Question Booklet No. :

CEAM/2024

Register Number | | | | | | | | | | |

2024

Paper – I

AUTOMOBILE ENGINEERING

(Degree Standard)

Duration : Three Hours] **[Total Marks : 300**

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

IMPORTANT INSTRUCTIONS

1. You will be supplied with this question booklet 15 minutes prior to the commencement of the examination.
2. This question booklet contains 200 questions. Before answering the questions, you shall check whether all the questions are printed serially and ensure that there are no blank pages in the question booklet. **If any defect is noticed in the question booklet, it shall be reported to the invigilator within the first 10 minutes and get it replaced with a complete question booklet. If the defect is reported after the commencement of the examination, it will not be replaced.**
3. Answer **all** the questions. All the 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 room invigilator to shade the answers. Instructions regarding filling of answers etc., which are to be followed mandatorily, are provided in the answer sheet and in the memorandum of admission (Hall Ticket).
6. You shall write and shade your question booklet number in the space provided on page one of the answer sheet with **BLACK INK BALL POINT PEN.** If you do not shade correctly or fail to shade the question booklet number, your answer sheet will be invalidated.
7. Each question comprises of five responses (answers) : i.e. (A), (B), (C), (D) and (E). You have to select ONLY ONE correct answer from (A) or (B) or (C) or (D) and shade the same in your answer sheet. If you feel that there are more than one correct answer, shade the one which you consider the best. **If you do not know the answer, you have to mandatorily shade (E).** In any case, choose ONLY ONE answer for each question. If you shade more than one answer for a question, it will be treated as a wrong answer even if one of the given answers happens to be correct.
8. 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 room during the time of the examination. After the examination, 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.
9. **You should not make any marking in the question booklet except in the sheets before the last page of the question booklet, which can be used for rough work. This should be strictly adhered to.**
10. Failure to comply with any of the above instructions will render you liable for such action as the Commission may decide at their discretion.

SEAL

SPACE FOR ROUGH WORK

1. Heel and Toe wear in tyres is caused by

(A) Over inflation

(B) Under inflation

(C) Excessive camber

(D) Excessive acceleration and braking

(E) Answer not known

2. Never attempt to service punctures in tire's

(A) Shoulders/Sidewalls

(B) Tread

(C) Rayon plies

(D) Tread base

(E) Answer not known

3. ———— transmits power from gear box to rear axle.

(A) Propeller shaft

(B) Fly wheel

(C) Rear Axle casing

(D) Clutch

(E) Answer not known

4. Central portion of propeller shaft is made from

(A) Steel shaft

(B) Gun metal shaft

(C) Steel tube

(D) Cast iron rod

(E) Answer not known

5. In the overdrive, there is an arrangement where by it is possible to lock

(A) Ring gear
(B) Sun gear
(C) Planet pinion cage
(D) Helical gear
(E) Answer not known

6. The ball joints are used on the tie-rod ends, because they

(A) reduce the amount of noise generated
(B) reduce the amount of sliding resistance
(C) can deal with movement of the suspension in all directions
(D) improve the force transmission speed
(E) Answer not known

7. ———— steering system adjusts the steering ratio of a vehicle to adapt to the changes in vehicle speed.

(A) Ackermann
(B) Davis
(C) Manual
(D) Adaptive
(E) Answer not known

8. The power steering pump is

(A) Belt driven by camshaft
(B) Belt driven by crankshaft
(C) Chain driven by camshaft
(D) Chain driven by crankshaft
(E) Answer not known

9. The Longitudinal members of truck are made of

(A) Channel section
(B) Box section
(C) Tubular section
(D) I-section
(E) Answer not known

10. Wheel base of the vehicle is the

(A) Distance between the centres of the front and rear wheels
(B) Distance between the centres of the front tyres
(C) Distance between the centres of the rear tyres
(D) Extreme length of the vehicle
(E) Answer not known

11. The frame may be get distorted to a parallelogram shape due to

(A) weight of vehicle
(B) cornering force
(C) weight of passengers
(D) wheel impact with road obstacle
(E) Answer not known

12. The central gear of an epicyclic gear box is known as

(A) Ring gear
(B) Planet gear
(C) Centric gear
(D) Sun gear
(E) Answer not known

13. Determine the overall gear ratio of a transmission system, take primary reduction is 2. Gear box reduction is 4 and final reduction is 4

(A) 16
(B) 8
(C) 24
(D) 32
(E) Answer not known

14. Automobile gears are generally made of

(A) Brass
(B) Aluminium Alloy steel
(C) Alloy steel
(D) Mild steel
(E) Answer not known

15. Match the typical gear box ratio with its gear stage :

(a)	1st Gear	1.	1 : 1
(b)	2nd Gear	2.	3.5 : 1
(c)	3rd Gear	3.	2 : 1
(d)	4th Gear	4.	1.4 : 1

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

(E) Answer not known

16. Where is overdrive fitted in transmission system?

(A) between transmission and propeller shaft

(B) between clutch and transmission

(C) between crankshaft and clutch

(D) between propeller shaft and differential

(E) Answer not known

17. The coefficient of friction for the clutch facing is approximately

(A) 0.1

(B) 0.4

(C) 0.8

(D) 1.2

(E) Answer not known

18. When the splines in the clutch plate hub (or) the clutch shaft wear's, it will result in

(A) clutch rattle

(B) clutch drag

(C) clutch slip

(D) knock

(E) Answer not known

19. A cone clutch is also called as

(A) diaphragm clutch

(B) centrifugal clutch

(C) multi disc clutch

(D) wedge clutch

(E) Answer not known

20. Determine the torque transmission capacity of a clutch for the following clutch parameters.

Axle pressure = 10×10^5 N/m^2,

Clutch contact area = 0.0001 m^2,

Coefficient of friction between driving and driven plates is 0.2. One side effective. Effective radius is 0.5 m

