Sl. No. : **10000021**

AME/17

Register Number

2017

AUTOMOBILE AND MECHANICAL 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. The applicant will be supplied with Question Booklet 10 minutes before commencement of the examination.
2. This Question Booklet contains **200** questions. Prior to attempting to answer the candidates are requested to check whether all the questions are there 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 and get it replaced with a complete Question Booklet. If any defect is noticed in the Question Booklet after the commencement of examination it will not be replaced.**
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 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. Do not tick-mark or mark the answers in the Question Booklet.
12. 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.

SEAL

SPACE FOR ROUGH WORK

1. The vehicle moving on a level circular path will exert pressure such that

(A) The reaction on the outer wheels will be more

(B) The reaction on the inner wheels will be more

(C) The reaction on the wheels are equal

(D) The reaction depends upon the speed of wheel

2. For a spring mass system, the frequency of vibration is 'N' what will be the frequency when one more similar spring is added in series

(A) $N/2$ (B) $N/\sqrt{2}$

(C) $\sqrt{2}/N$ (D) $2N$

3. Whirling speed of a shaft coincides with the natural frequency of its

(A) Longitudinal vibration (B) Transverse vibration

(C) Torsional vibration (D) Coupled bending-torsional vibration

4. Conductivities of semi conductors range from

(A) 10^{-9} to 10^{4} $ohm^{-1}cm^{-1}$ (B) 10^{-8} to 10^{3} $ohm^{-1}cm^{-1}$

(C) 10^{-7} to 10^{4} $ohm^{-1}cm^{-1}$ (D) 10^{-9} to 10^{3} $ohm^{-1}cm^{-1}$

5. Velocity factor is used to take care of

(A) effect of high velocity (B) possibility of fatigue failure

(C) possibility of high wear (D) pitting

6. Single plate clutch is used in

(A) four wheelers

(B) two wheelers

(C) mopeds

(D) applications where initial torque is high

7. Short shoe brakes have a angle of contact less than

(A) 10° (B) 20°

(C) 60° (D) 45°

8. Slip in the case of a centrifugal pump

(A) Increases the flow rate
(B) Reduces the energy transfer
(C) Reduces the speed
(D) Increases cavitation

9. In fully developed turbulent flow, if the diameter is halved without changing the flow rate, the frictional drop will change by the factor

(A) 32 times
(B) 16 times
(C) 8 times
(D) 4 times

10. In a steady flow of incompressible fluid, as the diameter is doubled, the velocity will

(A) be halved
(B) be doubled
(C) increase four fold
(D) decrease four fold

11. Which one of the following is a valid potential function?

(A) $\phi = clu\ x$
(B) $\phi = c \cos x$
(C) $\phi = 3xy$
(D) $\phi = c\,(x^2 + y^2)$

12. If a body is in stable equilibrium the metacentric height should be

(A) zero
(B) positive
(C) negative
(D) depends on the fluid

13. A horizontal cylinder half filled with fuel is having an acceleration of 10 m/s^2. The gravitational forces are negligible. The free surface of the liquid will be

(A) horizontal
(B) slopes in the direction of acceleration
(C) vertical
(D) slopes in the direction opposite of acceleration

14. The excess pressure in a droplet of 0.002 m diameter a fluid with surface tension of 0.01 N/m is

(A) 10
(B) 20
(C) 4π
(D) 0.00004π

15. The amount of energy added by heat transfer to the cycle to produce unit of network output is called

(A) Heat rate
(B) Work ratio
(C) Back work ratio
(D) Thermal efficiency

16. The value of dryness fraction at critical point for water–steam phase transformation may be

(A) 0
(B) 1
(C) either 0 (or) 1
(D) all of these

17. For a reversible engine cycle, the clausius inequality says,

(A) $\oint \frac{dQ}{T} > 0$
(B) $\oint \frac{dQ}{T} < 0$
(C) $\oint \frac{dQ}{T} = 0$
(D) $\frac{dQ}{T} + du = 0$

18. If carnot engine rejects heat at temperature of 400 K and accepts at 750 K. What shall be heat absorbed, if heat rejected is 1000 KJ

(A) 946 KJ
(B) 800 KJ
(C) 1875 KJ
(D) 750 KJ

19. Latent heat of vaporization of water at critical point is

(A) 334 J/Kg
(B) 234 J/Kg
(C) 334 KJ/Kg
(D) Zero

20. In reference to Thermodynamic equilibrium, it is required to have,

(A) Mechanical Equilibrium
(B) Chemical Equilibrium
(C) Thermal Equilibrium
(D) Mechanical, Chemical and Thermal Equilibrium

21. Free convection flow depends on all of the following EXCEPT

(A) Density
(B) Coefficient of viscosity
(C) Gravitational force
(D) Velocity

22. For a current wire of 20 mm diameter exposed to air $(h = 20\,W/m^2K)$, maximum heat dissipation occurs when thickness of insulation $(K = 0.5\,W/mK)$ is,

