinusoidal

(C) Cubic (D) Linear

20. Materials which are employed for electrodes in thermo-electric generators are of

(A) Insulators (B) Semi-conductor

(C) Metals (D) Conductors

21. Francis, Kaplan and Propeller turbines fall under the category of

(A) Impulse turbine

(B) Reaction turbine

(C) Mixed (impulse and reaction) turbine

(D) Axial flow

22. Super heating of steam is desirable for

(A) Increasing the efficiency of rankine cycle

(B) Reducing initial condensation losses

(C) Avoiding too high moisture in the last stage of turbine

(D) All the above

23. Pulverised fuel is used for

(A) Saving fuel (B) Better burning

(C) Obtaining more heat (D) None of the above

24. A nuclear unit becoming critical means

(A) It is generating power to rated capacity

(B) It is capable of generating much more than rated capacity

(C) There is danger of nuclear spread

(D) It generates no heat

25. What is the expression for the crippling load for a column of length 'l' with one end fixed and the other end free?

(A) $P = 2\pi^2 EI / l^2$

(B) $P = \pi^2 EI / 4l^2$

(C) $P = 4\pi^2 EI / l^2$

(D) $P = \pi^2 EI / l^2$

Where E – Young's modulus; I = Moment of Inertia

26. What is the shape of the shearing stress distribution across a rectangular cross section beam?

(A) Triangular

(B) Parabolic only

(C) Rectangular only

(D) A combination of rectangular and parabolic shape

27. Strain energy stored in a body of volume V subjected to uniform stress σ is

(A) $\dfrac{\sigma^2}{2E} \times V$

(B) $\dfrac{\sigma}{2E} \times V$

(C) $\dfrac{\sigma \times V^2}{2E}$

(D) $\dfrac{\sigma^2 \times V}{E}$

Where E – Modulus of Elasticity

28. A cantilever of length (l) carries a uniformly distributed load W per unit length over the whole length. The downward deflection at the free end will be

(A) $\dfrac{Wl^3}{8EI}$

(B) $\dfrac{Wl^3}{48EI}$

(C) $\dfrac{5Wl^3}{384EI}$

(D) $\dfrac{Wl^3}{3EI}$

Where $W = W \times l$ = Total load

29. The property of a material by virtue of which a body returns to its original shape after removal of the load is called

(A) Elasticity

(B) Plasticity

(C) Ductility

(D) Malleability

30. Torque transmitted by friction clutch

    (A) is more on the assumption of uniform pressure as compared to uniform wear

    (B) is less on the assumption of uniform pressure as compared to uniform wear

    (C) is same on the assumption of uniform pressure and uniform wear

    (D) is more or less on the assumption of uniform pressure as compared to uniform wear depending upon material

31. Train value of gear train is

    (A) equal to the speed ratio

    (B) half of the speed ratio

    (C) reciprocal of the speed ratio

    (D) double the speed ratio

32. A balance mass of value $2/3\,m$ is placed diametrically opposite to the crank at crank radius r. The unbalance force along the line of stroke of a reciprocating engine is

    (A) $\dfrac{2}{3}\,mw^2 r \cos\theta$

    (B) $\dfrac{1}{3}\,mw^2 r \cos\theta$

    (C) $\dfrac{2}{3}\,mw^2 r \sin\theta$

    (D) $\dfrac{1}{3}\,mw^2 r \sin\theta$

33. If the spring mass system with mass m and spring stiffness k is taken to very high altitude, the natural frequency of longitudinal vibrations.

    (A) increases

    (B) decreases

    (C) remains unchanged

    (D) may increase or decrease depends on climate

34. The solution to critically damped free vibration will be of the form

    (A) $x = A_1 \cos w_d t + A_2 \cos w_d t$

    (B) $x = A_1 \cos w_d t + A_2 \sin w_d t$

    (C) $x = Ae - w_n t \sin(w_d t + \phi)$

    (D) $x = (A_1 + A_2 t)\, e - w_n t$

35. Match the following.

List I

(a) Crossed helical gear

(b) Straight level gear

(c) Hypoid gears

List II

1. To connect two intersecting shaft at 90 degrees with a given speed ratios

2. To connect non parallel, non intersecting and teeth are curved

3. To connect non parallel, non intersecting shaft

	(a)	(b)	(c)
(A)	1	2	3
(B)	1	3	2
(C)	3	1	2
(D)	3	2	1

36. A V-belt designated by A-914-50 denotes

(A) a standard belt

(B) an oversize belt

(C) an undersize belt

(D) a medium size belt

37. The form factor in the design of gears dependant on the following factors.

(1) tooth number

(2) pressure angle

(3) module

(4) size of tooth

(A) (1), (2) and (3)

(B) (1) and (2) only

(C) (1) and (3) only

(D) (2), (3) and (4)