(A) 10 N-m

(B) 1 N-m

(C) 5 N-m

(D) 100 N-m

(E) Answer not known

21. Clutch slip could be caused by

(A) Excessive clearance out pedal

(B) Seizure of the spigot bearing

(C) Lock of clearance in pedal linkage

(D) Excessive friction between lining and fly wheel

(E) Answer not known

22. In an electromagnetic clutch, when the current passes through the winding, the electromagnetic field attracts the

(A) Pressure plate

(B) Clutch plate

(C) Fly wheel

(D) Gear

(E) Answer not known

23. Which of the following statements are correct about aerodynamic stability of a vehicle?

1. Roll stability can be achieved by ensuring that centre of pressure is clost to the roll axis of the vehicle.

2. Stability in the pitch plane governs the amount of steering correction required in cross winds

(A) 1 and 2 correct

(B) 1 and 2 incorrect

(C) 1 only correct

(D) 2 only correct

(E) Answer not known

24. Wind tunnel testing are performed to determine

(A) Tractive force and lift force

(B) Drag force and lift force

(C) Pressure distribution and drag force

(D) Pressure distribution and lift force

(E) Answer not known

25. In case of tanker body construction ———— cross section is readily adaptable to frameless construction.

(A) Rectangular

(B) Box

(C) Channel

(D) Circular

(E) Answer not known

26. Power tools are powered by

(A) electricity, compressed air, hydraulic pressure

(B) mechanical power, muscular power, animal power

(C) gears, ratchets, valves

(D) speed handles, breaker bars, worms

(E) Answer not known

27. Which one of the following is NOT an ideal property of a vehicle paint?

(A) reduced front visibility

(B) improved aesthetic apperance

(C) easy, identification

(D) reduced aerodynamic drag

(E) Answer not known

28. In military vehicles importance is given to

(A) upward visibility

(B) downward visibility

(C) forward visibility

(D) rearward visibility

(E) Answer not known

29. ———— involves using fine grit compound to bring the paint surface upto full shine.

(A) Glazing

(B) Sanding

(C) Priming

(D) Pre-heating

(E) Answer not known

30. Assertion [A] : Town buses have fairly small entry platforms.

Reason [R] : Town buses have short interval between stops.

(A) Both [A] and [R] are True

(B) Both [A] and [R] are False

(C) [A] is True but [R] is False

(D) [R] is True but [A] is False

(E) Answer not known

31. Consider the following statements True/False :

Statement [A] : The Roof is usually connected to the body side frames.

Statement [B] : Panel windshield scuttle assembly seals the engine from the passenger compartment.

(A) [A] – True, [B] – False

(B) [A] – False, [B] – True

(C) [A] and [B] are True

(D) [A] and [B] are False

(E) Answer not known

32. Select the fabrication – welding process for fastening the roof and body side

(A) arc welding

(B) laser braze welding

(C) spot welding

(D) seam welding

(E) Answer not known

33. Match the loads and vehicle conditions :

(a)	Static loads	1.	While applying brakes
(b)	Inertia loads	2.	Loads due to chassis parts
(c)	Momentary loads	3.	While crossing a broken patch
(d)	Short duration loads	4.	While taking a curve

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

(E) Answer not known

34. The vehicle spins out of control, if the turning radius approaches

(A) wheel base
(B) wheel track
(C) zero
(D) infinity
(E) Answer not known

35. In active suspension system, force actuator replaces

(A) Suspension spring
(B) Damper
(C) Shock absorber and spring
(D) Un spring mass
(E) Answer not known

36. With reference to dynamics of automotives squat is the

(A) Forward rolling
(B) Forward pitching
(C) Rearward rolling
(D) Forward yaw
(E) Answer not known

37. Low tire pressure results in

(1) Strong tire wear
(2) Weak lateral guidance of the vehicle
(3) Zero slip

(A) (1) only
(B) (2) only
(C) (1) and (2) only
(D) (1), (2) and (3)
(E) Answer not known

38. In a car, the oscillation centre lies outside the wheelbase then it is called the ———— centre. On the contrary, when the oscillation centre lies inside of the wheel base that it is called as ———— centre.

(A) Roll, bounce
(B) Pitch, bounce
(C) Bounce, pitch
(D) Yaw, roll
(E) Answer not known

39. If $\frac{w}{wa} = \sqrt{2}$, (where $w =$ frequency of excitation and w_n) is natural frequency of vibration, then transmissibility of vibration will be

(A) 0.5
(B) 1.0
(C) 1.5
(D) 2
(E) Answer not known

40. The system governed by the equation $M\ddot{x} + C\dot{x} + Kx = 0$, is dynamically stable, if

(A) K is positive, C is negative

(B) K is negative, C is positive

(C) K is positive, C is positive, M is positive

(D) K is positive, C is positive, M is negative

(E) Answer not known

41. Gas which is used for analysing in non dispersive infrared analyser for reference cell is

(A) Helium

(B) Argon

(C) Oxygen

(D) Nitrogen

(E) Answer not known

42. Flame ionization detector is used for measuring

(A) CO

(B) HC

(C) NOx

(D) CO_2

(E) Answer not known

43. Blowby in engine can be reduced by

(A) Adding compression rings

(B) Increasing the axial width of the ring face

(C) Removing compression ring

(D) Removing oil ring

(E) Answer not known

44. Thermal reactor in IC engine is used to control

(A) CO and NOx
(B) HC and NOx
(C) HC and CO
(D) CO_2 and NOx
(E) Answer not known

45. Positive crankcase ventilation system is used ———— in a vehicle.

(A) To reduce noise
(B) To reduce vibration
(C) To reduce emission
(D) To reduce exhaust gas temperature
(E) Answer not known

46. EGR is used to control NOx emission, by means of

(A) Increasing nitrogen available for combustion
(B) Reducing nitrogen available for combustion
(C) Increasing oxygen available for combustion
(D) Reducing oxygen available for combustion
(E) Answer not known