(A) 20 mm
(B) 25 mm
(C) 28 mm
(D) 10 mm

23. Match List I with List II and select the correct answer using the codes given below:

	List I		List II
(a)	Momentum transfer	1.	Thermal diffusivity
(b)	Mass transfer	2.	Kinematic viscosity
(c)	Heat transfer	3.	Diffusion co-efficient

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

24. A steel ball of mass 1 kg and specific heat 0.4 KJ/kg is at a temperature of 60°C. It is dropped into 1 kg of water at 20°C. The final steady state temp of water is,

(A) 23.5°C
(B) 30°C
(C) 35°C
(D) 40°C

25. Hardening by carburizing is limited to

(A) 0.05 mm
(B) 0.1 mm
(C) 2 mm
(D) 5 mm

26. The slowest cooling rate is achieved when steel is quenched in

(A) Fused salt
(B) Air
(C) Brine
(D) Mixture of water

27. Which one of the following was not used for understanding the mechanics of the heat treatments?

(A) TTT diagrams
(B) CCT diagrams
(C) Hardenability curves
(D) Phase diagrams

28. Heat treatment process to soften hardened steel was

(A) Normalizing
(B) Annealing
(C) Tempering
(D) Spheroidizing

29. In which of the process line defects were not formed

(A) Solidification of metals
(B) Recrystallisation of metals
(C) Deformation of metals
(D) Melting of metals

30. The molten metal is poured from the pouring basin to the gate with the help of a

(A) Riser
(B) Sprue
(C) Runner
(D) Core

31. In hot working of metals, the working temperature is

(A) Below the recrystallisation temperature
(B) Above the recrystallisation temperature
(C) Equal to the melting point of the metal
(D) 150°C

32. In oxy-acetylene gas welding, for complete combustion, the volume of oxygen required per unit ton of acetylene is

(A) 1
(B) 1.5
(C) 2
(D) 2.5

33. Match the List I with List II and choose the correct answer :

	List I		List II
(a)	Seiko	1.	Orderliness
(b)	Seiketso	2.	Clean up
(c)	Seiso	3.	Personal cleanliness
(d)	Seiton	4.	Proper arrangement

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

34. A least accurate measuring device was

(A) Air gauge
(B) Micrometer screw gauge
(C) Steel rule
(D) Optical projector

35. Gratings are used in connection with

(A) Flatness measurement
(B) Roundness measurement
(C) Surface texture
(D) Linear displacement

36. Which of the following methods is not concerned with the surface finish measurement?

(A) Spectrophotometry method
(B) Ultrasonic method
(C) Field emission method
(D) Critical angle of attack method

37. A ring gauge is used to measure

(A) Outside diameter only
(B) Roundness only
(C) Both outside diameter and roundness
(D) Only external threads

38. Extended Binary – coded decimal interchange code uses

(A) 8 – bit code
(B) 16 – bit code
(C) 32 – bit code
(D) 7 – bit code

39. Localizing an object in an image and selectively analyzing the object in a series of redundant layers is known as

(A) Maxwell pyramid
(B) Faraday pyramid
(C) Gaussian pyramid
(D) Turning test

40. CAE and CAM are linked through

(A) A Common database and communication system
(B) NC tape programming and automated design
(C) Assembly automation and tool production
(D) Parts production and testing

41. Flexible manufacturing allows for

(A) Automated design
(B) Factory management
(C) Tool design and tool production
(D) Quick and inexpensive product changes

42. Calligraphic is

(A) coloured image
(B) coloured drawing
(C) line drawing
(D) dot matrix

43. In robotics, precision of movement is a complex issue and it is described as three attributes namely spatial resolution, repeatability and

(A) soundness
(B) accuracy
(C) speed
(D) sensation

44. In the production of a product, the fixed costs are Rs. 6,000 and the variable cost is Rs. 10 per product. If the sale price of the product is Rs. 12 the break even volume of the product to be made will be

(A) 2000 (B) 3000

(C) 4000 (D) 6000

45. In a transportation problem, the materials are transported from 3 plants to 5 warehouses, the basic feasible solution must contain exactly, which one of the following allocated cells?