38. Crowning is done on a pulley to

(A) decrease the tendency of slip

(B) increase the coefficient of friction

(C) increase the power capacity

(D) increase the creep

39. Chip Equivalent is increased by

    (A) an increase in side cutting edge angle of tool

    (B) an increase in nose radius and side cutting edge angle of tool

    (C) increase the area of cut

    (D) increasing the depth of cut

40. Find out the index movement required to mill a hexagonal bolt by direct indexing. The rapid index plate has 24 holes

    (A) 4   (B) 1/4

    (C) 3   (D) 1/3

41. In CNC programming, APT stands for,

    (A) Automatically Programmed Tool

    (B) Application Programming Tool

    (C) Applied Precision Tooling

    (D) Automatically Precision Tooling

42. The best example for a continuous material handling system is,

    (A) robots   (B) automated guided vehicle system

    (C) conveyor system   (D) towline carts

43. Which one of the following is not a natural abrasive grinding wheel materials?

    (A) Sandstone   (B) Emery

    (C) Silicon carbide   (D) Diamonds

44. In Electron Beam Machining, the melting and vapourization of material is done by

    (A) Kinetic energy of the electron

    (B) Potential energy of the electron

    (C) External heat source

    (D) Focusing coils

45. In applying Vogel's approximation method (Transportation Problem) to a profit maximization problem, row and column penalities are determined by

    (A)   Finding the smallest unit cost in each row or column

    (B)   Finding the sum of the unit costs in each row or column

    (C)   Finding the difference between the two lowest unit costs in each row and column

    (D)   Finding the difference between the two highest unit costs in each row and column

46. In Simplex table, if all the values of the ratio column happen to be negative then the solution

    (A)   Infeasible   (B)   Unbounded

    (C)   Optimal   (D)   Multiple Optimum

47. A major assumption of stability of demand is important for justifying which of the following layout type?

    (A)   Fixed – Position layout   (B)   Product layout

    (C)   Process layout   (D)   Computerized layout

48. If EOQ is within the range of the lowest discounted rate offered, then

    (A)   Accept the discount offer and order the minimum in the range

    (B)   Reject the discount offer

    (C)   Consider the total costs of the ranges of discount before taking the decision

    (D)   Accept the discount offer and order at EOQ level

49. A time study was conducted on a job using stopwatch. Average observed time of the job was 10 minutes. The average rating was estimated to be 110%. The allowances for personal needs, rest etc amount to 10%. The standard time for the job is

    (A)   10.0 minutes   (B)   12.0 minutes

    (C)   10.1 minutes   (D)   12.1 minutes

50. Consider the following statement :

Assertion (A) : In cantilever trusses there is no necessity to find support reactions for solving it

Reason (R) : Cantilevers have moment as a reaction

(A) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(B) Both (A) and (R) are correct and (R) is not the correct explanation of (A)

(C) (A) is correct and (R) is incorrect

(D) (A) is incorrect and (R) is correct

51. The impact in which the two bodies join together after collision is called as

(A) Central impact

(B) Plastic impact

(C) Elastic impact

(D) Oblique impact

52. The maximum speed of the sliding block to pass point A with radius of curvature ρ, without slipping is

(A) $V_{max} = \sqrt{g\rho}$

(B) $V_{max} = \sqrt{g\rho \tan\theta}$

(C) $V_{max} = mg/\rho\theta$
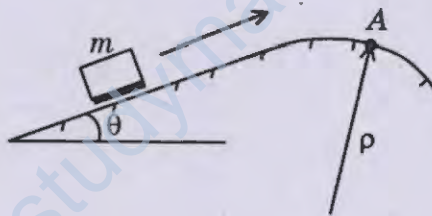
(D) $V_{max} = mg/\rho \tan\theta$

53. The importance of D'Alembert principle is

(A) convert static problem into dynamic problem

(B) convert dynamic problem into static problem

(C) relates centrifugal and centripetal force

(D) relates impulse and momentum

54. The mass moment of inertia of a sphere about any of its centroidal axes is given by

(A) $\frac{2}{5}mr^2$

(B) $\frac{2}{3}mr^2$

(C) $\frac{4}{5}mr^2$

(D) $\frac{4}{3}mr^2$

55. The maximum flame speed in CI engines occurs when

    (A) ignition lag occurs

    (B) mixture strength for hydrocarbon fuels is about 10% rich

    (C) mixture is made leaner (or) further enriched

    (D) it releases less thermal energy

56. Reforming in fuels for IC engines is a term used to convert

    (A) high antiknock quality gasoline into low antiknock gasoline quality

    (B) mixing certain products

    (C) low antiknock quality gasoline into high antiknock quality

    (D) the ends of a straight chain molecule to form a aromatic compound

57. The instrument used to examine the spark timing is

    (A) Viscous flowmeter   (B) Rotameter

    (C) Stroboscope   (D) Air compressor

58. Match List I (IC engine parts) with List II (Materials) following :

    List I   List II
    (a) Piston   1. Cast iron
    (b) Valves   2. Alloy steel
    (c) Crankshaft   3. Special alloy steel
    (d) Piston rings   4. Cast steel