47. EGR is the most effective way of reducing

(A) NOx
(B) CO
(C) HC
(D) CO and HC
(E) Answer not known

48. Smoke measurements can be broadly classified into two groups

(A) Continuous filtering and spot filtering

(B) Light extinction and hartridge

(C) Obscuration and hartridge

(D) Comparison and obscuration

(E) Answer not known

49. The spark ignition engine exhaust gases contains

(A) NO and NOx only

(B) NO and CO only

(C) NO, CO, NOx and HC

(D) CO, NOx, and HC only

(E) Answer not known

50. LNT is mainly used, to reduce ———— emission.

(A) Soot

(B) NOx

(C) CO_2

(D) Sulphur

(E) Answer not known

51. Bharat VI emission norms have been enforced across nation wide from the year

(A) 2020

(B) 2015

(C) 2014

(D) 2019

(E) Answer not known

52. The compression ratio of a compression ignition engine is 14:1, its clearance volume is 15 cm^2, and its piston displacement is

(A) 180 cm^2

(B) 195 cm^2

(C) 14 cm^2

(D) 15 cm^2

(E) Answer not known

53. Assertion [A] : In CI Engines, only air is compressed during compression stroke and the ignition can only take place after fuel is injected.

Reason [R] : The fuel injection in CI engine should happen just before the top dead centre.

(A) [A] is true but [R] is false

(B) Both [A] and [R] are true, [R] is the correct explanation of [A]

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(E) Answer not known

54. Typical 'Burn Angle' is about ———— for most engines.

(A) 10°

(B) 25°

(C) 45°

(D) 60°

(E) Answer not known

55. Coolant pumps in engine cooling systems are of

(A) Vane pump
(B) Reciprocating pump
(C) Centrifugal pump
(D) Electrical pump
(E) Answer not known

56. Thermostat valve is usually placed in:

(A) On the top of the radiator
(B) On the top of the engine block
(C) At the suction side of the pump
(D) All the delivery side of the pump
(E) Answer not known

57. Match the radiator parts with the suitable material :

(a)	Radiator fan	1.	Wax and powdered metal
(b)	Radiator fins	2.	Rubber
(c)	Thermostat	3.	Copper alloys
(d)	Radiator water hose	4.	Steels

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

(E) Answer not known

58. If compression ratio of a petrol engine is 9, the air standard efficiency is (Assume γ as 1.5)

(A) 33.33%
(B) 40% to 50%
(C) 66.66%
(D) 25% to 30%
(E) Answer not known

59. Ideal efficiency of an engine is known as

(A) Indicated thermal efficiency
(B) Brake thermal efficiency
(C) Air standard efficiency
(D) Mechanical efficiency
(E) Answer not known

60. Piston pins are usually either a press fit in the rod or

(A) Locked to the rod with a bolt
(B) Free-floating in the rod and piston
(C) Locked to the piston with a bolt
(D) A press fit in the piston
(E) Answer not known

61. The cross-sectional area of one cylinder of an engine multiplied by its stroke is called

(A) Clearance volume
(B) Combustion volume
(C) Swept volume
(D) Engine capacity
(E) Answer not known

62. Select the braking system for heavy duty commercial vehicle

(A) Mechanical braking system

(B) Hydraulic braking system

(C) Pneumatic braking system

(D) Electromagnetic braking system

(E) Answer not known

63. If the wheel get locked even before the vehicle stops due to the application of brake, then the vehicle will

(A) Bounce

(B) Roll

(C) Skid

(D) Yaw

(E) Answer not known

64. When the velocity of the vehicle is doubled, the stopping distance

(A) Doubles

(B) Halves

(C) Quadruples

(D) Remains same

(E) Answer not known

65. Braking is generated due to the frictional force generated between the

(A) Brake drum and brake shoe

(B) Brake shoe and piston

(C) Brake shoe and wheel rim

(D) Brake drum and wheel rim

(E) Answer not known

66. The statement that is not an advantage of a rubber spring used in automobile

(i) Rubber springs has excellent Vibration Damping

(ii) Can store more energy

(iii) Rubber suspension is not reliable

(iv) Longer suspension life

(A) (i) (B) (ii)

(C) (iii) (D) (iv)

(E) Answer not known

67. Panhard rod is used to absorb the

(A) Side Thrust

(B) Vertical Loading

(C) Driving Thrust

(D) Braking Torque

(E) Answer not known

68. Coil spring rate is affected by

(i) Diameter of the wire

(ii) Diameter of the coil

(iii) No. of turn in the coil

(A) (i), (ii) only

(B) (ii), (iii) only

(C) (i), (iii) only

(D) (i), (ii), (iii)

(E) Answer not known

69. In a typical commercial vehicle, the S-cam foundation brake slack adjuster is fully applied position, ideally the slack adjuster – to – pushrod angle should be

(A) Less than 90° degrees
(B) Exactly 90° degrees
(C) More than 90° degrees
(D) Does not matter
(E) Answer not known

70. In order to accommodate the difference in centre distance between the eyes of a leaf spring

(A) Strap is provided in the spring
(B) U Bolt is clamped to hold the spring
(C) Shackle is provided at one end of eye
(D) Rubber bushing at one end of eye
(E) Answer not known

71. _____ technology introduced for the purpose of saving the stand by loss in vehicle.

(A) Mild hybrid
(B) Micro hybrid
(C) Plug in hybrid
(D) Fully hybrid
(E) Answer not known

72. _____ sensor is used to check the obstacle in front of autonomous vehicle.