(A) 3 (B) 5

(C) 7 (D) 8

46. Fulkerson's rule deals with

(A) Numbering of events in PERT/CPM model

(B) The simulation model

(C) Queuing theory model

(D) Transportation model

47. The time which results in the least possible direct cost of an activity is known as

(A) Normal time (B) Slow time

(C) Crash time (D) Standard time

48. Positive slack on a PERT indicates that project is

(A) ahead of schedule (B) beyond schedule

(C) on critical path (D) as per schedule

49. 'Planning involves the selection of objectives, policies, procedures and programmes from among alternatives' was stated by

(A) Koontz and O' Donnell (B) Hodge

(C) Alford and Betty (D) Hurley

50. Which one of the following element was not involved in directing?

(A) Motivation (B) Leadership

(C) Communication (D) Delegation

51. Four stroke petrol engines as compared to two stroke petrol engines having same output rating and same compression ratio have

(A) Higher thermal efficiency

(B) Higher specific fuel consumption

(C) Higher specific output

(D) Higher torque

52. In a four stroke I.C. Engine cam shaft rotates at

(A) Same speed as crank shaft

(B) Twice the speed of crank shaft

(C) Half the speed of crank shaft

(D) 1.5 times the speed of crank shaft

53. In a typical medium speed 4-stroke cycle diesel engine, the inlet valve

[TDC – Top Dead Centre, BDC – Bottom Dead Centre]

(A) Opens at 20° before TDC and closes at 35° after BDC

(B) Opens at TDC and closes at BDC

(C) Opens at 10° after TDC and closes at 20° before BDC

(D) Remain open for 200°

54. The most perfect method of scavenging is

(A) Cross scavenging

(B) Uniflow scavenging

(C) Loop scavenging

(D) Reverse flow scavenging

55. Modern CRDI engines uses injection pressure of the order of

(A) 400 bar

(B) 800 bar

(C) 1000 bar

(D) 1600 bar

56. ———— permits one shaft to drive two other shafts with equal efforts at three different shafts speeds.

(A) Universal joint
(B) Stub axles
(C) Differential
(D) Axle housing

57. The parking brakes employed in vehicles are operated

(A) Mechanically
(B) Hydraulically
(C) Pneumatically
(D) Electronically

58. The operation of removing trapped air from the hydraulic braking system is known as

(A) Trapping
(B) Tapping
(C) Bleeding
(D) Cleaning

59. Which of the following chassis layout is fitted with transfer case?

(A) Front engine – Front wheel drive
(B) Rear engine – Rear wheel drive
(C) Front engine – All wheel drive
(D) Front engine – Rear wheel drive

60. The slots or openings in a disc wheel enhances

(A) Vehicle body cooling
(B) Passenger compartment cooling
(C) Engine – Radiator cooling
(D) Brake system cooling

61. Air brakes are mostly used in case of

(A) Cars
(B) Jeeps
(C) Trucks
(D) Three-wheelers

62. In petrol engine, increase of cooling water temperature will

(A) Increase the knocking tendency

(B) Decrease the knocking tendency

(C) Not affect the knocking tendency

(D) Increase or decrease knocking tendency depending on strength and time of spark

63. Which of the following statement is not correct with respect to alcohols as alternate fuels in I.C. Engines?

(A) Alcohols are corrosive in nature

(B) Alcohol contains about half the heat energy of gasoline

(C) Auto-knock characteristics of alcohol is poor

(D) Alcohol does not vaporize as easily as gasoline

64. The thermostat in I.C. engines permitting hot water to go to radiator is set around

(A) 70 – 80° C

(B) 80 – 85° C

(C) 85 – 95° C

(D) Above 100° C

65. There are three types of Disc Brake

(A) Fixed Caliper, Tab-Action and Two-Piston

(B) Fixed Caliper, Sliding Caliper and Floating Caliper

(C) Floating Caliper, Swinging Caliper and Proportioning Caliper

(D) Fixed caliper, floating caliper and Swinging caliper

66. Free pedal play in car clutches is about

(A) 3 mm

(B) 300 mm

(C) 30 mm

(D) 60 mm

67. The co-efficient of friction for the clutch facing is approximately

(A) 0.1

(B) 0.4

(C) 0.8

(D) 1.2

68. The torque transmitting capacity of fluid coupling [T] for a given slip varies with impeller internal diameter 'D' and its speed 'N' as

(A) $I \propto D^3N^2$ (B) $I \propto D^3N^3$

(C) $I \propto D^5N^5$ (D) $I \propto D^5N^2$

69. ———— are welded to the rear wheel house panel, the floor panel and the rear of the rocker panel in a car.

(A) Rear doors (B) Rear windows

(C) Rear quarter panels (D) Trunk lid

70. Technician A says, the conventional body design will have more floor height, hence stability will be increased. Technician B says the weight of the frame is more, hence less vehicle speed. Out of these.

(A) A is correct

(B) B is correct

(C) Both A and B are correct

(D) Neither A nor B are correct

71. Acute angles between backrest and seat squab results in

(A) Compressed thorax (B) Numness in arms

(C) Thigs press on the stomach (D) Numness in feet

72. Which one of the following is incorrect with respect to painting of vehicles?

(A) Paints creates a thermal boundary layer on the surface

(B) Paints prevents rapid corrosion of parts

(C) Paint colour increases the ability to be seen

(D) Paint colour increases the aesthetic look

73. In viscous damping, the damping force is ———————— the velocity of vibrating body.

(A) Proportional to
(B) Inversely proportional to
(C) Square of
(D) Cube of

74. The ratio of damping constant to the critical damping constant is called as

(A) Logarithmic decrement
(B) Damping ratio
(C) Magnification factor
(D) Transmissibility ratio

75. Consider the following degrees of freedom

(i) Pitch

(ii) Roll

(iii) Xaw

The DOF which is not included in half car model is

(A) (i) and (ii)
(B) (i) and (iii)
(C) (ii) and (iii)
(D) (i), (ii), (iii)

76. The active spring component of actively body control system influence the motion of vehicle's body within ———————— range of its natural frequency.