	(a)	(b)	(c)	(d)
(A)	4	3	2	1
(B)	1	2	3	4
(C)	4	2	3	1
(D)	1	3	2	4

59. In a jet engine, the air-fuel ratio is

    (A) 30 : 1   (B) 40 : 1

    (C) 50 : 1   (D) 60 : 1

60. Transport of fluids in chemical process plants, Air conditioning systems, flow process in gas ducts of air craft engines are examples of

    (A) Rayleigh flow   (B) Fanno flow

    (C) Turbulent flow   (D) Isothermal flow

61. In an ideal vapour compression refrigeration cycle, the specific enthalpy of refrigerant (in kJ/kg) at the following states are given as :

Inlet of condenser : 283

Exit of condenser : 116

Exit of evaporator : 232, The COP of this cycle is

(A) 2.27   (B) 2.75

(C) 3.27   (D) 3.75

62. The Aircraft refrigeration system having high supersonic speeds, the system used for refrigeration is

(A) simple air cooling   (B) simple evaporative system

(C) bootstrap system   (D) bootstrap evaporative system

63. Calculate the pressure due to a column of 0.2 m of water

(A) 1962 N/m²   (B) 2962 N/m²

(C) 962 N/m²   (D) 1000 N/m²

64. The Hydraulic Gradient Line (HGL) is defined as the sum of

(A) Pressure head and datum head

(B) Pressure head and kinetic head

(C) Pressure head, datum head and kinetic head

(D) Datum head and kinetic head

65. Match List I (Quantity to measure) with List II (Measuring Devices) :

List I (Quantity to measure)	List II (Measuring Devices)
(a) Differential pressure	1. Viscometer
(b) Absolute pressure	2. Manometer
(c) Air velocity	3. Anemometer
(d) Viscosity of fluid	4. Barometer

	(a)	(b)	(c)	(d)
(A)	4	2	3	1
(B)	2	4	3	1
(C)	2	4	1	3
(D)	1	2	3	4

66. If at the inlet of the turbine, water possesses kinetic energy as well as pressure energy, the turbine is known as

(A) Impulse turbine

(B) Reaction turbine

(C) Axial flow turbine

(D) Both (B) and (C)

67. Overall efficiency of a centrifugal pump is given by

(A) Manometric efficiency ×Mechanical efficiency

(B) Hydraulic efficiency × Mechanical efficiency

(C) Manometric efficiency × Hydraulic efficiency

(D) Mechanical efficiency × Thermal efficiency

68. Match the List I with List II and answer the code below :

List I

(a) Black body

(b) Gray body

(c) Specular

(d) Diffuse

List II

1. 'ε' does not depend on wavelength

2. Mirror like reflection

3. Zero reflectivity

4. Intensity same in all direction

	(a)	(b)	(c)	(d)
(A)	2	1	3	4
(B)	3	4	2	1
(C)	2	4	3	1
(D)	3	1	2	4

69. Milk spills over when it is boiled in an open vessel. The boiling of milk at this instant is referred to as

(A) Interface evaporation

(B) Sub-cooled boiling

(C) Film boiling

(D) Saturated nucleate boiling

70. Addition to fin to the surface increases the heat transfer, if $\sqrt{\dfrac{hA}{kP}}$ is,

(A) Equal to one

(B) Greater than one

(C) Less than one

(D) Greater than one but less than two

71. The results of proportional mode of control is

    (A) eliminate steady state error

    (B) stable responses

    (C) high responses

    (D) eliminate overshoot

72. In an automatic control system for controlling the speed of the shaft ——————— is the correction unit.

    (A) PID controller   (B) Microprocessor

    (C) Motor   (D) Tachogenerator

73. In Hall effect sensor, the Hall voltage is

    (A) proportional to the magnetic flux density and current

    (B) proportional to the magnetic flux only

    (C) inversely proportional to the current

    (D) proportional to the resistance and current

74. The resistance of conventional metal-oxide thermistors ——————— with an increase in temperature.

    (A) increases   (B) decreases

    (C) remains constant   (D) increases non linearly

75. A sensor is having an accuracy of +5% of full range output. What is the true reading if the sensor range is 0 to 200° C

    (A) plus 5° C of the true reading

    (B) minus 5° C of the true reading

    (C) plus 10° C of the true reading

    (D) plus 20° C of the true reading

76. The relation between the no. of links (l) and the number of binary joints (j) for a kinematic chain having constrained motion is given by $j = \frac{3}{2}l - 2$. If the left hand side of this equation is greater than right hand side, then the chain is