(A) Temperature
(B) LIDAR
(C) GPS
(D) TPS
(E) Answer not known

73. The starting torques of starting motors for cars vary between

(A) 10 to 30 Nm
(B) 30 to 60 Nm
(C) 60 to 100 Nm
(D) 100 to 200 Nm
(E) Answer not known

74. The magnetic field of the alternator is created by

(A) Stator
(B) Rotor
(C) Motor
(D) Diode
(E) Answer not known

75. Major systems in the automotive electrical systems include the

(A) Horn, lighting and ignition systems
(B) Starting, charging and ignition systems
(C) Accessory, charging and warning systems
(D) Starting, emissions and ignition systems
(E) Answer not known

76. In two wheelers the following ignition system is used

(A) Battery coil ignition system
(B) Magneto ignition system
(C) Capacitor discharge ignition
(D) Electronic ignition system
(E) Answer not known

77. The ideal ignition timing is dependent on

(A) Engine speed

(B) Engine load

(C) Engine speed and load

(D) Fuel consumption

(E) Answer not known

78. A battery is advice that is used for storing _____ energy and conversing it in to electricity.

(A) Chemical

(B) Kinetic

(C) Potential

(D) Mechanical

(E) Answer not known

79. The liquid in the battery, that surrounds the positive and negative electrode

(A) Electro liquid

(B) Electrolyte

(C) Electro acid

(D) Sodium sulphate

(E) Answer not known

80. The major drawback of Ni-Zn battery is/are

(1) Low charging

(2) Short cycle life

(3) Low energy discharge

(4) High cost

(A) (1) only

(B) (2) only

(C) (2), (3) and (4)

(D) (1), (2) and (3)

(E) Answer not known

81. Which of the following statements is not applicable for automatic control theory,

(A) Time variant systems

(B) Linear time invariant systems

(C) Non linear systems

(D) Casual systems

(E) Answer not known

82. The function of vacuum servo on the speed control system is

(A) Opens and closes the throttle

(B) Opens the throttle

(C) Closes the throttle

(D) Partially open the throttle and completely closed the throttle

(E) Answer not known

83. The important variables of special interest in driveline control are

(A) Rotational velocities
(B) Torques
(C) Both (A) and (B)
(D) Neither (A) Nor (B)
(E) Answer not known

84. In diesel engines, speed control is often referred to as

(A) RQV control
(B) RVQ control
(C) QVR control
(D) QRV control
(E) Answer not known

85. A PID controller introduced in the system has a

(A) Pole at the orgin in the open loop transfer function
(B) Pole at the orgin in the closed-loop transfer function
(C) RHP zero in the closed-loop transfer function
(D) LHP zero in the closed-loop transfer function
(E) Answer not known

86. A process is controlled by a PID controller. The sensor has high measurement noise. To reduce the effect of noise, we

(A) Use anti wind-up circuits to mitigate the wind-up effect
(B) Use a band width-limited derivative term to prevent measurement noise amplification
(C) Use proportional and derivative term in the forward path
(D) Move the proportional and derivative term to different positions in the controller
(E) Answer not known

87. Match the following for the time domain response of the second order vehicle system :

(a) Over damped system	1. $\xi = 1$
(b) Under damped system	2. $\xi = 0$
(c) Critically damped system	3. $\xi > 1$
(d) Undamped system	4. $\xi < 1$

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

(E) Answer not known

88. In order to remain stable, a linear system should have poles that lie

(A) Only in the LHP
(B) In the LHP and on the imaginary axis
(C) In the LHP and single poles on the imaginary axis
(D) In the RHP
(E) Answer not known

89. The type of testing in which the input to the test subject is generated based on the output from previous output is called

(A) Closed loop testing
(B) Open loop testing
(C) Control loop testing
(D) Fixed loop testing
(E) Answer not known

90. Match the following :

(a)	Clutch slip	1.	Difficult to change gear
(b)	Clutch drag	2.	Creates peculiar noise
(c)	Clutch judder	3.	Huge heat generation
(d)	Clutch rattle	4.	Vehicle suddenly jumps

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

(E) Answer not known

91. Tight brake shoe anchoring pins can be rectified by

(A) By bleeding out air in the brake

(B) Replacing worn pistons in master cylinder

(C) Removing leakages

(D) Cleaning and lubricating

(E) Answer not known

92. A vehicle with a strut front suspension has a strut chatter problem when the front wheels are turned to the right or left. The most likely cause of this problem is

(A) A defective lower ball joint

(B) A defective upper strut mount bearing

(C) Worn lower control arm bushings

(D) A binding outer tie rod end

(E) Answer not known

93. Stiff steering can be diagnosised

(A) Wheels out of balance

(B) Siezed track rod and joint

(C) Steering coloumn bushes worn

(D) Wheel nuts (or) bolt loose

(E) Answer not known

94. When working on an engine with an electric fan, always

(A) Tie the fan so it cannot move

(B) Disconnect the electric connector on the fan leads

(C) Remove the battery from the vehicle

(D) Block the airflow through the radiator

(E) Answer not known

95. A 'recall' means that the manufacturer is

(A) Asking the owners to return the vehicles to the dealer for inspection and possible repair

(B) Asking the owners to return the vehicles to them for replacement of the vehicle

(C) Asking the owners to return the vehicles to them of a refund

(D) Asking the owners to recall the service history of the vehicle and report it to them

(E) Answer not known

96. Before taking a right (or) left turn, a signal should be given at least _____ meters ahead

(A) 10

(B) 20

(C) 30

(D) 40

(E) Answer not known

97. The motor vehicles Act was first framed in the year

(A) 1939

(B) 1948

(C) 1955

(D) 1977

(E) Answer not known

98. The Bharat stage – III was implemented in the year of

(A) 2009
(B) 2010
(C) 2008
(D) 2011
(E) Answer not known

99. Hatch back vehicles which are used for the carriage of passengers come under the classification of

(A) Category L
(B) Category M
(C) Category N
(D) Category T
(E) Answer not known

100. Excessive vibration in an engine may NOT be due to

(A) Un balance in firing arrangement
(B) Un balance in mechanical construction
(C) Operation at the vibratory critical speed
(D) Aerodynamic at high vehicle velocity
(E) Answer not known

101. Assertion [A] : The main purpose of well in the rim is to mount or remove the tyre from the wheel. Rim has 5° (or) 15° taper.