(A) 1 to 2 Hz
(B) 5 to 10 Hz
(C) 20 to 30 Hz
(D) 50 to 100 Hz

77. The unit of understeer coefficient is

(A) Radian
(B) *MM/MM*
(C) *N/M*
(D) *M*

78. A front engined, front wheel drive with a large proportion of the vehicle weight on front tyres may tend to exhibit ———————— behaviour.

(A) Reverse steer
(B) Under steer
(C) Neutral steer
(D) Over steer

79. What are the gain and natural frequency of the following system transfer function?

$$G(S) = \frac{36}{S^2 + 3S + 36}$$

(A) 36, 6 (B) 6, 6

(C) 1, 6 (D) 6, 1

80. To implement the derivative term, we usually use a low-pass filter. The time constant of a low-pass filter should be

(A) much smaller than the derivative time constant

(B) much smaller than the integral time constant

(C) much smaller than the system time constant

(D) much larger than the derivative time constant

81. A PID controller has a proportional band of 50%, the proportional gain is

(A) $K_p = 50$ (B) $K_p = PB/50$

(C) $K_p = 50\ PB$ (D) $K_p = 100/PB$

82. Which of these descriptions is true of the step response of an over damped system?

(A) it rises to a steady state value with no overshoot

(B) it rises to a steady state value with little overshoot

(C) it rises to a steady state value with large overshoot

(D) it does not settle to a steady state value

83. The short hand formula for calculating the closed loop transfer function for simple system is

(A) forward / (1 + open loop) (B) forward * feed back / (1 + open loop)

(C) forward / (1 + forward) (D) loop / (1 + open loop)

84. The percentage overshoot of a second order system to a step input depends only on

(A) the value of the step input (B) the value of the damping ratio

(C) the value of the gain (D) natural frequency

85. Three way catalytic converters reduce the emission of

(A) CO, CO_2 and soot

(B) CO, No_x and HC

(C) CO_2, No_x and HC

(D) CO, HC and soot

86. No_x emission is maximum in S.I. engines when the air fall ratio is

(A) exactly stoichiometric

(B) lean mixture

(C) rich mixture

(D) nearby stoichiometric

87. Efficient operation of catalytic converters require maintenance of

(A) temperature and pressure

(B) temperature and equivalence ratio

(C) pressure and equivalence ratio

(D) temperature

88. Rhodium in the catalytic convertor promotes the reduction of

(A) HC

(B) CO

(C) No_x

(D) Smoke

89. The three way catalytic converters, having following combination of catalysis used,

(A) Platinum, Palladium and Rhodium

(B) Platinum, Palladium and Nickel

(C) Palladium, Rhodium and Nickel

(D) Platinum, Rhodium and Nickel

90. A Gasoline engine running in a closed room is dangerous because the exhaust gas contains mainly

(A) Blue smoke
(B) Water vapour
(C) Carbon monoxide
(D) Air

91. Knocking takes place in C.I. Engines

(A) at the start of combustion
(B) at the end of combustion
(C) during combustion
(D) during the delay period

92. The purpose of preventive maintenance is to

(A) help schedule breakdowns
(B) eliminate routine service work
(C) force the driver to use his own service station
(D) help prevent failure

93. Service specifications are set by the

(A) Vehicle manufacturer
(B) Technician
(C) Service manager
(D) Society of Automotive Engineers

94. Most shops discourage customers from roaming around the shop work areas because the customers

(A) often want to help
(B) may steal the data and shared it to the competitor
(C) could be in danger without reality it
(D) may find out they are paying for warranty work

95. A power window motor operates in one direction but not the other direction. Which is the most likely cause of this complaint?

(A) worn brushes

(B) defective permanent magnets

(C) loss of residual magnetism in the armature

(D) defective power window switch

96. The main purpose of the field coils in a DC motor is to

(A) create a stationary magnetic field in the stator

(B) create a magnetic field in the armature

(C) create a CEMF

(D) reverse the polarity in the armature winding just as commutation occurs.

97. The stator windings in an alternator are being tested with an ohmmeter. The resistance measured between each of the three windings is nearly 0 ohms. What does it indicate?

