Sl. No. :

CEAUE/18

Register Number

2018

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. The applicant will be supplied with Question Booklet 15 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 in series 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 Room Invigilator to mark the answers.
6. You will also encode your Question Booklet Number 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 time of 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. Applicants have to write and shade the total number of answer fields left blank on the boxes provided at side 2 of OMR Answer Sheet. An extra time of 5 minutes will be given to specify the number of answer fields left blank.
13. 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 primary function of lubrication is to

(A) Provide cooling effect
(B) Provide sealing action
(C) Provide cleaning action
(D) Reduce wear

2. In turbocharger, the time taken for the boost or increase in manifold pressure is known as

(A) Turbo boost
(B) Turbo lag
(C) Turbo time
(D) Turbo waste

3. Turbo charger is driven by

(A) Inlet air
(B) Exhaust gas
(C) Inlet charge
(D) Crank case Hewby

4. Combustion in C.I. engine is

(A) Steady and homogeneous
(B) Steady and heterogeneous
(C) Unsteady and homogeneous
(D) Unsteady and heterogeneous

5. Knocking in SI engine can be controlled by

(A) Increasing inlet pressure
(B) Retarding spark timing
(C) Reducing speed of the engine
(D) Advancing spark timing

6. Normal cetane has cetane number of

(A) 100
(B) 75
(C) 60
(D) 30

7. In SI engines maximum flame speed is obtained when the equivalent ratio is between

(A) 1.1 and 1.2
(B) 1.0 and 1.1
(C) 1.2 and 1.3
(D) 1.3 and 1.4

8. With increase in engine speed, the crank angle required for flame propagation

(A) Increases
(B) Decreases
(C) Remains same
(D) Increases and then decreases

9. Identify the incorrect statement with respect to radial tyres

(A) High resistance to puncture

(B) High rolling resistance

(C) Low hysteresis losses

(D) Better braking efficiency in net roads

10. Tubeless tyres cannot be fitted over ———— wheels.

(A) Pressed steel disc

(B) Wire

(C) Light alloy cast

(D) Forged

11. The differential case is bolted to the ———— of the final drive.

(A) Crown wheel

(B) Sun gear

(C) Planet gear

(D) Spider

12. Which one of the following is NOT taken by torque tube in torque tube type rear drive?

(A) Side thrust

(B) Torque reaction

(C) Driving thrust

(D) Braking torque

13. When the teeth have worn out, the eccentric bush is rotated by certain angle for compensation in ———— steering gear box.

(A) Recirculating ball type

(B) Worm and nut type

(C) Rack and pinion type

(D) Worm and wheel type

14. In reversed-elliot type configuration ———— prevents axial movement of stub axles.

(A) Thrust washer

(B) Pitmann arm

(C) Relay rod

(D) U joints

15. In case of four wheel drive, identify the appropriate driving mode which is more suited for off-road application.

(A) 2 H

(B) 4 H

(C) 2 L

(D) 4 L

16. When a vehicle is cornering the crown wheel is rotating at 500 rpm, and the outer wheel is turning at 520 rpm. The speed of the inner wheel is

(A) 20 rpm
(B) 500 rpm
(C) 480 rpm
(D) 540 rpm

17. Where is the Hook's joint used in an automotive vehicle?

(A) between gear box and propeller shaft
(B) between flywheel and clutch
(C) between clutch and gearbox
(D) in the clutch output shaft

18. The term 'ply rating' with reference to a tyre refers to the

(A) Actual number of plies
(B) Recommended inflation pressure
(C) Aspect ratio
(D) Rated strength

19. Propeller shaft is a driving shaft that connects the

(A) transmission main or output shaft of gear box and differential
(B) clutch shaft and gear box main shaft
(C) engine shaft and gear box main shaft
(D) transmission input shaft and differential

20. An underinflated tyre will wear the tread most

(A) near centre
(B) near the edges
(C) in the lateral direction
(D) in the cross direction

21. For faultless operation of hydraulic braking system

(A) brake fluid should be pure
(B) boiling point of brake fluid should be high
(C) viscosity of brake fluid should be high
(D) there should be minimum amount of trapped air

22. Match the following : Leaf springs

(a)	Cambered leaf springs	1.	reduce the tendency of the vehicle to pitch
(b)	Flat leaf springs	2.	rigid suspension
(c)	Shorter leaf springs	3.	increase the tendency of the vehicle to yaw
(d)	Spring shackle	4.	flexible connection

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

23. Electronically controlled suspensions are being discussed

Statement 1 : They use air springs

Statement 2 : Height sensors are used so the computer will know when the tire meets a bump.

Which statement is correct?

