Question Booklet Code : [redacted]

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

2019
AUTOMOBILE ENGINEERING
(DEGREE Std.)

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 Code 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. **Do not make any marking in the question booklet except in the sheet before the last page of the question booklet, which can be used for rough work. This should be strictly adhered.**
11. 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.
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 venturi in the carburettor causes the

(A) Increase of air velocity

(B) Decrease of air velocity

(C) Decrease of fuel flow

(D) Decrease of manifold vacuum

2. Supercharging is the process of supplying intake charge to the engine

(A) At a pressure above atmospheric

(B) At a pressure below atmospheric

(C) At same pressure of atmospheric

(D) At critical pressure

3. Turbo charger is used for

(A) Increasing engine power and decreasing emissions

(B) Reducing engine power and decreasing emissions

(C) Increasing engine power and increasing emissions

(D) Reducing engine power and increasing emissions

4. The maximum pressure in the lubrication system is controlled by

(A) Oil Pump (B) Oil Filter

(C) Relief valve (D) Safety valve

5. The most important property of lubricant to be considered in engine application is

(A) Density (B) Viscosity

(C) Thermal Conductivity (D) Surface tension

6. Match the following :

(a)	Magnesium alloy wheel	1.	Easy to change the wheel
(b)	Aluminum alloy wheel	2.	Wheel Cover
(c)	Disc wheel	3.	Less prone to corrosion
(d)	Wire wheel	4.	High impact strength

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

7. Cars that use independent rear suspension generally offer :

I. Better Fraction On Rough Roads

II. An Improved Ride Quality

Which option best completes the statement?

(A) I only
(B) II only
(C) Both I and II
(D) Neither I nor II

8. Lateral bending of the Frame side members may be caused on account of

(A) Weight of passengers
(B) Side wind
(C) Engine torque
(D) Braking torque

9. To take care of the difference in the driving angle as rear axle moves up and down, the propeller shaft has one or more

(A) Slip joints
(B) Elbow joints
(C) Release joints
(D) Universal joints

10. The ursprung mass in a vehicle system is mainly composed of

(A) The frame assembly
(B) Gearbox of propeller shaft
(C) Axle and parts attached to it
(D) Engine and associated parts

11. Which of the statement is INCORRECT with respect to forward control chassis layout?

(A) Better utilization of space
(B) Enhanced rearward visibility
(C) Engine located below driver's cabin
(D) Improved forward visibility

12. How many universal joints are needed to nullify the speed fluctuations of drive shaft?

(A) 2
(B) 3
(C) 1
(D) 4

13. The tilt of the king pin or ball joint centre line from vertical axis with respect to plane of the wheel

(A) Camber
(B) Caster
(C) King pin inclination
(D) Toe-in

14. The fundamental condition of true rolling is

(A) all wheels must rotate in uniform speed
(B) all wheels must rotate about common centre
(C) all wheels can rotate independently
(D) inner wheels rotate faster than outer wheels

15. What type of tyre has a slow deflation when punctured and offers considerable resistance to side deflection when the vehicle is cornered?

(A) tubed cross-ply
(B) tubed radial-ply
(C) tubeless cross-ply
(D) tubeless radial-ply

16. Driving thrust and torque reaction is taken in a Hotchkiss drive by

(A) road springs
(B) radius rods
(C) swinging shackle
(D) propeller shaft

17. Hypoid gears require special lubricant because

(A) tooth is made of soft material
(B) tooth is made of hard material
(C) such gears rotate faster
(D) sliding action is there between the teeth

18. The braking force at the wheels is ———— proportional to the coefficient of friction between the road and tyre and is ———— proportional to the weight of the vehicle.

(A) directly, inversely
(B) directly, directly
(C) inversely, directly
(D) inversely, inversely

19. In a hydro-elastic suspension system, the rubber is used as a ———— and the fluid under pressure acts as a ————

(A) Spring, Spring eye
(B) Spring eye, Spring
(C) Spring, Damper
(D) Damper, Spring

20. Identify the INCORRECT statement:

When Coil spring is compared with leaf spring:

(A) there is no interleaf friction
(B) has good ride qualities
(C) energy stored per unit volume is almost equal
(D) available in variable rate

21. Identify the INCORRECT statement:

Statement :

Helper springs are provided on many commercial vehicles in addition to main leaf springs.

(A) Allow for a wide range of loading.
(B) When vehicle is lightly loaded, there helper springs do not come into operation.
(C) Used on rear suspension only.
(D) When ends of helper springs touch the special bracket fixed to the cross member, the helper springs come into operation.