(A) The stator windings do not have an open circuit

(B) The stator windings are shorted to the stator frame

(C) The stator windings are open

(D) The stator windings are magnetized

98. A waveform repeats itself 60 times per second. What is the frequency of the waveform?

(A) 120 hertz

(B) 1 hertz

(C) 60 hertz

(D) 3600 hertz

99. A rectifier diode bridge in an alternator is used to

(A) Convert DC into AC

(B) Regulate voltage output

(C) Bridge the gap between the stator and the rotor

(D) Convert or rectify the negative half of a sine wave into the positive half of a sine wave

100. If the ratio of the length of connecting rod to the crank radius increases

(A) primary unbalanced forces increase

(B) primary unbalanced forces decrease

(C) secondary unbalanced forces increase

(D) secondary unbalanced forces decrease

101. The radius of gyration 'k' for a solid cylinder of radius 'R' is equal to

(A) $\sqrt{2}\,R$

(B) $R/\sqrt{2}$

(C) $0.6324\,R$

(D) $0.5\,R$

102. A ball is thrown up. The sum of kinetic and potential energies will be maximum at

(A) the ground

(B) the highest point

(C) the centre

(D) all the points

103. The potential energy an elevator losses in coming down from the top of a building to stop at the ground floor is

(A) lost to the driving motors

(B) converted into heat

(C) lost in friction of the moving surfaces

(D) used up in lifting the counter poise weight

104. The motion transmitted between the teeth of two spur gears in mesh is generally

(A) Sliding

(B) Rolling

(C) Rotary

(D) Partly sliding and partly rolling

105. If a constant force 'F' acts on a body of mass 'm' for time 't' and changes its velocity from u to v under an acceleration of 'a' all in the same direction, then for equilibrium of the body

(A) $F = \frac{mu}{t}$

(B) $F = \frac{mv}{t}$

(C) $F = m\left(\frac{v-u}{t}\right)$

(D) $F = m\left(\frac{v+u}{t}\right)$

106. Due to addition of extra full length leaves the deflection of a semi-elliptic spring

(A) increases
(B) decreases
(C) does not change
(D) is doubled

107. Strain rosettes are generally used for

(A) measurement of load
(B) measurement of shear strain
(C) measurement of longitudinal strain
(D) measurement of resilience

108. Rivets are generally specified by

(A) shape
(B) diameter of head
(C) overall length
(D) shank diameter

109. A propped cantilever is indeterminate externally to

(A) The second degree
(B) The third degree
(C) The fourth degree
(D) The fifth degree

110. Design of power transmission shafting is based on

(A) Maximum shear stress theory of failure
(B) St.Venant theory
(C) Rankine's theory
(D) Heigh's theory

111. If the radius of wire stretched by a load is doubled then its Young's modulus

(A) will be doubled
(B) will be halved
(C) becomes four times
(D) remains unaffected

112. One kgf/cm^2 when converted to SI units is

(A) 0.0981 MPa
(B) 0.98 MPa
(C) 10^4 Pa
(D) 1 Pa

113. Flow separation in flow past a solid object is caused by

(A) a reduction of pressure to vapour pressure

(B) a negative pressure gradient

(C) a positive pressure gradient

(D) the boundary layer thickness reducing to zero

114. If x is the distance measured from the leading edge of a flat plate, the laminar boundary layer thickness varies as

(A) $\frac{1}{x}$ (B) $x^{4/5}$

(C) x^2 (D) $x^{1/2}$

115. A pump handling a liquid raises its pressure from 1 bar to 30 bar. Take the density of the liquid as 990 Kg/m^3. The isentropic specific work done by the pump in KJ/Kg is

(A) 0.10 (B) 0.30

(C) 2.50 (D) 2.93

116. Which of the following is not a property of the system?

(A) Temperature (B) Pressure

(C) Volume (D) Heat

117. 'COP' of a reversible heat pump is 1.2. If it is reversed to run as reversible heat engine then its efficiency shall be

(A) 0.833 (B) 0.2

(C) 1.2 (D) 0.5

118. The change of entropy, when heat is absorbed by the gas is

(A) positive (B) negative

(C) positive or negative (D) zero

119. For each mole of oxygen, number of moles of nitrogen required for complete combustion of carbon are

(A) 20/21 (B) 2/21

(C) 77/21 (D) 79/21

120. Two sphere A and B of same material have radii 1 m and 4 m and temperature 4000 K and 2000 K respectively. Which one of the following statement is correct related to heat transfer by radiation?