(A) 1 only

(B) 2 only

(C) Both (1) and (2)

(D) Neither (1) nor (2)

24. Antilock braking system are designed

(A) With max powerful brakes to provide quicker stops

(B) To prevent wheel lockup during stops

(C) To provide warning system to inform the driver that a skid is occurring

(D) To monitor the speed signals from the wheel speed sensors

25. Retarders are used in ———— application.

(A) Downhill (B) Uphill

(C) Normal (D) Parking

26. Electric brakes are commonly used in

(A) Two wheelers (B) Cars

(C) Trucks (D) Trailers

27. To reduce the shock of engagement, the friction disc has a series of waved

(A) cushion pads
(B) facings
(C) cushion springs
(D) discs

28. The main disadvantage of a torque converter is

(A) it cannot multiply torque at high speed ratio
(B) its efficiency is high only in limited speed range
(C) it cannot provide high torque at stall turbine speed
(D) its efficiency becomes zero before normal running speed

29. Noise from the transmission in neutral could be caused by

(A) clutch not engaging
(B) worn or dry bearings
(C) chipped or broken teeth on main shaft gears
(D) defective extension housing seal

30. In the semi centrifugal clutch, the force of the pressure plate against the friction disc increases with engine speed because of weights located on the

(A) pressure plate
(B) fly wheel
(C) clutch shaft
(D) release levers

31. In hydrostatic drive ———— provides the protection for engine and other drive components.

(A) Accumulator
(B) Safety valve
(C) Load apportioning valve
(D) Pressure relief valve

32. The central gear of an epicyclin gear box is known as

(A) Sun gear
(B) Planet gear
(C) Ring gear
(D) Arm

33. The stator in torque converter provides stator torque when the fluid strikes the ———— of the stator blade.

(A) Concave part
(B) Convex part
(C) Periphery
(D) Centre part

34. The hydrostatic transmission used in the vehicle will have

(A) constant displacement pump and constant displacement motor

(B) constant displacement pump and variable displacement motor

(C) variable displacement pump and variable displacement motor

(D) variable displacement pump and constant displacement motor

35. When the gear ratio through the transmission is 1 : 1, the transmission is in

(A) Over drive

(B) Direct drive

(C) Under drive

(D) Neutral

36. If more than one pairs of gears are used to transmit power, then the gear ratio is

(A) sum of gear ratios of each pair

(B) product of the gear ratios of each pair

(C) difference of gear ratios of each pair

(D) division of gear ratios of each pair

37. Keeping the foot on clutch pedal during vehicle running is called as

(A) Vehicle ride

(B) Clutch ride

(C) Double declutching

(D) Clutch drag

38. The free pedal play adjustment in clutch is made by

(A) Adjusting the length of any rod in linkages

(B) Introducing a new member in linkages

(C) Means of adjusting a screw

(D) Adjusting back lash

39. To disengage the clutch the release bearing is moved

(A) forward towards the flywheel

(B) away from the flywheel

(C) alternatively from neutral position

(D) in any direction

40. The regulator in the charging system controls

(A) Engine speed
(B) Generator input
(C) Generator output
(D) Battery discharging

41. Engine cranking resistance is nothing but the

(A) speed required to crank the engine
(B) torque required to crank the engine
(C) starter to ring gear ratio required to crank the engine
(D) lowest possible temperature at which engine starts

42. Bendix drive used for starter motor works on

(A) principle of friction
(B) principle of inertia
(C) principle of centrifugal force
(D) principle of resistance

43. The process of passing fresh air through the passenger compartment of a vehicle is known as

(A) Air conditioning
(B) Air filtering
(C) Air heating
(D) Ventilation

44. A car air conditioning system may be between

(A) 6 to 8 tons
(B) 10 to 15 tons
(C) 0.025 to 0.05 tons
(D) 1 to 4 tons

45. The refrigeration system is divided into a high side and a low side by

(A) the condenser and evaporator
(B) the compressor and the restriction in the orifice tube or expansion valve
(C) the accumulator and receiver
(D) the desiccant and refrigerant

46. In air conditioning system, 'Drier' is placed between

(A) Condensor and evaporator
(B) Compressor and condensor
(C) Condensor and Boiler
(D) Boiler and Super heater

47. Inside the water tanker body, the baffle plates are provided to

(A) Reduce any cause of fire

(B) Prevent any chemical reactions

(C) Reduce vehicle noise due to water

(D) Prevent surging action of water

48. Identify the incorrect statement with respect to compactness of driver cabin.

(A) Lighter in weight

(B) Cheaper to produce

(C) Higher running cost

(D) Higher utilization of space

49. With respect to bus frame sections, which section has a good resistance to torsion at dynamic conditions

(A) I section

(B) L section

(C) C section

(D) O section

50. ———— configuration accelerates the air flow in a windtunnel.