   (A)   completely constrained chain

   (B)   incompletely constrained chain

   (C)   locked chain

   (D)   quadric cycle chain

77. Two kinematic links 1 and 2 of mechanism have absolute angular velocity w_1 (clockwise) and w_2 (anti-clockwise) respectively. The angular velocity of link 1 relative to link 2 is

   (A) $w_1 + w_2$ (B) $w_2 - w_1$

   (C) $\dfrac{w_1 - w_2}{2}$ (D) $\dfrac{w_1 + w_2}{w_1 - w_2}$

78. Roller followers are not used in automobiles because of

   (A)   Jumping at lower speed   (B)   Rolling away from path

   (C)   Failure of Roller pin points   (D)   Less friction in rollers

79. If the velocity of an entire link is marked as a point in velocity polygon, then

   (A)   The link is rotating   (B)   The link is small

   (C)   The link is translating   (D)   The link is not rigid

80. Match the following :

   (a)   Pantograph   1.   Slider Crank

   (b)   Whitworth mechanism   2.   4-bar

   (c)   Scotch yoke mechanism   3.   Straight line

   (d)   Peaucellier mechanism   4.   Double slider

	(a)	(b)	(c)	(d)
(A)	3	1	4	2
(B)	2	1	4	3
(C)	2	4	1	3
(D)	3	4	1	2

81. A joint used to connect two co-axial rods which are subjected to either axial tensile force or axial compressive force.

(A) knuckle joint

(B) cotter joint

(C) universal joint

(D) flange coupling

82. The coupling, which is used to connect which are perfectly aligned

(A) universal coupling

(B) old ham's coupling

(C) flange coupling

(D) bushed pin type coupling

83. Which of the following statement is wrong for a connecting rod?

(A) A connecting rod will be equally strong in buckling about X axis, if $I_{XX} = 4I_{YY}$

(B) If $I_{XX} > 4I_{YY}$, the buckling will occur about Y axis

(C) If $I_{XX} < 4I_{YY}$, the buckling will occur about X – axis

(D) The most suitable section for connecting rod is 'T' section

84. In helical compression spring, the external force acts along the axis of spring induces ——————— in the spring wire.

(A) compressive stress

(B) tensile stress

(C) torsional shear stress

(D) shear stress

85. The long bearing have the advantage of ——————— compared to short bearing.

(A) More heat dissipation

(B) More load carrying capacity

(C) More load carrying capacity with more heat dissipation

(D) Less load carrying capacity with more heat dissipation

86. How can shock absorbing capacity of a belt be increased?

    (A)   By tightening it properly

    (B)   By increasing shank diameter

    (C)   By grinding the shank

    (D)   By making the shank diameter equal to the core diameter of thread

87. Formed cutters an

    (A)   convex milling cutter and concave milling cutter

    (B)   taper shank end mill cutter and straight shank end mill

    (C)   plain metal slitting saw and staggered teeth metal slitting saw

    (D)   tap and reamer cutter

88. In slotting machine, the following mechanism have been used to remove the metal during downward stroke

    (A)   Tumbler gear mechanism (or) Back gear mechanism

    (B)   Ball gear mechanism (or) Back gear mechanism

    (C)   Rotary indexing mechanism

    (D)   Whitworth quick return mechanism (or) variable speed reversible motor drive mechanism (or) Hydraulic drive mechanism

89. The rake angle in a twist drill

    (A)   varies from minimum near the dead centre to a maximum value at the periphery

    (B)   is maximum at the dead centre and zero at the periphery

    (C)   is constant at every point of the cutting edge

    (D)   is a function of the size of the chisel edge

90. The knee tool holders are useful for

    (A)   single operation alone

    (B)   simultaneous turning and boring or turning and drilling operations

    (C)   grinding operation

    (D)   broaching operation

91. Equity theory of motivation focuses on

~~(A)~~ The fact that people are influenced by the expected results of their actions

(B) People's expectations of the different outcomes for a given action

(C) The motivational force involved in a person's actions at work

(D) People's perception of how they should perform in a given situation at work

92. Which statement is not an advantage in a formal organisation?

(A) Well defined authority, responsibility and accountability

(B) Proper standardisation of work is practicable

(C) Rules are considered religiously

~~(D)~~ Duplication of work is practiced

93. Identify the information system that gives the output in the form of summary and exception reports that are useful to the managers

~~(A)~~ Management information system

(B) Office automation system

(C) Transaction processing system

(D) Executive support system

94. Which is a flexible budget?

(A) A budget that shows a detailed schedule of expected sales for the budget period

(B) A budget that does not change through the budget period

~~(C)~~ A budget that adjusts for changes in the volume of activity

(D) A budget that does not change as volume changes

95. Which of the following statement related to productivity is not correct?

(A) Achieving more output with same level of inputs

(B) Achieving same level of output with reduced inputs

(C) Proportionate increase in output is more than proportionate increase in inputs

~~(D)~~ Proportionate increase in output is less than proportionate increase in inputs