22. The severity of electric braking is controlled by means of

(A) electromagnet
(B) rheostat
(C) adjusting screw
(D) anchor pin

23. When ignition key is ON, the instrument panel brake warning light turns on if the following brake is applied.

(A) parking-brake
(B) service brake
(C) dual brake
(D) disc brake

24. As applied to braking system, the term 'brake fad' means

(A) decrease in friction due to wear
(B) fall-off in efficiency due to heat
(C) increase in effort as the shoe clearance increases
(D) discoloration of the lining when it is soaked with oil

25. The provision made to allow a leaf spring to vary its length is a

(A) swinging shackle
(B) rubber u-bolt mounting
(C) sliding centre bolt
(D) spline in the spring eye

26. If brake wheels get locked before the vehicle stops, the vehicle is said to be

(A) rubbing
(B) sliding
(C) rolling
(D) skidding

27. The steering knuckle attaches to the lower-control arm by a

(A) king pin
(B) tension strut
(C) busing
(D) ball joint

28. The blades of stator in a torque converter have a shape of

(A) round
(B) flat
(C) curved
(D) square

29. In automatic transmission, the device which converts the hydraulic pressure to mechanical movement is called

(A) Servo
(B) Brake
(C) Motor
(D) Pump

30. The hydrostatic drive uses the following property of the fluid

(A) Viscosity
(B) Density
(C) Pressure
(D) Kinetic Energy

31. The gear ratio of a torque converter gradually changes to that fluid coupling when the vehicle

(A) speed decreases
(B) speed increases
(C) descending steep grades
(D) climbing hill

32. In neutral position of sliding mesh gear box, the no. of gears which are in engaged position is

(A) 0
(B) 1
(C) 2
(D) 3

33. The dog clutch is used in

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

34. The floor board clearance is adjusted in clutch by

(A) adjusting length of the clutch linkages

(B) bending the clutch lever

(C) ✔ means of screw at lower end of clutch pedal

(D) pedal lash

35. What are the occasions in which clutch should be disconnected?

(A) accelerating and braking

(B) climbing over a slope

(C) ✔ starting, shifting gear, stopping and idling

(D) moving down the slope

36. The vehicle application for an oxygen sensor in exhaust system is to provide a closed loop feed back to control

(A) ✔ Air-fuel ratio

(B) CO emission

(C) NOx emission

(D) HC emission

37. Electronic suspension is used to achieve ———— between light and heavy load conditions.

(A) constant spring rate

(B) ✔ constant suspension frequency

(C) constant height between road and vehicle body

(D) constant damping

38. The air bag of an automobile is made of

(A) Rubber fabric

(B) ✔ Nylon fabric

(C) Composite fabric

(D) Thermosetting Plastic fabric

39. In electronic power steering, the torque sensor is nothing but

(A) Speed Sensor

(B) Position Sensor

(C) Hall effect Sensor

(D) ✔ Magnetic Sensor

40. Compared to hot plug, a cold plug has
(A) Small area exposed to the combustion gases
(B) Larger area exposed to the combustion gases
(C) Equal area exposed to the combustion gases
(D) No heat transfer area.

41. In automobile ignition system, the ignition component that steps up voltage is the
(A) Battery
(B) Ignition Coil
(C) Capacitor
(D) Distributor

42. The basic principle of distributor less ignition system is known as
(A) lost spark plug
(B) lost distribution
(C) lost spark
(D) lost voltage

43. Hot running engines require
(A) hot spark plug
(B) cold spark plug
(C) taper seat spark plug
(D) washer seat spark plug

44. The one way clutch of a pre-engaged starter motor
(A) starts the motor to crunk the engine
(B) stops the motor when engine starts
(C) prevents the engine driving the motor
(D) prevents the motor crunking the engine

45. The gear reduction between the starter and the engine flywheel is generally
(A) 5-10
(B) 10-16
(C) 16-20
(D) 20-25

46. In DC generator of automobiles, the magnetic field is generated in
(A) stator
(B) armature
(C) commutator
(D) carbon brushes

47. Pitching moment is influenced by ———— in a moving vehicle.

(A) Lift force
(B) Cross windforce
(C) Drag force
(D) Side thrust

48. Which one of the following vehicle is NOT an LCV?

(A) Tata Ace
(B) Ashok Leyland Stila
(C) Tata Manza
(D) Ashok Leyland Dost

49. Thermal and acoustic insulation is usually elaborate in ———— bus tyre.

(A) Suburban
(B) Long distance
(C) Touring
(D) Articulated

50. Use of longitudinal channel beams and tubular cross members results in

(A) increased bending strength
(B) increased torsional flexibility
(C) reduced torsional flexibility
(D) increased structural damping

51. Door is opened and closed/locked by

(A) sensor
(B) rheostat
(C) actuator
(D) cable and pulley

52. Sedan, saloon, coupe and hatch back are types of body of

(A) trucks
(B) cars
(C) buses
(D) vans

53. The two types of wind tunnels are

(A) open and closed cross loop

(B) ✓ open and closed circuit

(C) controlled velocity and uncontrolled velocity

(D) fixed velocity and variable velocity

54. The scuttle panel is

(A) near seat back construction

(B) enclosed car body

(C) window above quarter panel

(D) ✓ between bonnet and wind screen

55. Small coaches for long distances have the seating capacity of

(A) 20 – 25

(B) 15 – 26

(C) ✓ 16 – 30

(D) 31 – 45

56. In bus body significant distortion of the overall stiffness occurs at

(A) front portion

(B) rear portion

(C) under floor

(D) ✓ doors and large openings

57. Which type of vibrations are also known as transient vibration?

(A) Undamped vibrations

(B) ✓ Damped vibrations

(C) Torsional vibrations

(D) Transverse vibrations

58. Slip angles at front and rear tires for steady state handling characteristics of the vehicle when the vehicle is influenced by lateral force