(A) Test section

(B) Honeycomb screen

(C) Diffuser

(D) Contraction cone

51. Surface imperfections on a vehicle body will increase

(A) Interference drag

(B) Internal drag

(C) Lift force

(D) Frictional drag

52. With respect to, reduction of aerodynamic drag force of a vehicle, identify the incorrect statement

(A) Improves the overall vehicle stability

(B) Increase fuel economy of the vehicle

(C) Better appearance and styling

(D) Minimum acceleration for same power output

53. Bluff body is one which has a length in the flow direction close or equal to that

(A) Perpendicular to flow direction

(B) Parallel to flow direction

(C) At an angle to flow direction

(D) Opposite to flow direction

54. Modeling ride height, yaw, roll and steering conditions can be done with

(A) Dynamo meter

(B) Wind tunnel

(C) Car workshop

(D) Body shop

55. Aerodynamic down force is opposite to

(A) Lift force

(B) Drag force

(C) Side force

(D) Wind force

56. Mechanical linkage for lifting and lowering the window glass includes a sliding arm that operated by

(A) Rack and pinion

(B) Sissor action

(C) Cable and pulley

(D) Chain and sprocket

57. Choose the appropriate angle between the seat and backrest of the driver's seat

(A) 65°

(B) 105°

(C) 165°

(D) 185°

58. The panel forming the inner housings for the road wheel is

(A) Front bumper

(B) Rear bumper

(C) Wheel arch

(D) Dolly

59. Panel dividing engine compartment from passenger compartment is called

(A) heel board

(B) cant panel

(C) fire wall

(D) bulk head

60. For a Multiple Degree Of Freedom (MDOF), the term "higher modes" refers to?

(A) Modes of vibration with the longest periods

(B) Modes of vibration with the shortest periods

(C) Modes of vibration with the shortest frequencies

(D) Modes of vibration with the highest participation factor

61. The torque available at the contact between driving wheels and the road is known as ;

(A) Clutch effort

(B) Brake effort

(C) Tractive effort

(D) Brake and tractive efforts

62. The force available at the contact between tyre and the road is known as ;

(A) Tractive effort

(B) Traction effort

(C) Axle ratio

(D) Braking effort

63. Vehicle slip angle for the kinematic model of lateral vehicle motion is referred as

(A) $\beta = \tan^{-1}\left[\dfrac{e_f \tan\delta_r + e_r \cdot \tan\delta_f}{e_f + e_r}\right]$

(B) $\beta = \tan^{-1}\left[e_f \cdot \tan\delta_r + e_r . \tan\delta_f\right]$

(C) $\beta = \tan^{-1}\left[e_f \cdot \tan\delta_t + e_r . \tan\delta_r\right]/(e_f + e_r)$

(D) $\beta = \tan^{-1}\left[e_f + e_r\right]$

Where β = vehicle slip angle,

$e_f, e_r \Rightarrow$ longitudinal distance from c.g to front tires and rear tires respectively

$\delta_f, \delta_r \rightarrow$ front and rear wheel steering angle

64. The following statements are true for an passive suspension system

(A) Decreasing suspension stiffness improves ride quality and road holding. However, it decreases rattle space requirements

(B) Increasing suspension stiffness improves ride quality and road holding

(C) Increasing suspension stiffness improves road holding and increase raffle space requirements

(D) Decreasing suspension stiffness improves ride quality and road holding; However it increases raffle space requirements

65. The following statement is true for an analysis of active suspension system – In order to improve ride quality without deterioration in the suspension deflection and tire deflection transfer functions, the best one can do is,

(A) Achieve significant enhancement in sprung mass acceleration at the sprung mass frequency

(B) Avoid any deterioration in all three transfer functions at the unsprung mass natural frequency

(C) Simultaneously achieve significant enhancement in suspension deflection and tire deflection at the sprung mass natural frequency

(D) If possible, ensure that the suspension deflection transfer function does have a contact low frequency asymptote

66. The function of a shackle with a leaf spring in an suspension is to

(A) Allow pivoting of spring end

(B) Control sideways

(C) Control rear torque

(D) Allow spring length to change

67. The starting system includes

(A) a battery, a starter and an ignition switch

(B) a battery, a distributor and an ignition switch

(C) a battery, a starter and a distributor

(D) a distributor, a starter and an ignition switch

68. The fuel which has maximum resistance to knock in SI engines is

(A) n-heptane (B) Iso-octane

(C) Benzene (D) Alcohol

69. In hydraulic brakes, the brake torque at the wheel base depends on the applying braking pressure (P_{Br}), which is represented by the following expressions

(A) $T_{Br} = F_{Br} . r_{stat} = r_{Br} . \mu_{Br} . A_{Br} . P_{Br} = r_{stat} . k_{Br} . P_{Br}$

(B) $T_{Br} = K_{Br} . P_{Br}$.

(C) $T_{Br} = F_{Br} . r_{stat} = r_{stat} . P_{Br}$.

(D) $T_{Br} = P_{Br}$.

Where, P_{Br} = Braking Pressure ; T_{Br} = Brake torque r_{Br} = effective braking radius, μ_{Br} = coefficient of friction for brakes. A_{Br} = Active area of the brakes shear

70. The advantages of the combustion pressure sensor used in the S.I. Engine are as follows ;

(A) Integral acquisition of all oscillations in the combustion chamber

(B) Straight forward mounting

(C) High costs to harden pressure sensors for the operation in the combustion chamber

(D) Strong disturbance noise from closing valve (or) piston tilting

71. The following errors will include in the Adoptive Lambada control model in engine management systems for high accuracy

(A) Additive Lambada error

(B) Multiplicative Lambada error

(C) Offset Lambada error

(D) Additive Lambada offset and multiplicative Lambada errors

72. Zero initial condition for a system means

(A) Input reference signal is zero

(B) Zero stored energy

(C) No initial movement of moving parts

(D) System is at rest and no energy is stored in any of its components

73. Which among the following is a disadvantage of modern control theory?

(A) Implementation of optimum design

(B) Transfer function can also be defined for different initial conditions

(C) Analysis of all system takes place

(D) Necessity of computational work

74. Which bus forms an intermediate communications path between input/output ports and input/output units?

(A) Control bus

(B) Data bus

(C) Address bus

(D) System bus

75. A good control system has all the following features except

(A) Good stability

(B) Slow response

(C) Good accuracy

(D) Sufficient power handling capacity

76. "NoRol" brakes are used in ———— application.