Reason [R] : Taper is also found in tubeless tyres. This helps to make a good seal.

(A) [A] is True; [R] is False

(B) [A] is False; [R] is True

(C) [A] and [R] are True; [R] is the correct explanation of [A]

(D) [A] and [R] are true; [R] is not the correct explanation of [A]

(E) Answer not known

102. Match List I and List II and select the correct answer :

List I	List II
(a) Automobile wheel mounting on axle	1. Magneto bearing
(b) High speed grinding spindle	2. Angular contact bearing
(c) IC engine connecting rod	3. Taper roller bearing
(d) Leaf spring eye mounting	4. Hydrodynamic Journal bearing
	5. Sintered metal bearing
	6. Teflon/Nylon Bush

	(a)	(b)	(c)	(d)
(A)	3	1	6	5
(B)	1	2	3	4
(C)	1	2	4	6
(D)	3	1	4	6

(E) Answer not known

103. The type of rear axle used in trucks is

(A) Semi floating
(B) Fully floating
(C) Three quarter floating
(D) Non floating
(E) Answer not known

104. The adjustment for backlash in a differential is provided between

(A) Crown wheel and sun gear
(B) Crown wheel and the planet gear
(C) Sun gear and the planet gear
(D) Crown wheel and drive pinion
(E) Answer not known

105. The number of universal joints and slip joints in a Hotchkiss drive are ———— and ———— respectively.

(A) 02 and 02
(B) 02 and 01
(C) 01 and 02
(D) 01 and 01
(E) Answer not known

106. The problem or speed fluctuation in the driven shaft of propeller can be solved using

(A) slip joint
(B) constant velocity joint
(C) torque tube
(D) semi floating axle
(E) Answer not known

107. When slip angles of the front wheels are less than those of the rear wheels, radius of the turn is decreased. This condition is called

(A) Understeer
(B) Oversteer
(C) Toe in
(D) Castor
(E) Answer not known

108. The angle between vertical and tyre centre line is called

(A) caster angle
(B) camber angle
(C) king pin inclination
(D) combined angle
(E) Answer not known

109. Identify the wrong statements in view of subframe

1. Subframe made as offer an assembly support to many elements of chassis
2. Subframes consists of lower arms, anti roll bar, steering box and power trains
3. Subframes made as to contribute for managing body deformations in the event of a crash
4. Subframes does not offer suspensions to the body area most suitable from a structural stand point

(A) 2 and 4
(B) 2 and 3
(C) 2 only
(D) 4 only
(E) Answer not known

110. Automatic transmission employs

(A) Fluid coupling and epicyclic gear box only

(B) Fluid coupling and torque converter only

(C) Torque convertor and epicyclic gear box only

(D) Fluid coupling, torque convertor and epicyclic gear arrangement

(E) Answer not known

111. In most epicyclic gear trains, two or more planet gears are equally placed around the sun gear in order to reduce

(A) Radial loading

(B) Axial loading

(C) Total weight

(D) Total stress

(E) Answer not known

112. In comparison with manual transmission, automatic transmission are of

(A) greater cost, greater weight, larger size, lower efficiency

(B) low cost, low weight, small size, high efficiency

(C) low cost, low weight, large size, low efficiency

(D) high cost, greater weight, small size, high efficiency

(E) Answer not known

113. Assertion [A] : Synchro mesh gear box does not require double declutching

Reason [R] : There is a provision of synchro mesh device which avoids the necessity of double declutching

(A) [A] is True but [R] is False

(B) [A] is False but [R] is True

(C) Both [A] and [R] are False

(D) Both [A] and [R] are True

(E) Answer not known

114. By using synchronizing unit, the two involved adjacent gears have their speeds

(A) Decreased

(B) Increased

(C) Stabilized

(D) Equalized

(E) Answer not known

115. Two advantages of using helical gears rather than spur gears in transmission are

(A) high strength and low cost

(B) high strength and less end thrust

(C) low noise level high strength

(D) low noise level and economy

(E) Answer not known

116. The type of clutch used in motor cycles is

(A) single plate clutch

(B) cone clutch

(C) multi plate clutch

(D) fluid clutch

(E) Answer not known

117. If there are no of plates increased in multiplate clutch, and it leads to

1. Increased torque carrying capacity
2. Frictional force increase
3. Increased centrifugal force

(A) 1 only

(B) 2 only

(C) 3 only

(D) 1 and 2

(E) Answer not known

118. The material used for brake lining should have ———— coefficient of friction.

(A) low

(B) high

(C) medium

(D) zero

(E) Answer not known

119. The term used to define and measure the air resistance acting against a moving car is

(A) Coefficient of drag
(B) Coefficient of lift
(C) Velocity of vehicle
(D) Density of air
(E) Answer not known

120. The horizontal force opposing the motion of the vehicle is

(A) Air drag
(B) Lift force
(C) Side wind force
(D) Upwind drag
(E) Answer not known

121. Lift force is caused by

(A) projected frontal area of vehicle
(B) pressure differential from top to bottom of vehicle
(C) friction of air passing over vehicle body
(D) air flow passing through the radiator
(E) Answer not known

122. Models are mounted in the ———— when the wind tunnel is operated with desired flow velocity.

(A) contraction cone
(B) test section
(C) diffuser
(D) guide vanes
(E) Answer not known

123. Why socket wrench is widely used in automobile shops?

(A) The head of this wrench comes angular to the centre line

(B) The wrenches have handles fitted with a ratchet which enables the worker to drive the shaft quickly