96. The square of the standard deviation is also called

 (A) Skewness   (B) Variance

 (C) Medium   (D) Mode

97. Which one of the following is not the surface characteristic?

 (A) Profile

 (B) Lay

 (C) Contacting envelope

 (D) Flaws

98. The method of inspection by variables gives a record of

 (A) No. of parts inspected

 (B) Actual measurement of the product

 (C) No. of defective parts inspected

 (D) Approximate measurement of the product

99. Expressing a dimension $45.2^{\pm 0.02}$ mm is the case of

 (A) Bilateral tolerance

 (B) Unilateral tolerance

 (C) Limiting dimensions

 (D) Unlimiting dimensions

100. The two slip gauges in precision measurement are joined by

 (A) Assembling

 (B) Slipping

 (C) Wringing

 (D) Sliding

101. Gudgon pins are made of

   (A) Same material of the piston

   (B) Cast iron

   (C) Aluminium

   (D) Hardened and ground steel

102. Modern intake manifolds are made by

   (A) PVC   (B) Backlite

   (C) Cast iron   (D) Dupont zytel

103. When the exhaust manifold is red hot?

   (A) Engine works on low load and lean air-fuel mixture

   (B) Engine works with high load and lean air-fuel mixture

   (C) Engine works with low load of rich air-fuel mixture

   (D) Engine works with high load of rich air-fuel mixture

104. High performance over hear cam engines have

   (A) one cam per head

   (B) two cam per head

   (C) three cam per head

   (D) four cam per head

105. Two stroke cycle engine adapted with a

   (A) uni flow scavenging

   (B) back flow scavenging

   (C) cross flow scavenging

   (D) double way flow scavenging

106. Calorific value of Bio gas is

   (A) 4,250 Kcal/Kg   (B) 5,500 Kcal/Kg

   (C) 5,875 Kcal/Kg   (D) 14,000 Kcal/Kg

107. The initial jet velocity of diesel fuel entering into the cylinder of a conventional diesel engine is about

(A) 1000 m/s   (B) 2000 m/s

(C) 100 m/s   (D) 50 m/s

108. Solid injection in I.C. engines refers to the injection of

(A) Liquid fuel only   (B) Liquid fuel and air

(C) Solid fuel   (D) Solid fuel and air

109. The peak cycle temperature of the gas of a diesel engine may reach upto

(A) 3500 K   (B) 2500 K

(C) 4500 K   (D) 1500 K

110. The radiator coding tubes are generally made of

(A) rubber   (B) plastic

(C) brass   (D) copper

111. The heat given to the coding medium in IC engines is about

(A) 60 – 70 %   (B) 50 – 60 %

(C) 40 – 50 %   (D) 30 – 40 %

112. The principle used in diesel engine codant pump is

(A) positive displacement   (B) constant volume

(C) constant pressure   (D) centrifugal

113. Engine over heating may result due to the

(A) radiator pressure cap stuck closed

(B) thermostat stuck open

(C) broken fan belt

(D) excess codant in the system

114. The adjustable wheel alignment angles are

    (A)   Steering axis inclination, caster and camber

    (B)   Turning radius, set back and thrust angle

    (C)   Toe, suspension height and included angle

    (D)   Caster, camber and toe

115. Which of the following is not a common spring type?

    (A)   Coil spring   (B)   Composite spring

    (C)   Leaf spring   (D)   Torsion bar

116. In gas filled shock absorber the gas used is

    (A)   Atmospheric air   (B)   Nitrogen

    (C)   Oxygen   (D)   Hydrogen

117. Which of the one is not the part of unspring weight?

    (A)   drive axle   (B)   axle shaft

    (C)   wheel   (D)   engine

118. Which of the following is not a battery rating?

    (A)   20 – h rate   (B)   25 – A rate

    (C)   Cold rate   (D)   47–A rate

119. The voltage 'V' between the cell terminals during charge shall be given by the equation

    (A) $V = e - rc$ (B) $V = e + rc$

    (C) $V = e \times rc$ (D) $V = e + \dfrac{r}{c}$

120. What is the purpose of vent plug in battery?

    (A)   provide grounding

    (B)   pouring electrolyte and water

    (C)   increase internal resistance

    (D)   increase specific gravity of battery

121. Carburettors should be adjusted correctly to allow engine to idle smoothly at —————— rpm.

   (A)   200 to 300 rpm   (B)   500 to 550 rpm

   (C)   1000 to 2000 rpm   (D)   1500 to 1600 rpm

122. Generally the running temperature of the engine lies between

   (A)   120 – 140° C   (B)   40 – 50° C

   (C)   200 – 300° C   (D)   75 – 90° C

123. Which is not a reason for engine starts but stops immediately?

   (A)   Faulty fuel pump   (B)   Choked fuel filter

   (C)   Frozen engine oil   (D)   Choked silencer

124. Piston resizing is done by

   (A)   Boring   (B)   Trimming