(A) downhill

(B) uphill

(C) normal

(D) parking

77. Fitment of bullbars, roof racks on a vehicle will increase

(A) Interference drag
(B) Internal drag
(C) Form drag
(D) Frictional drag

78. With respect to airbag safety systems, identify the odd choice

(A) Seat belt
(B) Pre-tensioner
(C) Load limiter
(D) Sporty steering wheel

79. ———— catalyst deactivation of NSR (Noble Metal Catalysts) on emission control in S.I. Engine is due to the following reasons

(A) Sulphur poisoning and thermal degration
(B) Carbon deposition and thermal degration
(C) Sulphur poisoning and carbon deposition
(D) Sulphur poisoning, carbon deposition and thermal degration

80. In Euro VI (2014) norms the NO_x emission limits for petrol engine

(A) 40 mg/km
(B) 50 mg/km
(C) 60 mg/km
(D) 70 mg/km

81. In Euro IV (2005) norms the co emission limits for petrol engine

(A) 1.0 gm/km
(B) 1.5 gm/km
(C) 0.5 gm/km
(D) 1.25 gm/km

82. Particulate Traps used in

(A) Petrol engine
(B) Diesel engine
(C) Gas engine
(D) Oil engine

83. The essential condition for the engine fitted with three way catalytic converter is that it operates

(A) at optimum speed

(B) very close to stoichiometric A/F ratio

(C) at optimum temperature

(D) at constant speed

84. Exhaust Gas Recirculation (EGR) is deactivated at engine idle, because

(A) Exhaust temperature is too high to handle

(B) Substantial amounts of residual gas already exists in the cylinder

(C) Engine vacuum is too small to allow exhaust into intake

(D) Possibility of higher emissions

85. Soot is formed in diesel engine environment at temperatures in the range of

(A) 1000 – 2800 K (B) 3000 – 4000 K

(C) 4000 – 4500 K (D) 4500 – 4800 K

86. The following is the most important parameter affecting CO formation and emission

(A) A/F ratio (B) Fuel type

(C) Engine temperature (D) Engine speed

87. Operating SI engines on low fuel-air mixtures give

(A) Low CO and HC, moderate NO_x emissions

(B) High CO, Low HC, moderate NO_x emissions

(C) Low CO, High HC, moderate NO_x emissions

(D) High CO and HC, moderate NO_x emissions

88. While discussing semi independent rear suspension, Technician A says some individual rear wheel movement is provided by the trailing arms. Technician B says some independent rear wheel movement is provided by the struts. Who is correct?

(A) Technician A

(B) Technician B

(C) Both Technician A and B

(D) Neither Technician A nor Technician B

89. The electronic air suspension switch should be in the off position if the

(A) Vehicle is boosted with a booster battery

(B) Vehicle is diagnosed with a scan tool

(C) Vehicle is jacked up on one corner to change a fire

(D) Battery is being changed

90. Automatic Transmission Fluids (ATF) is leaking from the bottom of the flywheel housing. The most likely cause of this problem is