(A) Greater than that of sphere 'B'
(B) Less than that of sphere 'B'
(C) Equal to that of sphere 'B'
(D) Equal to double that of sphere 'B'

121. Formation of frost on evaporator in a refrigerator,

(A) increases heat transfer rate
(B) results in loss of heat due to poor heat transfer
(C) is immaterial
(D) decreases compressor power

122. In SI unit, one ton of refrigeration is equal to

(A) 210 KJ/min
(B) 210 KJ/sec
(C) 3.5 KW/min
(D) 3.5 KW/hour

123. Which is more viscous lub oil given below?

(A) SAE 30
(B) SAE 40
(C) SAE 70
(D) SAE 80

124. The air standard efficiency of an otto cycle compared to Diesel cycle for given compression ratio is

(A) same
(B) less
(C) more
(D) unpredictable

125. For evaporators and condensers, for the given conditions, the Logarithmic Mean Temperature Difference (LMTD) for parallel flow is

(A) Equal to that for counter flow
(B) Greater than that for counter flow
(C) Less than that for counter flow
(D) Very much smaller than that for counter flow

126. Which one of the following materials, deformation of crystals was not by twinning?

(A) Zinc (B) Tin

(C) Iron (D) Aluminium

127. Balls for ball bearings are made of

(A) High carbon (B) Mild steel

(C) Stainless steel (D) Carbon-chrome steel

128. Which of the following is a copper free alloy?

(A) Brass (B) Phosphor bronze

(C) Invar (D) Muntz metal

129. Iron-carbon alloy containing 1.7 to 4.3% carbon is called

(A) Eutectoid cast Iron (B) Hyper eutectic cast Iron

(C) Hypo-eutectic cast Iron (D) Eutectoid steel

130. Match the List I alloys with List II applications and select the correct answer using the codes given below

	List I		List II
(a)	Chromel	1.	Journal bearing
(b)	Babbit alloy	2.	Milling cutter
(c)	Nimonic alloy	3.	Thermo couple wire
(d)	High speed steels	4.	Gas turbine blade

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

131. Hard-zone cracking in low alloy steel due to welding is the result of an absorption of

(A) N_2 (B) O_2

(C) H_2 (D) C

132. Cutting power consumption in turning can be significantly reduced by

(A) increasing rake angle of the tool

(B) increasing the cutting angle of the tool

(C) widening the nose radius of the tool

(D) increasing the clearance angle

133. A grinding wheel of 150 mm diameter is rotating at 3000 rpm. The grinding speed is

(A) 7.5π m/s (B) 15π m/s

(C) 45π m/s (D) 450π m/s

134. In ultrasonic machining process, the material removal rate will be higher for materials with

(A) higher toughness (B) higher ductility

(C) lower toughness (D) higher fracture strain

135. In Electro-Discharge machining, the work piece is connected to

(A) Cathode (B) Anode

(C) Earth (D) Electrolyte

136. Feed drives in CNC milling machines are provided by

(A) synchronous motors (B) induction motors

(C) stepper motors (D) servo-motors

137. The rake angle in a drill

(A) increases from centre to periphery

(B) decreases from centre to periphery

(C) remains constant

(D) is irrelevant to the drilling operation

138. For general use the measuring tip of a comparator should be

(A) Flat (B) Spherical

(C) Conical (D) Grooved

139. The gauges which are only used for checking the size and condition of other gauges are called

(A) Plug gauge (B) Master gauge

(C) Limit gauge (D) Inspection gauge

140. Statistical quality control was developed by

(A) Frederick Taylor (B) Walter Shewhart

(C) George Dantzing (D) W.E. Deming

141. Match the List I with List II and select the correct answer given below :

	List I		List II
(a)	Talysurf	1.	T slots
(b)	Telescopic gauge	2.	Flatness
(c)	Transfer calipers	3.	Internal dia
(d)	Autocollimeter	4.	Roughness

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

142. Which of the following errors are not controllable?

(A) Caliberation errors (B) Environmental errors

(C) Avoidable errors (D) Random errors

143. A technique for displaying applications where complex 3-D geometric are required for the exterior shell of a product is called

(A) 2-D modelling
(B) Solid modelling
(C) 3-D modelling
(D) Surface modelling

144. The resolution of electrostatic plotter is expressed in terms of

(A) number of lines per unit area
(B) number of dots per inch
(C) ratio of darkened area to gross area
(D) number of lines per inch

145. The difference between CAD and CAM is that CAD software is directed at product design while CAM software is

(A) concerned with production and control of tool design
(B) concerned with management programs
(C) specifically for PC board design
(D) designed for communications

146. A Robot is basically a

(A) machining device
(B) inspection device
(C) material handler
(D) machine tool

147. Basic tool required for work study is

(A) Graph sheet
(B) Process chart
(C) Planning chart
(D) Stop watch

148. The individual human variability in time studies to determine the production standards is taken care of by

(A) personal allowances
(B) work allowances
(C) error allowances
(D) machine allowances

149. Buffer stock + Reserve stock + Safety stock equals

(A) Order quantity
(B) EOQ
(C) Reorder point
(D) Maximum inventory level

150. Petrol engines are not suitable for part-load operation, because

(A) mechanical efficiency is poor due to increasing internal losses at increased throttling

(B) of fear of pre-ignition

(C) of huge knocking

(D) of increased detonation tendency

151. A distributor in spark ignition engines performs the function of

(A) distributing the right quantity of fuel oil to the desired cylinder

(B) distributing the air requirement appropriately

(C) adding additives to fuel oil

(D) providing the correct firing order in the engine

152. If the compression ratio of an engine working on Otto cycle is increased from 5 to 7, the % of increase in efficiency will be