(C) The jaws have serrations to keep the work in grip

(D) The jaws are adjustable and fit the cavity to the shapes

(E) Answer not known

124. When using a ratchet, the handle will

(A) turn freely in both directions

(B) turn freely in one direction and drive the socket in the other

(C) drive the socket in both directions

(D) not turn in both directions

(E) Answer not known

125. Three basic types of pullers are

(A) channel lock, screw and vise-grip

(B) pressure screw, pusher and twister

(C) pressure screw, slide hammer and combination

(D) adjustable, socket and combination

(E) Answer not known

126. Bending rigidity of automotive body panels can be calculated by the following formula

(A) GJ

(B) EI

(C) M/Z

(D) $E/R = \frac{M}{I} = \frac{f_b}{y}$

(E) Answer not known

127. Identify the incorrect statement :

Advantages of integral bus body construction over conventional bus body construction

(A) less weight

(B) ease of entry and exit

(C) improved stability

(D) more squeaks and rattles

(E) Answer not known

128. Due to the weight of the vehicle, the side members of the frame are subjected to

(A) vertical bending

(B) horizontal bending

(C) torsion

(D) curved bending

(E) Answer not known

129. A vehicle which has higher front axle weight than rear axle weight will tends to

(A) under steer
(B) over steer
(C) neutral steer
(D) generate higher slip angle
(E) Answer not known

130. The rolling resistance is proportional to

(A) the speed of the car
(B) the gradient of road
(C) the weight of the car
(D) co-efficient of drag
(E) Answer not known

131. A general vibrating model of a vehicle is called the

(A) quarter car model
(B) half car model
(C) full car model
(D) may be quarter or half car model
(E) Answer not known

132. Higher camber angle leads to

(A) good steering response
(B) good ride comfort
(C) minimise tire wear
(D) excessive tire wear
(E) Answer not known

133. As per the tire-axis system, the camber angle is the angle formed between ———— plane and ———— plane.

(A) XZ, Wheel
(B) YZ, Wheel
(C) YZ, Road
(D) XZ, Road
(E) Answer not known

134. Consider the following statement true/false

Statement (A) : A Roll angle of the vehicle is the vertical movement of vehicle.

Statement (B) : Lateral acceleration helps the vehicle in straight line/path movement.

(A) (A) – True, (B) – False
(B) (A) – False, (B) – True
(C) (A) and (B) are true
(D) (A) and (B) are false
(E) Answer not known

135. Cornering stiffness of a tire is defined as the ratio of cornering force to

(A) Slip angle
(B) Steer angle
(C) Static tire deflection
(D) Dynamic tire deflection
(E) Answer not known

136. Trucks have higher tendency to roll while cornering compared to cars due to their

(A) Higher inertia
(B) Higher wheel base
(C) High weight
(D) High centre of gravity
(E) Answer not known

137. For an under damped harmonic oscillator, resonance

(A) Occurs when excitation frequency is greater than un-damped natural frequency

(B) Occurs when excitation frequency is less than un-damped natural frequency

(C) Occurs when excitation frequency is equal to un-damped natural frequency

(D) Never occurs

(E) Answer not known

138. The time interval after which the motion is repeated itself is known as

(A) Frequency

(B) Cycle

(C) Isolation

(D) Time period

(E) Answer not known

139. A car has 4 wheel independent suspension system. The number of DOF of suspension system are

(A) 12

(B) 6

(C) 4

(D) 8

(E) Answer not known

140. The ratio of the dynamic to the static amplitude of motion is called

(A) Transmissibility factor

(B) Rolling factor

(C) Magnification factor

(D) Resistance ratio

(E) Answer not known

141. Crank case pressure are produced by

(A) The cooling system

(B) The ignition system

(C) Power output

(D) Blow-by

(E) Answer not known

142. The selective catalytic reactor uses ———— solution to reduce the harmful NO_X emission.

(A) Zeolite

(B) Copper

(C) Aqueous urea

(D) Alumina

(E) Answer not known

143. For controlling the smoke emission ———— component is added with fuel.

(A) Barium

(B) Sodium

(C) Potassium

(D) Calcium

(E) Answer not known

144. The catalyst platinum and rhodium used in the catalytic converter promotes the conversion of following harmful emission elements into harmless emission

(A) CO, HC

(B) CO, NO_X

(C) CO, PM

(D) HC, NO_X

(E) Answer not known

145. NOx emissior is maximum in SI engines when the air-fuel ratio is

(A) Nearly stoichiometric
(B) Lean
(C) Rich
(D) Both (B) and (C) conditions
(E) Answer not known

146. Decrease in Air fuel ratio in SI engine results in

(A) Increase of NOx
(B) Decrease of CO and UBHC
(C) Increase of CO and UBHC
(D) Increase of particulate
(E) Answer not known

147. Ammonia injection is used to control

(A) NOx
(B) HC
(C) CO
(D) SOx
(E) Answer not known

148. Particulate emissions are more in ———— engines.

(A) MPFI – Multi Point Fuel Injection
(B) DI – Direct Injection
(C) HCI – Homogeneous Charge Ignition
(D) Port Fuel Injection (PFI)
(E) Answer not known

149. Compared with gasoline spark-ignition engines, heavy duty diesel engines have

(A) Higher carbon monoxide and lower nitrogen oxide emissions
(B) Higher hydrocarbon and lower nitrogen oxide emissions
(C) Higher carbon monoxide and hydrocarbon emissions
(D) Lower carbon monoxide and higher nitrogen oxide emissions
(E) Answer not known

150. Euro II is not implanted in which of the following city in the year 2000?

(A) Delhi
(B) Bengaluru
(C) Kolkatta
(D) Mumbai
(E) Answer not known

151. For better efficiency and emission the CI engine operated at 16:1 compression ratio. Swept volume of a cylinder is 450 cm^3. Clearance volume is ———— cm^3.

(A) 30
(B) 60
(C) 90
(D) 120
(E) Answer not known

152. Identify the eddy current dynamometer

(A) High speed torque corresponding to maximum permitted excitation
(B) Minimum torque corresponding to residual magnetization
(C) Performance limited by minimum permitted shaft torque
(D) Minimum permitted speed
(E) Answer not known

153. The VVT engine improved

(A) More torque and low maintenance
(B) Small engine and breaking efficiency
(C) Performance and fuel economy
(D) Multi fuel with duel operation
(E) Answer not known

154. State True/False

Statement (A) : A turbocharger is a forced induction device used to allow more power to be produced for an engine.