(A) A leaking for an converter weld

(B) A leaking rear main bearing seal

(C) A leaking in the transmission cooler lines

(D) A leaking transmission pump seal

91. In an OHV engine, oil leaking from the bottom of the fly wheel housing may be caused by a

(A) Leaking timing gear cover seal

(B) Leaking expansion plug in the rear of the engine stock

(C) Leaking pilot bearing seal

(D) Leaking oil gallery plug

92. After boring or honing cylinders, clean and protect the cylinder wall with

(A) Light oil and gasoline

(B) Gasoline and kerosine

(C) Steam cleaning and air drying

(D) Soapy water and light oil

93. To check the Piston-ring end gap, install the ring

(A) above the ring ridge

(B) in the Piston groove

(C) at the bottom of the cylinder

(D) below the ring ridge

94. If a torsion-bar front-suspension system sags, restore proper suspension height by

(A) Replacing the torsion bar

(B) Replacing the shock absorber

(C) Adjusting the torsion bar

(D) Replacing the ball joints

95. A cause of rattle and squeal during braking with caliper brakes is

(A) Excessive pedal force

(B) Loose brake pad

(C) Worn disc

(D) Worn piston

96. The purpose of a radiator is

(A) to provide a large amount of cooling surface area

(B) to provide a large amount of heating surface area

(C) to provide area for lubrication

(D) to supply air-fuel mixture

97. For cooling the pistons of diesel engines, the commonly fluid used is

(A) Air

(B) Water

(C) Fuel oil

(D) Lubricating oil

98. In order to give sufficient draft to the pattern, cooling fins are usually given a taper of

(A) 15 to 20 degrees

(B) 10 to 12 degrees

(C) 8 to 15 degrees

(D) 3 to 5 degrees

99. The device in the cooling system that increases the boiling point of the water is called

(A) Radiator

(B) Drain plug

(C) Water Jacket

(D) Pressure cap

100. Pump used in the forced cooling system is normally

(A) Piston pump

(B) Gear pump

(C) Vane pump

(D) Centrifugal pump

101. The main purpose of fan in a liquid cooling system is to

(A) Disperse engine fumes

(B) Pump cold air over the hot coolant

(C) Cool the external surface of the engine

(D) Drive air flow when the vehicle speed is low

102. The lubricants commonly used in the automobile are

(A) Animal oils

(B) Vegetable oils

(C) Mineral oils

(D) Cooking oils

103. If L is the stroke and N is the speed in rpm, then mean piston speed of two-stroke engine is

(A) LN (B) $\frac{LN}{2}$

(C) 2 LN (D) $\frac{LN}{4}$

104. Two-stroke SI engines suffer from

(A) Fuel loss (B) Idling difficulty

(C) Cold starting difficulty (D) Low efficiency

105. Compression ratio for spark ignition engines usually varies between

(A) 4 – 6 (B) 7 – 10

(C) 16 – 20 (D) 20 – 25

106. Which of the following medium is compressed in a diesel engine cylinder?

(A) Air alone (B) Air and fuel

(C) Air and lub oil (D) Fuel alone

107. The process of mining air and fuel in the correct proportion is known as

(A) Super charging (B) Carburetion

(C) Scavenging (D) Turbo charging

108. ———— is a result of operating a vehicle with over inflated tyres.

(A) Circular wear (B) Edge wear

(C) Center wear (D) Irregular wear

109. Which of the following is not a common sidewall ply material?

(A) Cotton (B) Rayon

(C) Nylon (D) Polyester

110. In semi-floating axle in order to remove axle shaft

(A) Wheel, drum, bearing retainer plate must be removed

(B) Axle housing must be removed

(C) Differential must be removed

(D) Final drive must be removed

111. The reversible steering system means

(A) Direction of rotation can be reversed

(B) Transmits road shocks to steering wheel

(C) Facilitates reversal of vehicles

(D) Not transmits road shocks to steering wheel

112. If the propeller shaft speed is 1000 rpm, axle reduction is 5; rpm of outer wheel is 210, then rpm of inner wheel and differential case are

(A) 210 and 180

(B) 200 each

(C) 180 and 210

(D) 190 and 200

113. A collapsible steering column is one which collapses to

(A) Damp out road vibrations

(B) Improve safety for the driver

(C) Simplify its removal for repair

(D) Provide adjustment for the steering wheel

114. When a vehicle turns a corner, the action of the differential causes

(A) The inner wheel to speed up

(B) The outer wheel to speed up

(C) Increased torque applied to inner wheel

(D) Increased torque applied to outer wheel

115. The purpose of the 'well' in a wheel rim is to

(A) lock the tyre onto the rim

(B) allow the tyre to be fitted and removed

(C) expose the valve of the inner tube

(D) prevent the type dislodging during severe cornering

116. The reason why a laminated spring is made up of a series of leaves is to

(A) reduce interleaf friction

(B) soften the spring action and increases the maximum deflection

(C) allow the leaves to slide during the bump movement

(D) overcome the weakness at the centre of a single leaf spring

117. The arrangement using a two-piston tandem or dual master cylinder is

(A) power brake

(B) air assisted hydraulic brake

(C) dual brake

(D) fail-safe brake

118. Which one of the following is not a type of disc brake?

(A) fixed-caliper disc brake

(B) floating-caliper disc brake

(C) reciprocating-caliper disc brake

(D) sliding-caliper disc brake

119. The function of the master cylinder is

(A) to increase pressure equally in all wheel cylinders

(B) to increase pressure unequally in all wheel cylinders

(C) to increase power equally in all wheel cylinders

(D) to decrease power equally in all wheel cylinders

120. Service brakes means

(A) foot-operated brake used to slow or stop the vehicle

(B) hand-operated to hold the vehicle on level

(C) foot-operated to hold on hills

(D) hand-operated to hold on hills

121. The function of the air reservoir in the pneumatic brake system is

(A) to store air for brake application

(B) to avoid air pressure fluctuation

(C) to supply air for brake application even after engine has stopped and just restarted

(D) to produce air pressure fluctuation

122. The parking brakes generally acts on

(A) Front wheels
(B) Rear wheels
(C) Front and rear wheels
(D) Propeller shaft

123. Brake lining consists mainly of

(A) Asbestos
(B) Copper
(C) Cast iron
(D) Aluminium

124. Shock absorber in a vehicle is used to

(A) Absorb the energy
(B) Dissipate the energy
(C) Decrease the energy
(D) Increase the energy