(A) 2%

(B) 8%

(C) 4%

(D) 14%

153. In air standard diesel cycle at fixed 'r' and fixed 'γ'

[r – compression ratio, γ – specific heat ratio]

(A) ($\eta_{thermal}$) increases with increase in heat addition and cut-off ratio

(B) ($\eta_{thermal}$) decreases with increase in heat addition and cut-off ratio

(C) ($\eta_{thermal}$) increases with increase in heat addition and decrease in cut off ratio

(D) ($\eta_{thermal}$) remain the same with increase in heat addition and cut-off ratio

154. The specific fuel consumption for a petrol engine first decreases with increase in fuel air ratio and then increases with further increases in fuel air ratio. The minimum value occurs in the range of,

(A) chemical correct mixture

(B) lean mixture

(C) rich mixture

(D) unpredictable

155. The main function of the tread pattern of the tyre is that

(A) Tread groove pass air between the tyre and the road surface, there by preventing tyre from over-heating

(B) The crests between the tread grooves absorb noise

(C) The tread groove expels water that is drawn between the tyre and road surface

(D) The tread pattern protects the tyre's inner carcass from small stones and pieces of glass

156. The tyre is designated as "175/65 R14 82S", then the load index for the tyre is

(A) 175 (B) 65

(C) 14 (D) 82

157. The object of air conditioning a car is to control these in the

(A) Temperature and Pressure (B) Pressure and Humidity

(C) Humidity and Temperature (D) Humidity and Pressure

158. The angle of inclination of the front wheel tyre with respect to the vertical plane is

(A) Caster (B) Camber

(C) Wheel track (D) Toe-out

159. ———— permits the motion to be transmitted from the gear box output shaft to the pinion shaft of the differential, irrespective of the inclination of the drive shaft.

(A) Riveted joints

(B) Welded joints

(C) Slip joints

(D) Universal joints

160. The energy stored per unit volume in coil spring as compared to leaf spring is

(A) Equal amount
(B) Double the amount
(C) Four times higher
(D) Six times higher

161. In hydraulic Brakes "Bleeding" refers to

(A) The process of removing air out from the braking system
(B) The process of filling the brake fluid in the brake cylinders
(C) The leakage of brake fluid in the brake system
(D) The process of emptying the brake fluid from the brake system

162. The ratio of total load on the spring to the maximum deflection is called as

(A) Spring Tension
(B) Spring life
(C) Spring efficiency
(D) Spring rate

163. To prevent the automatic-level control system from reacting too quickly, the system includes

(A) a height control valve
(B) an air compressor
(C) an air dryer
(D) a time-delay mechanism

164. In an electric air suspension system, the following components are used

(A) Electric air compressor, a micro computer control module, four air springs, there height semons and the air distribution section
(B) Four air spring only
(C) Four coil spring only
(D) Electric air compressor only

165. The component of the torque convertor that allows multiplication of torque is the

(A) Turbine
(B) Impeller
(C) Pump
(D) Stator

166. Cushioning springs in clutch plate are meant to reduce

(A) Torsional vibrations
(B) Vehicle speed
(C) Jerky starts
(D) None of the above

167. The sliding dog clutch in the constant mesh gear box is to transmit the power from the

(A) Primary shaft to lay shaft
(B) Lay shaft to output shaft
(C) Primary shaft to output shaft
(D) None of the above

168. In a fully automated centrifugal clutch the reaction plate is installed in between

(A) The pressure plate and cover pressing
(B) The pressure plate and fly wheel
(C) The pressure plate and the driven plate
(D) Cover processing and bob weight

169. In a simple epicyclic gear train for transmission of torque. The following component must be held stationary

(A) Sun gear
(B) Annular gear
(C) The carrier unit
(D) Any one of the above

170. Automatic transmission as compared to manual transmission are usually

(A) More fuel efficient
(B) Less fuel efficient
(C) Equally efficient
(D) None of the above

171. The interior of a vehicle is given an aesthetic look by adding

(A) Panels
(B) Mechanisms
(C) Trims
(D) Firewall

172. Which of the following device is used to measure the airflow velocity in wind tunnel testing?

(A) Anemometer
(B) Altimeter
(C) Barometer
(D) Steam generator

173. The most commonly used supplementary restraint system is

(A) Seat belt
(B) Disc brakes
(C) Air bags
(D) Telescopic steering column

174. Bumper and other collision absorbing materials is made up of

(A) Light alloys of Brass
(B) Light alloys of Copper
(C) Light alloys of Aluminium
(D) Wood blocks

175. Choose one feature that improves the forward visibility of a vehicle.

(A) Brake light
(B) Hazard lights
(C) Turn indicators
(D) Cornering head light

176. Which type of bus is more suited for the following features?

Engine in front of passenger compartment

Low ratio of useful length to overall length

Poor aerodynamic shape and high tare weight

(A) Classic type bus
(B) Doubleducker bus
(C) Split level bus
(D) Articulated bus