Statement (B) : A turbocharged engine cannot be a powerful than the naturally aspirated engine.

(A) (A) – True, (B) – False

(B) (A) – False, (B) – True

(C) (A) and (B) are true

(D) (A) and (B) are false

(E) Answer not known

155. Apart from corrosive wear generated by acidic combustion products, the presence of ———— in the lubricating oil is another ————. This is particularly true for particles of specific crucial size that may bridge the oil film in the engine component operating clearances.

(A) Sand particles, primary source of engine wear

(B) Abrasive particles, primary source of engine wear

(C) Water particles, secondary source of engine wear

(D) Abrasive particles, secondary source of engine wear

(E) Answer not known

156. The most important characteristics of lubricating oil is its

(A) Viscosity

(B) Physical stability

(C) Chemical stability

(D) Cleanliness

(E) Answer not known

157. A simple Carbureltor supplies rich mixture during _____ conditions.

(A) Starting
(B) Idling
(C) Cruising
(D) Accelerating
(E) Answer not known

158. The float of a carburetor controls

(A) Fuel flow rate
(B) Fuel and air mixture flow rate
(C) Air flow rate
(D) Level of fuel
(E) Answer not known

159. The choke is closed when the engine is

(A) Accelerating
(B) Hot
(C) Cold
(D) Idling
(E) Answer not known

160. For starting the engine, the air-fuel ratio should be

(A) 9 : 1
(B) 12 : 1
(C) 13 : 1
(D) 15 : 1
(E) Answer not known

161. A modern antilock braking system uses

(A) Sensor on each wheel

(B) Electrically driven hydraulic pump

(C) Only a sensor

(D) Both sensor and electrically driven hydraulic pump

(E) Answer not known

162. ABS function requires measurement of

(A) Torque

(B) Temperature

(C) Wheel rotation

(D) Camber

(E) Answer not known

163. The most common material used for brake liner is

(A) Asbestos

(B) Aluminium

(C) Cast iron

(D) Copper

(E) Answer not known

164. In a master cylinder, the primary piston is the piston that is

(A) Nearest the front end of the car

(B) Hydraulically operated by the secondary piston

(C) Needed only on vehicles with drum brakes

(D) Directly operated by the push rod from the brake pedal

(E) Answer not known

165. Wheel lock up does not occur in ———— braking system.

(A) Drum
(B) Disc
(C) ABS
(D) Power
(E) Answer not known

166. A passenger car of mass 800 kg is travelling at 36 kmph, if the average force is required to bring it to rest in 20 meters

(A) 2 kN
(B) 1 kN
(C) 2.5 kN
(D) 1.5 kN
(E) Answer not known

167. Due to which of the following reason engines are usually rubber mounted?

(A) To prevent road shocks from reaching the engine
(B) To reduce the transmission of vibration between the engine and body
(C) To prevent flow of electricity between the engine and body
(D) To prevent the heat from passing between the engine and body
(E) Answer not known

168. As the shock absorber is compressed, fluid passes through the piston orifices and

(A) Out of the dust shield
(B) Into the upper part of the cylinder
(C) Into the lower part of the cylinder
(D) Out of the air or gas chamber
(E) Answer not known

169. While discussing live-axle leaf spring rear suspensions. Technician A says this type of rear suspension have a great deal of unspring weight. Technician B says this type of rear suspension often has semi-elliptical springs. Who is correct?

(A) Technician A only

(B) Technician B only

(C) Both Technician A and Technician B

(D) Neither Technician A nor Technician B

(E) Answer not known

170. Leaf spring eyes used in cars are usually linked with

(A) Bronze bushes

(B) Rubber bushes

(C) Steel bushes

(D) Composite bushes

(E) Answer not known

171. Identify the wrong statements

(1) Sprung weight is the weight that is supported by the car springs

(2) Vehicle control increases with increase of unsprung weight

(3) Anything that is not supported by springs is unsprung weight

(A) (1) only

(B) (1) and (2) only

(C) (2) only

(D) Both (2) and (3)

(E) Answer not known

172. An Ohm-Meter shows a reading 12Ω if it is used to measure the resistance of a fuel injector, determine the current flows through the injector. Take battery voltage is 12V.

(A) 1 mA
(B) 10 mA
(C) 100 mA
(D) 1000 mA
(E) Answer not known

173. Three major parameters/conditions that affect automotive air conditioner are,

(A) Fuel, oil and coolant
(B) Moisture, Dirt and Air
(C) Cold weather, Humid Days and High Altitude
(D) Warm weather, dry days and low altitude
(E) Answer not known

174. Capacitive transducers are normally used for

(A) Static measurement
(B) Dynamic measurement
(C) Both static and dynamic measurement
(D) Transient measurement
(E) Answer not known

175. For a charging circuit, the maximum voltage drop should be

(A) > 0.5 V
(B) < 0.5 V
(C) = 0.5 V
(D) = 1.5 V
(E) Answer not known

176. The role of electronic spark timing control is

(A) To monitor engine speed and load condition

(B) To advance retard the fuel injection timing

(C) To compute spark advance for fuel economy

(D) To adjust (A/F) ratio based on load condition

(E) Answer not known

177. Assertion [A] : Dwell is the measure of time during which the ignition coil is charging or contact breakers are closed.

Reason [R] : As the speed increases, the dwell angle remains the same, but the actual time is reduced.