125. The coil spring in wishbore suspension is placed between the

(A) two wishbores
(B) upper wishbore and the cross member
(C) lower wishbore and the cross member
(D) shock absorber and the cross member

126. The laminated leaf spring, which is in common use, is of the type

(A) full elliptic
(B) semi elliptic
(C) one quarter elliptic
(D) three quarter elliptic

127. Which one of the following is a rubber spring?

(A) Leaf spring
(B) Coil spring
(C) Torsion bar
(D) Compression spring

128. The automobile chassis is mounted on the axles through

(A) Springs
(B) Dampers
(C) Shackles
(D) Thrust rods

129. The trailing shoe in drum brakes means the movement of the brake drum is

(A) from pivot end to force end
(B) from force end to pivot end
(C) towards the force end
(D) away from the force end

130. The only difference between torque converter and fluid coupling is the inclusion of following in torque converter

(A) Reaction member
(B) Idling member
(C) Driving member
(D) Driven member

131. In Epicyclic gear set, the neutral position is achieved by

(A) holding ring gear stationary
(B) holding sun gear stationary
(C) holding arm stationary
(D) holding no member of gear set stationary

132. In Synchromesh gear box, the synchronous rotation is achieved using the ———— between the synchronizer and the gear.

(A) Friction
(B) Adhesion
(C) Vibration
(D) Relative velocity

133. The double de-clutching process is applicable to

(A) Sliding mesh gear box
(B) Constant mesh gear box
(C) Wilson gear box
(D) Synchromesh gear box

134. The purpose of transmission in an automobile is to vary the

(A) speed of the automobile
(B) power of the automobile
(C) torque of the automobile
(D) acceleration of the automobile

135. In single plate clutch the torsional vibration is absorbed by

(A) Friction linings
(B) Cushion springs
(C) Coil springs
(D) Release levers

136. The component of torque converter that redirects the flow of oil to impeller is

(A) Turbine
(B) Impeller
(C) Stator
(D) Free wheel

137. The most widely used sensor for temperature measurement in vehicles is

(A) Thermocouple (B) RTD

(C) Thermistor (D) Strain gauge

138. In electronic power steering, most of the steering effort is supplied by the

(A) Hydraulic pump

(B) Hydraulic piston

(C) Electric motor

(D) Electronic control unit

139. Speed measuring sensors in vehicles are mostly

(A) Inductive type (B) Conductive type

(C) Linear type (D) Non linear type

140. Under charging

(A) results in battery plate sulphation

(B) increases specific gravity of the electrolyte

(C) produces excessive gassing

(D) increases the temperature

141. Electrolyte used in a lead acid cell is

(A) NaOH (B) Only H_2SO_4

(C) Only water (D) Dilute H_2SO_4

142. Cadmium test on battery is done to check

(A) Battery plates are defective or not

(B) Electrolyte level

(C) Loss of water

(D) Specific gravity of electrolyte

143. Silicon diode in charging system is used as

(A) Regulator (B) Cut-out

(C) Condenser (D) Rectifier

144. The dwell angle on a six-cylinder engine compared to a four cylinder engine is

(A) more

(B) less

(C) equal

(D) sometimes less and sometimes more

145. High energy ignition system allows the use of spark plugs

(A) with wider gaps

(B) with narrow gaps

(C) with long electrode

(D) with short electrode

146. Excessive contact breaker gap in ignition system of automobiles results in

(A) Burning of points

(B) Advanced timing

(C) Increased dwell

(D) Weak spark

147. The main function of a spark plug is

(A) To conduct the high potential from the ignition system into the combustion chamber

(B) To store excessive energy during power stroke

(C) To cool the engine

(D) To supply air and fuel in correct proportion

148. Spark energy which is sufficient to initiate combustion for A/F ratio 12 : 1 is

(A) Below 10 milli joules

(B) Above 100 joules

(C) Between 75 to 100 joules

(D) Between 50 to 75 joules

149. The available current in lend acid battery can be increased by

(A) Increasing Electrolyte quantity

(B) Increasing plate area

(C) Decreasing plate area

(D) Decreasing Electrolyte quantity

150. In a car, forward visibility of a driver is NOT improved by

(A) Moving the driver's seat closer to the windscreen

(B) Increasing the height of driver's seat from the floor

(C) Utilizing cornering headlamps at curves

(D) Cushioning effect of driver's seat

151. Which type of car has an aerodynamic drag coefficient between 0.2 and 0.3?

(A) Limousine

(B) Four door saloon

(C) Sports coupe

(D) Estate car

152. The battery performs the following EXCEPT

(A) Supplies current to crank the engine

(B) Supplies current when the charging system cant handle the load

(C) Supplies current to the ignition system with the engine off

(D) Supplies current to the ECM while is engine is off

153. Convertible is a type of car with

(A) soft top fixed roof

(B) Two seater

(C) Soft top folding roof

(D) Sports car

154. Primer is used in automobile to

(A) Provide a sound base for subsequent coatings

(B) Sealing down the scratches

(C) Levelling defects

(D) Provide a good finishing touch

155. The metal cover over the engine compartment is

(A) door skins
(B) boot
(C) scuttle
(D) bonnet

156. Good forward visibility to driver and all passengers is provided in bus of

(A) Single deck
(B) Double deck
(C) Articulated
(D) Two level single deck

157. Engine is located in front of the body in commercial vehicle of

(A) Semi-normal control type
(B) Forward control type
(C) Semi-forward control type
(D) Normal control type