177. In constant speed test, the vehicle is driven with

(A) Constant speed at various steer angle

(B) Constant speed at constant steer angle

(C) Constant speed at various turing radii

(D) Constant speed at constant steer angle with constant radius

178. The coefficient of rolling resistance is defined as the ratio between

(A) Rolling resistance to lateral load

(B) Lateral load to rolling resistance

(C) Rolling resistance to normal load

(D) Normal load to rolling resistance

179. Engine overheating may be due to

(A) struck radiator pressure cap

(B) open thermostat

(C) excess coolant

(D) broken fan belt

180. Yaw velocity can be measured using

(A) Proximity sensor

(B) Speed sensor

(C) Gyro sensor

(D) Torque sensor

181. A regulator problem is where the closed loop system must

(A) try to follow a series of set point changes

(B) remove any disturbances acting on the system

(C) respond very quickly

(D) respond very slowly

182. Engine knock can be measured by using

(A) Combustion pressure sensor

(B) Mechanical vibration sensor

(C) Ion current measurement

(D) All the above

183. The knocking sensitivity of engines could be reduced by

(A) Compact combustion chamber geometry

(B) Central position of the spark plug

(C) Increased turbulence

(D) All the above

184. Reducing the combustion-chamber surface area

(A) reduces the amount of unburned HC in the exhaust gas

(B) increases the amount of unburned HC in the exhaust gas

(C) reduces the amount of No_x in the exhaust gas

(D) increases the amount of unburned HC and No_x in the exhaust gas

185. Reducing the compression ratio of an engine reduces the combustion temperature, and this

(A) reduces the amount of No_x formed

(B) increases the amount of No_x formed

(C) reduces the amount of HC formed

(D) increases the amount of H_2O formed

186. The function of the air aspirator system is

(A) Furnishes the addition air for reduce HC and No_x emission

(B) Furnishes the addition air for reduce HC and CO emission

(C) Furnishes the addition air for reduce HC and CO but increase of No_x

(D) Furnishes the addition air for increase of HC and reduce CO and No_x

187. Lead compounds were added in gasoline to

(A) reduce HC emissions

(B) reduce knocking

(C) reduce exhaust temperature

(D) increase power output

188. Hydro carbon emission in CI Engine is mainly due to

(A) over mixing of fuel and air

(B) under mixing of fuel and air

(C) constant mixing of fuel and air

(D) both (A) and (B)

189. The automatic on-off and time delay head lamp control

(A) turns the head lamps off as the driver gets out the car

(B) times the flashing of the lights when the hazard system is energized

(C) turns the head lamps off after a present time delay following the turning off of the engine

(D) turns the head lamps off 13 minutes after the driver leaves the car

190. Blade in the hack saw cuts during the

(A) Forward stroke

(B) Backstroke

(C) Both stroke

(D) Pressure applied

191. No_x emission in SI engines will be lowest during

(A) Acceleration
(B) Deceleration
(C) Cruising
(D) Idling

192. Two controlling devices in the automatic transmission operated by hydraulic pressure are the bonds and

(A) pistons
(B) gears
(C) planetary gear sets
(D) clutches

193. The alternator produces electricity in its

(A) rotor field coil
(B) stator windings
(C) regulator
(D) armature commutator

194. The electronic spark control used on some turbo charged engines

(A) refer as the spark if detonation begins
(B) takes the place of mechanical advance mechanisms
(C) advances the spark to suit operating conditions
(D) reduce spark voltage if detonation begins

195. In the starting motor, magnetism

(A) rotate the armature and demeshes the pinion
(B) rotate the armature and meshes the pinion
(C) prevents high armature speed as the engine starts
(D) sends cracking force in one direction only

196. In a test to determine braking efficiency of a vehicle weighing 1200 kg is placed on a brake testing machine. The brake tester shows the following reading. Front right : 2120 N; Front left 2080 N; Rear Right.: 1490 N; Rear left : 1510 N; Then the braking efficiency is

(A) 50% (B) 60%

(C) 70% (D) 80%

197. The important requirement of a catalytic convertor is

(A) High surface area and low volume heat capacity

(B) Low surface area and low volume heat capacity

(C) High surface area and high volume heat capacity

(D) Low surface area and high volume heat capacity

198. A combination of roll and pitch is called as

(A) Levelling pitch (B) Diagonal pitch

(C) Grundig pitch (D) Cushioning pitch

199. In the Passenger cars, the following type of carburetor is preferred

(A) Horizontal type

(B) Upward draught type

(C) Downward draught type

(D) Inclined draught type

200. Most commonly used lubrication system in heavy vehicles is the

(A) Splash Lubrication system

(B) Pressure Lubrication system

(C) Gravity Lubrication system

(D) Petrol Lubrication system

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