   (C)   Knurling   (D)   Grinding

125. Excessive oils in engine leads to

   (A)   Oiling up   (B)   Dark white smoke

   (C)   Blue smoke   (D)   Black smoke

126. Clutch facings are usually attached to the plate by

   (A)   Steel screws   (B)   Steel rivets

   (C)   Aluminium screws   (D)   Brass rivets

127. Frictional wear of hydraulically operated clutch is

   (A)   minimum

   (B)   maximum

   (C)   maximum at higher speeds and minimum at lower speeds

   (D)   nil

128. Transfer box is equipped with

    (A) Front wheel drive   (B) Rear wheel drive

    (C) Four wheel drive   (D) Hotch-Kiss drive

129. Mechanical efficiency is very poor in

    (A) Epicyclic gear box

    (B) Constant mesh gear box

    (C) Synchromesh gear box

    (D) Sliding mesh gear box

130. The function of a slip joint is to allow the propeller shaft to

    (A) change length

    (B) bend sideways

    (C) change inclination

    (D) transfer torque at any angle

131. Universal joints are efficient when the angle of inclination between two shafts is

    (A) less than 18°   (B) between 18° to 25°

    (C) between 25° to 40°   (D) more than 40°

132. Limited slip differential is employed on

    (A) front-wheel drive vehicles

    (B) rear-wheel drive vehicles

    (C) four-wheel drive vehicles

    (D) all wheel drive vehicles

133. The Hooke's joint consists of

    (A) one fork   (B) two forks

    (C) three forks   (D) four forks

134. Match the following :

(a)	Camber angle	1.	Inward tilt of the steering axis from vertical when viewed from front
(b)	Caster angle	2.	Tilt of the steering axis toward the front (or) rear of the vehicle
(c)	Steering axis inclination	3.	Camber angle plus steering axis inclination
(d)	Included angle	4.	Inward (or) outward tilt of wheel from vertical when viewed from front

	(a)	(b)	(c)	(d)
(A)	4	2	1	3
(B)	4	3	2	1
(C)	1	4	2	3
(D)	1	2	3	4

135. The term swept area in brakes refers to

(A) contact area between the tire and the road

(B) rotor and drum area rubbed by the brake lining

(C) piston area in master cylinder

(D) piston area in wheel cylinder

136. Which of the following is the heart of the hydraulic braking system?

(A) wheel cylinder

(B) master cylinder

(C) push rod

(D) connecting pipes

137. Which of the following is not a part of drum brakes?

(A) Caliper

(B) Brake shoes

(C) Retractor spring

(D) Expander

138. Brake squeal is due to

I. Back plate bent or shoe slightly twisted

II. Shoe scraping on back plate shoe pads

III. Loose wheel bearing

IV. Overloaded vehicle

(A) I, II and III only

(B) II, III and IV only

(C) I, II and IV only

(D) II and IV only

139. Which is / are correct with respect to bead wires of a tire?

    1. Bead wire will place the tire firmly on the wheel

    2. Bead wire help transmit starting and stopping torque from the wheel to the tire

    (A) 1 only   (B) 2 only

    (C) Both 1 and 2   (D) Neither 1 nor 2

140. Inertia type drives are commonly employed in

    (A) light transport vehicles   (B) light passenger vehicles

    (C) heavy transport vehicles   (D) electrically operated vehicles

141. In an alternator, the magnetic field is produced in the

    (A) rotor   (B) stator

    (C) carbon brushes   (D) slip ring

142. The regulated voltage output of the alternator on a 12-V system should be

    (A) exactly 12 V   (B) 10.9 V

    (C) 11.9 V   (D) approximately 14 V

143. ——————— are much smaller, lighter in weight and produce more current than ———————.

    (A) Generators, alternators   (B) Alternators, generators

    (C) Generators, induction motors   (D) Alternators, dynamometer

144. Automotive starting motors are

    (A) Shunt wound motor   (B) Series wound motor

    (C) A.C Induction motor   (D) Permanent magnet motor

145. The electrolyte for a full charged lead acid battery has a specific gravity value of

    (A) 1.000   (B) 1.265

    (C) 1.100   (D) 1.500

146. Free pedal play in car clutches is about

    (A) 6 mm   (B) 30 mm

    (C) 60 mm   (D) 100 mm

147. The spray of water from a car washer is at a pressure of about

    (A) 3 Mpa   (B) 30 Mpa

    (C) 3 Kpa   (D) 30 Kpa

148. EGR system is employed for controlling emission of

    (A) HC   (B) CO

    (C) NO   (D) HC and CO

149. Maximum allowable hydro carbons in the car emission are approximately

    (A) 10 ppm   (B) 100 ppm

    (C) 1000 ppm   (D) 5000 ppm

150. In the year ——————————, safety standards and regulations for fitment of Child Restraint System (R44) got implemented.