158. What are deterministic vibrations?

(A) Vibrations caused due to known exciting force
(B) Vibrations caused due to unknown exciting force
(C) Vibrations which are periodic in nature
(D) Vibrations which are unperiodic in nature

159. Edely current damping is an example of

(A) Coulomb damping
(B) Hysteresis damping
(C) Viscous damping
(D) Dry friction damping

160. The energy dissipated due to viscous damping is proportional to the following power of the amplitude of motion

(A) 1
(B) 2
(C) 3
(D) 0.5

161. The steady state steering angle, when the vehicle is influenced by lateral force during cornering, Where, $\delta = \left(\frac{L}{R}\right) + [k_v . a_y]$

L = wheel base

R = wheel roling

kv = under stear gradient

$a_y = Vx^2 / R$

When $k_v > 0$; what is the effect steering angle;

(A) $\frac{m_f}{c_f} > \frac{m_r}{c_r} \Rightarrow (k_v) > 0 \Rightarrow \alpha_f > \alpha_r 1 =$ under stear

(B) $\frac{mf}{c_f} = \frac{mr}{c_r} \Rightarrow (k_v) = 0 \Rightarrow \alpha_f = \alpha_r =$ Neutral stear

(C) $\frac{mf}{c_f} < \frac{mr}{c_r} = (k_v) < 0 \Rightarrow \alpha_f < \alpha_r =$ over stear

(D) $(k_v) = 0 \Rightarrow \alpha_f > \alpha_r =$ Neutral stear

162. Longitudinal slip ratio is defined as for a vehicle when the influence of braking and acceleration

(A) $\frac{\sigma_x = [(r_{eff}) \cdot W_w] - V_x}{V_x}$ during braking ; $\sigma_x = \frac{(r_{eff}) W_w - V_x}{(r_{eff})(W_w)}$ during acceleration

(B) $\frac{\sigma_x = [(r_{eff}) W_w] - V_x}{(r_{eff})(W_w)}$ during braking ; $\sigma_x = \frac{(r_{eff}) W_w - V_x}{V_x}$ during acceleration

(C) $\sigma_x = (r_{eff}) W_w / V_x$ – braking ; $\sigma_x = \frac{(r_{eff}) W_w}{(r_{eff})(W_w)}$ during acceleration

(D) $\frac{\sigma_x = [(r_{eff}) W_w] - V_x}{V_x}$ during braking ; $\sigma_x = \frac{(r_{eff}) W_w + V_x}{(r_{eff})(W_w)}$ during acceleration

Where, σ_x = longitudinal slip ratio ;

$[(r_{eff}) W_w]$ – Equivalent rotational velocity

(V_x) – longitudinal velocity at the axle of the where

163. The battery is an electrochemical device. This means the battery

(A) makes chemicals by electronic means

(B) uses chemicals to provide electricity

(C) has non-chemical plates

(D) does not use an electrolyte

164. The output of hall effect sensors used for speed measurement applications is

(A) square wave with constant amplitude

(B) square wave with variable amplitude

(C) sine wave with constant amplitude

(D) sine wave with variable amplitude

165. The average coefficient of friction of asbestos base non-metallic lining is

(A) 0.4 (B) 1.2

(C) 1.5 (D) 10

166. The minimum number of compression rings is an automobile engine is

(A) one (B) two

(C) three (D) four

167. The function of a float chamber is a carburetor is to

(A) Store energy

(B) Prevent possible blockage of nozzle by dust particle

(C) Supply the fuel to the nozzle at constant pressure head

(D) Supply air

168. In CI engines, by increasing inlet air pressure the knocking tendency

(A) Increases

(B) Decreases

(C) Not affected

(D) First decreases and then increases

169. Which phenomenon occurs due to coincidence of two output signals generated manually as well as by control algorithm at the time of switching in manual mode?

(A) Bumped data transfer

(B) Bumpless transfer

(C) Coincidence data transfer

(D) Damped coincidence data transfer

170. Which of the following system provides excellent transient and steady state response?

(A) Proportional action

(B) Proportional + integral action

(C) Proportional + Differential action

(D) Proportional + Integral +Differential action

171. Proportional band of a controller is defined as the range of

(A) Measured variable to the set variable

(B) Output as the measured variable varies from maximum to minimum

(C) Measured variables through which the output varies from maximum to minimum

(D) Input as the measured variable varies from maximum to minimum

172. Dynamic response of first order system is of differential form is represented by the following expression

(A) $\tau_p . \frac{d\bar{y}(t)}{dt} = 0$

(B) $\tau_p . \frac{d\bar{y}(t)}{dt} + \bar{y}(t) = a$

(C) $\tau_p . \frac{d\bar{y}(t)}{dt} = k_p . \bar{u}(t)$

(D) $\tau_p . \frac{d\bar{y}(t)}{dt} + \bar{y}(t) = k_p \bar{u}(t)$

173. How detonation can be prevented?

(A) Low octane rating

(B) Enrichment of air fuel ratio

(C) High voltality fuel

(D) Increasing ignition timing

174. In case of a car equipped with disc brakes at the front wheels and drum brakes at the rear wheels, a fault in proportioning valve will influence