(A) Both [A] and [R] are individually true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are individually true but [R] is not the correct explanation of [A]

(C) [A] is true but [R] is false

(D) [A] is false but [R] is true

(E) Answer not known

178. In Battery coil ignition system, the correct sequence of flow of current is

(A) Battery – Ammeter – Ignition coil – Distributor – Spark plug

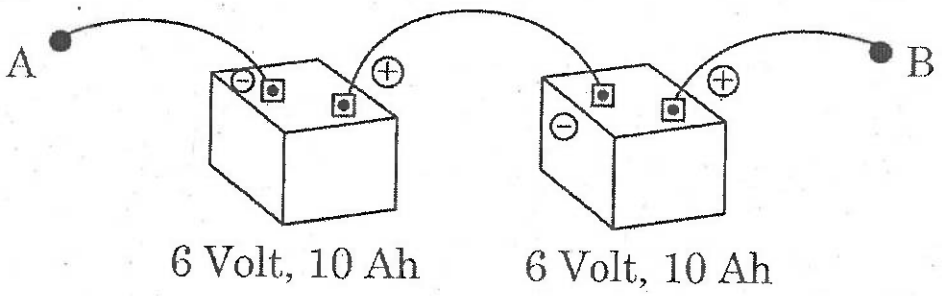
(B) Battery – Ignition coil – Ammeter – Distributor – Spark plug

(C) Battery – Ammeter – Distributor – Ignition coil – Spark plug

(D) Battery – Distributor – Ammeter – Ignition coil – Spark plug

(E) Answer not known

179. Two Batteries are connected as shown in the below figure. Calculate the potential across the terminal A and B.



(A) 6 volt, 10 Ah

(B) 12 volt, 10 Ah

(C) 6 volt, 20 Ah

(D) 12 volt, 20 Ah

(E) Answer not known

180. Cells are connected in parallel to

(A) Increase the efficiency

(B) Increase the current capacity

(C) Increase the voltage output

(D) Increase the internal resistance

(E) Answer not known

181. A low maintenance battery usually has grids made of

(A) Calcium

(B) Antimony

(C) Glass

(D) Lead dioxide

(E) Answer not known

182. The lambda control loop compensates errors of the air fuel ratio by a

(A) Multi positive correction factor
(B) Single positive correction factor
(C) Multi negative correction factor
(D) Single negative correction factor
(E) Answer not known

183. In adaptive knock control, the sampling time is inversely proportional to

(A) Engine speed
(B) Engine torque
(C) Wheel torque
(D) Wheel inertia
(E) Answer not known

184. The PID controllers reduces

(A) Lateral errors
(B) Longitudinal errors
(C) Lateral errors and longitudinal errors
(D) Longitudinal errors and moment errors
(E) Answer not known

185. _____ is an electronic device that measures the proportion of oxygen in the gas or liquid being analysed.

(A) Adaptive sensor
(B) Knock sensor
(C) Lambda sensor
(D) PID sensor
(E) Answer not known

186. While designing PID control, the poles of the controller, transfer function should lie on _____. However by tuning Kp, K_I and K_D the system _____ analysis can be studied.

(A) Right half plane, frequency response

(B) Left half plane, frequency response

(C) Left half plane, transient response

(D) Left half plane, steady state

(E) Answer not known

187. The proportional controller

(A) Introduces offset

(B) Increases band width

(C) Increases margin of stability

(D) Reduces velocity constant

(E) Answer not known

188. Three types of stability control systems proposed for YAW control is

(A) Differential braking, steer by wire and active torque distribution

(B) Adaptive cruise control, monotonous driving and electronic stability

(C) Passive braking, active distribution and adaptive braking

(D) Steer by wire, active distribution and semi-active cruise control

(E) Answer not known

189. Control technique which gives quick transient and stability response

(A) Root locus

(B) Bode

(C) Nyquist

(D) Nicholas

(E) Answer not known

190. The settling time $(t_s)5\%$, is given as

(A) The time taken for the response to stay within 5% of its final value

(B) The time taken to reach the final output value

(C) The time taken to reach 95% of the final output value

(D) The time take to reach the 5% overshoot

(E) Answer not known

191. While servicing an automotive air conditioner a technician feels the high pressure line, low pressure line and evaporator inlet while in operation. For an air conditioner working in good condition they should be respectively.

(A) Hot, cold and cold

(B) Cold, cold and hot

(C) Hot, cold and hot

(D) Cold, hot and cold

(E) Answer not known

192. Maximum permissible quality in a cylinder is usually

(A) 0.01 mm

(B) 0.1 mm

(C) 0.3 mm

(D) 0.5 mm

(E) Answer not known

193. Technician 'A' says disc brakes do not require a return spring. Technician 'B' says the piston seal pulls the piston back to release the rotor. Who is right?

(A) Technician (B)

(B) Technician (A)

(C) Both (A) and (B)

(D) Neither (A) nor (B)

(E) Answer not known

194. The cylinder head nuts should be tightened to a torque of about

(A) 15 Nm

(B) 50 Nm

(C) 150 Nm

(D) 250 Nm

(E) Answer not known

195. If a chemical such as solvent gets in your eyes, you should immediately

(A) Cover your eyes and seek medical attention

(B) Wash your eyes with water and seek medical attention

(C) Seek medical attention with out first aid

(D) Rub your eyes and remove the solvents

(E) Answer not known

196. What should be ensured before overtaking a vehicle?

(A) The vehicle infront is turning left

(B) No vehicle is approaching from behind

(C) The vehicle infront is turning right

(D) The road ahead is clearly visible and it is safe to overtake

(E) Answer not known

197. An engine running in a closed room is dangerous because the exhaust gas contains

(A) Blue smoke

(B) Water vapour

(C) Carbon monoxide

(D) Oxides of nitrogen

(E) Answer not known

198. A learner's license is effective for a period of

(A) One year only

(B) Six months only

(C) Three months only

(D) Nine months only

(E) Answer not known

199. Suspension and cancellation of driving license in certain cases is provided in section _____ of motor vehicle Act 1988.

(A) Section 24

(B) Section 22

(C) Section 21

(D) Section 23

(E) Answer not known

200. In motor vehicle Act, the first schedule gives

(A) Various traffic signs

(B) First party claims

(C) Second party claims

(D) Third party claims

(E) Answer not known

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

SEAL