    (A) 2004   (B) 2005

    (C) 2006   (D) 2007

151. Under the Motor vehicle act, the first schedule contains —————————— number of Mandatory traffic signs

    (A) 32   (B) 34

    (C) 36   (D) 38

152. If the person obtaining (or) renewing the licence, already forty years age, is effective for a period of —————————— years.

    (A) 3 years   (B) 4 years

    (C) 5 years   (D) 6 years

153. Too rich mixture for a SI engine means air : fuel ratio of about

   (A)　1:17　　　　　　　　　(B)　1:15

   (C)　1:14　　　　　　　　　(D)　1:10

154. The multi-purpose vehicle formerly (1983) known as —————, introduced by Chrysler

   (A)　Animals carrier　　　　(B)　Goods carrier

   (C)　People carrier　　　　　(D)　Private carrier

155. A six cylinder flat engine does not have

   (A)　Unbalanced primary force

   (B)　Unbalanced secondary force

   (C)　Unbalanced couples

   (D)　Unbalanced torsions

156. Secondary Inertia forces in all engines caused by

   (A)　Eccentric structure of crank shaft

   (B)　Rotation of crank shaft

   (C)　Angularity of connecting rod

   (D)　Rotation of connecting rod

157. Choose the most common firing order for a six cylinder in line engines

   (A)　1–5–3–6–2–4　　　　　(B)　1–6–3–5–2–4

   (C)　1–3–6–2–4–5　　　　　(D)　1–4–3–2–6–5

158. Intake valves are made of

   (A)　Non magnetic material

   (B)　Magnetic material

   (C)　Piezo electric material

   (D)　Thermoset plastic materials

159. S.U. Carburetor is of

   (A)   Constant choke type

   (B)   Constant volume type

   (C)   Constant vaccum type

   (D)   Constant discharge type

160. CETANE number of diesel normally available in market is in the range

   (A)   45–50   (B)   60–65

   (C)   75–80   (D)   90–100

161. In multiple plunger Jerk pump system, a timed injection (petrol) system, the injection pressure is

   (A)   50 to 100 bar   (B)   100 to 200 bar

   (C)   100 to 300 bar   (D)   200 to 300 bar

162. Driving thrust and torque reaction is taken in a Hotch kiss drive by

   (A)   Road springs   (B)   Radius rods

   (C)   Swinging shackle   (D)   Propeller shaft

163. The type of injector used in CRDI systems is

   (A)   Pintle injectors

   (B)   Electro hydraulic injectors

   (C)   Electronic unit injectors

   (D)   Poppet injectors

164. The Nozzle diameter of a typical diesel engines fuel injector will range from

   (A)   5 to 7 mm   (B)   1 to 5 mm

   (C)   0.02 to 0.1 mm   (D)   0.2 to 1 mm

165. Multigrade lubricating oils of I.C. engines are specified as

(A) SAE 40   (B) SAE 10 W 40

(C) SAE W 40   (D) SAE 10 W 30

166. The lowest temperature at which the oil burns continuously is called as

(A) flash point   (B) fire point

(C) self ignition temperature   (D) cloud point

167. The maximum pressure in the lubricating system is controlled by

(A) oil pump   (B) oil filter

(C) valve relief   (D) supply voltage

168. Friction that occurs between the layers of oil film is called as

(A) boundary friction   (B) dry friction

(C) greasy friction   (D) viscous friction

169. Spectrographic testing is used to identify the

(A) Metalic and organic contaminants in the oil

(B) Emission components in the exhaust

(C) Energy content of any fuel

(D) Fatty acid content of any fuel

170. Match the following :

	Type					Coil end shape
(a)	Tapered				1.	Coil is continuous spiral
(b)	Tangential				2.	Last coil is bent to be square with the coil
(c)	Square				3.	End of wire is flattened
(d)	Pigtail				4.	Last coil is wound to a smaller diameter

	(a)	(b)	(c)	(d)
(A)	4	3	2	1
(B)	1	2	3	4
(C)	2	3	4	1
(D)	3	1	2	4

171. Delco eye is used to
    (A) shows the specific gravity
    (B) shows the voltage of the cell
    (C) connect two plates
    (D) indicate level of electrolyte

172. The range of specific gravity of lead acid battery, when fully charged
    (A) 1.25 – 1.50   (B) 1.2 – 1.23
    (C) 1.26 – 1.28   (D) 1.17 – 1.20

173. The output voltage produced by the secondary winding of ignition coils varies between
    (A) 10,000 to 20,000 volts
    (B) 25,000 to 27,000 volts
    (C) 25,000 to 30,000 volts
    (D) More than 30,000 volts

174. While setting the spark plug electrode gap ———————— gauge is used.
    (A) flat feeler   (B) round wire
    (C) round plug   (D) round feeler

175. Insulating material in spark plug is made up of
    (A) Teflon   (B) Wood
    (C) Porcelain   (D) Thermosetting plastic