(A) Front brakes lock
(B) Front brakes drag
(C) Rear brakes lock
(D) Rear brakes slip

175. The process of ensuring equal braking effect at all the wheels inspite of unequal lining wear is called

(A) Retardation
(B) Compensation
(C) Stabilization
(D) Actuation

176. Generally the rear leaf springs are kept longer than the front leaf springs which prevents

(A) Excessive yaw
(B) Excessive roll
(C) Excessive bounce
(D) Excessive air resistance

177. Identify the incorrect statement :

Spring eyes for light commercial vehicles utilizes rubber bushes

(A) Rubber bushes are quiet in operation
(B) The wears on the bush is negligible
(C) Lubrication is required
(D) Allow for slight assembly misalignment

178. When braking, the brake shoe is moved outward to force the brake lining against the

(A) Cylinder
(B) Anchor pin
(C) Brake drum
(D) Wheel rim

179. Apart from hydrocarbons, the main pollutants in the engine exhaust are

(A) CO and CO_2 (B) CO_2 and NO_x

(C) CO and NO_x (D) CO_2 and H_2O

180. Evaporative emission in S.I engines account for emission of

(A) 50% CO (B) 50% HC

(C) 100% HC (D) 25% HC

181. EGR is the most effective way of reducing emission of

(A) NO_x (B) CO

(C) HC (D) CO and HC

182. Three way catalytic converters reduce 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

183. Blue smoke in diesel engines indicate

(A) NO_x (B) HC

(C) CO (D) unburnt oil

184. Photochemical smog is mainly due to

(A) NO_x and HC (B) Soot and particulate matter

(C) CO and CO_2 (D) Excess O_2

185. NO_x emission is maximum in S.I engines when the air-fuel ratio is

(A) Nearly stoichiometric (B) Lean

(C) Rich (D) None of the above

186. The measurement principle of chemiluminescence analyzer is based on the

(A) Reaction between NO and O_2

(B) Reaction between NO and O_3

(C) Reaction between NO and H_2O

(D) Reaction between NO and air

187. The different parts of the Worldwide Motor Cycle Test Cycle (WMTC) depends upon

(A) the engine size

(B) the maximum vehicle speed

(C) the engine size or the maximum vehicle speed

(D) the engine size and the maximum vehicle speed

188. BS VI emission standard is applicable from

(A) 2019

(B) 2020

(C) 2021

(D) 2022

189. The following is not actually a pollutant for local environment but it is a green house gas

(A) CO

(B) CO_2

(C) O_2

(D) NO_x

190. A premature rear wheel lockup in the brake system is due to

(A) Weak shoe return springs

(B) A detective booster

(C) Pedal linkage binding

(D) Front caliper pistons seized

191. Worn or defective or broken synchronizer and incomplete disengagement of clutch cause

(A) transmission jumps out of gear

(B) gear clash when shifting

(C) transmission noisy in reverse

(D) transmission oil leaks

192. In most of the passenger cars, clutch-pedal free play should be about

(A) 10 mm

(B) 25 mm

(C) 50 mm

(D) 100 mm

193. Air brakes are mostly used in

(A) Passengers cars

(B) Light vehicles

(C) Heavy Commercial vehicles

(D) Three wheelers

194. In a hydraulic clutch system

(A) The clutch pedal push rod is in contact with the marter cylinder piston

(B) Fluid pressure from the slave cylinder operator the marter cylinder

(C) There is a specified clearance between the clutch relative bearing and the pressure plate diaphragm spring

(D) A push rod is connected between the slave cylinder and the clutch relative bearing

195. For maximum thermal efficiency, the fuel-air mixture in SI engines should be

(A) Lean

(B) Rich

(C) Stoichiometric

(D) May be rich or lean

196. A vehicle with a power recirculating ball steering gear has a complaint of steering wander and reduced road fuel. The most likely cause of this problem is

(A) a loose sector lash adjustment

(B) low power steering fluid level

(C) a loose idler arm

(D) a best pitman arm

197. After a hot engine is shut down and allowed to cool off, the upper radiator lose gradually collapses. The most likely came of this problem is

(A) a defective vacuum valve in the radiator cap

(B) a defective pressure relief valve in the radiator cap

(C) an engine thermostat that is stuck open

(D) a leaking water pump seal

198. A thermostat is opened by a ———— in a copper cup.

(A) wax pellet

(B) metal pellet

(C) spring

(D) wax and powdered metal pellet

199. A torx screwdriver has an ———— tip.

(A) two-proxy

(B) six-proxy

(C) four-proxy

(D) eight-proxy

200. A coolant with Hybrid Organic Additive Technology (HOAT) additive is ———— in color.

(A) Green

(B) Yellow

(C) Blue

(D) Black

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