176. When the cylinder bore is increased, then the ignition timing will be
    (A) less ignition advance is needed
    (B) it has no effect
    (C) more ignition advance is needed
    (D) standard timing is used

177. When the air gap length of spark plug is increased, what happens to the break down voltage?
    (A) Decreases   (B) Increases
    (C) No change   (D) Decreases and then increases

178. Clutch free pedal play helps to

    (A)   maximize the mechanical advantage

    (B)   minimize the chatter

    (C)   avoid a rapid wear of thrust bearing

    (D)   disengage easily

179. The free wheeling mechanism contains

    (A)   a planetary gear   (B)   a propeller shaft

    (C)   an over running clutch   (D)   a torque tube drive

180. Cushioning springs in clutch plate reduces

    (A)   vehicle speed   (B)   torsional vibrations

    (C)   jerky starts   (D)   friction

181. The air resistance to a car at 20 kmph is 'R'. The air resistance at 40 kmph will be

    (A) R (B) $2R$

    (C) $3R$ (D) $4R$

182. Over drive is placed

    (A)   before gear box

    (B)   in between propeller shaft and gear box

    (C)   after propeller shaft

    (D)   in between engine and gear box

183. Interlocking mechanism ensures that

    (A)   only one gear can be engaged at a time

    (B)   only two gears can be engaged at a time

    (C)   only three gears can be engaged at a time

    (D)   noiseless running of gear box

184. Which of the following statement is false about Hotch-kiss drive?

    I.   It has 2 universal joints

    II.   It has a sliding joint

    III. Leaf springs takes the driving thrust and torque reaction

    IV. Leaf spring is held between two shackles

(A) I, III only   (B) II, III only

(C) Both I and II   ~~(D)~~ IV only

185. In centre point steering, the scrub radius is

(A) positive   (B) negative

~~(C)~~ zero   (D) infinite

186. Ackermann steering mechanism consists of

(A) sliding pairs only

~~(B)~~ turning pairs only

(C) both (A) and (B)

(D) neither (A) nor (B)

187. Perfect steering is achieved during a turn when all the wheels have

(A) sliding motion

~~(B)~~ rolling motion

(C) partly sliding and partly rolling motion

(D) lateral slip

188. In variable ratio rack and pinion steering system, the ratio of steering wheel radius to pinion pitch circle radius is called as

(A) Gear ratio

~~(B)~~ Movement ratio

(C) Angle ratio

(D) Power ratio

189. The function of master cylinder is

(A) to increase pressure equally in all cylinders

(B) to increase pressure unequally in all cylinders

(C) to decrease pressure unequally in all cylinders

(D) to decrease power equally in all cylinders

190. Which of the following statement is / are correct?

I. The width of the wheel should equal to the width of the tire tread

II. The diameter of the wheel should be equal to the tire diameter.

(A) I only

(B) II only

(C) Both I and II

(D) Neither I nor II

191. The starting torque of starting motors for cars vary between

(A) 100 to 150 N.m

(B) 60 to 90 N.m

(C) 10 to 30 N.m

(D) 1 to 9 N.m.

192. A red ship in the tyre tube indicates that the tyre is made up of

(A) Butyl

(B) GR – S

(C) Natural rubber

(D) Poly urethane

193. If the tyre is designated as 185/60 R 14 82 H, then

Marking		Meaning
(a)	185	1. Load index
(b)	60	2. Section width in mm
(c)	14	3. Rim diameter in inches
(d)	82	4. Aspect ratio

	(a)	(b)	(c)	(d)
(A)	3	1	4	2
(B)	3	1	2	4
(C)	2	4	1	3
(D)	2	4	3	1

194. For identification, the colour of tail light in a car is
    (A) white   (B) red
    (C) green   (D) yellow

195. Luminous flux is defined as the amount of light passing through an area in
    (A) one millisecond   (B) one minute
    (C) one second   (D) one microsecond

196. One reason for using recirculated air in a heating system is because it
    (A) decreases warm up time   (B) increases warm up time
    (C) reduces pollution   (D) reduces traffic congestion

197. The component that controls the flow of refrigerant as demanded by the system is called the
    (A) compressor   (B) condenser
    (C) evaporator   (D) expansion valve

198. In drum type brakes the fluids on releasing, returns to the master cylinder due to the action of the piston return spring and
    (A) by-pass port   (B) wheel-cylinder spring
    (C) compensating port   (D) brake shoe retractor spring

199. Hypoid gears require special lubricant because
    (A) teeth are made of soft material
    (B) teeth are made of hard material
    (C) such gears rotate faster
    (D) sliding action is there between the teeth

200. Increase of torque in a vehicle is obtained by
    (A) decreasing speed   (B) decreasing power
    (C) decreasing petrol consumption   (D) decreasing tractive effort

GFTA/16
[Turn over