(A) $\alpha_f = \frac{mf}{2C_{\alpha f}}, \alpha_r = \frac{mr}{2C_{\alpha r}}$

(B) ✓ $\alpha_f = \frac{mf}{2C_{\alpha f}} \cdot \frac{Vx^2}{R}; \alpha_r = \frac{mr}{2C_{\alpha r}} \cdot \frac{Vx^2}{R}$

(C) $\alpha_f = \frac{mr}{2C_{\alpha r}} \cdot \frac{Vx^2}{R}; \alpha_r = \frac{mf}{2C_{\alpha f}} \cdot \frac{Vx^2}{R}$

(D) $\alpha_f = \alpha_r = Vx^2 / R$

Where, mf, mr = Front and rear wheel mass. V_x = Vehicle speed, R = Wheel radius, $C_{\alpha f}, C_{\alpha r}$ = correcting stiffness of tires with front and rear wheel.

59. The aerodynamic drag force under the influence of longitudinal force of an vehicle is expressed as

(A) $(F_{aero}) = \frac{1}{2} e C_d \cdot A_f$

(B) $(F_{aero}) = \frac{1}{2} e V_{wind}^2$

(C) $(F_{aero}) = \frac{1}{2} e C_d \cdot A_f \cdot V_{wind}^2$

(D) ✓ $(F_{aero}) = \frac{1}{2} e C_d A_f [V_x + V_{wind}]^2$

Where – $e \rightarrow$ density of air

$C_d \rightarrow$ coefficient of drag

V_x – longitudinal vehicle velocity

$A_f \rightarrow$ Frontal area of the vehicle

$V_w \rightarrow$ wind velocity

60. The effectiveness of the passive suspension system is determine by using following modes of transfer function

(1) Acceleration transfer function $H_4(S) = \frac{\ddot{Z}_s(S)}{\dot{Z}_r(S)}$

(2) Raffle space transfer function $H_{RS}(S) = \frac{Zs(S) - Z_4(S)}{\dot{Z}_r(S)}$

(3) Tire deflection transfer function $H_{TD}(S) = \frac{Z_4(S) - Z_r(S)}{\dot{Z}_r(S)}$

(A) Acceleration transfer and raffle space transfer only

(B) Raffle space and tire deflection transfer

(C) Acceleration and fix deflection transfer

(D) ✓ Acceleration, raffle space and tire deflection transfer

61. The spark plug gap can be checked by

(A) feeler gauge
(B) pressure gauge
(C) vacuum gauge
(D) Manometer

62. The just charged battery should not be tested for open–Circuit voltage test with voltmeter because

(A) The gases on the plate surfaces will cause a high reading
(B) The gases on the plate surfaces will be harmful
(C) The gases on the plate surfaces will dilute electrolyte
(D) The gases on the plate surfaces will damage the volt meter

63. Sequence of coolant circulation in automotive engine cooling system is

(A) pump–radiator–engine block–Cylinder head
(B) pump–engine block–Cylinder head–Radiator
(C) pump–engine block–radiator–Cylinder head
(D) pump–radiator–engine head–Cylinder block

64. A single jet carburettor tends to supply richer mixture during

(A) Starting
(B) Editing
(C) Low speed operation
(D) High speed operation

65. Detonation in S.I engines occur due to

(A) Pre ignition of the charge before the spark
(B) Sudden ignition of the charge before the spark
(C) Auto Ignition of the charge after the spark struck
(D) Simultaneous ignition in Cylinder and intake manifold

66. The number of operational amplifiers require for designing of electronic PID controller is;

(A) 1 (B) 2

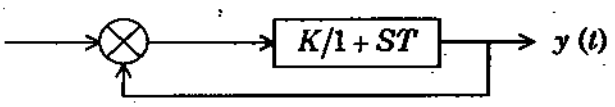
(C) 3 (D) 6

67. The integral control is used for ———— in the Dynamic response characteristics of a vehicle system as a controller

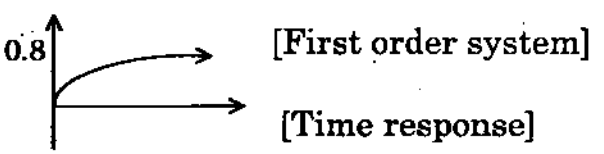
(A) Increasing the steady state error (B) Decreasing the steady state error

(C) Increasing the noise and stability (D) Decreasing the damping coefficient

68. If a first order system and its time response to a unit step are as shown below; the gain K is;



and



(A) 0.25 (B) 0.8

(C) 1 (D) 4

69. A unit step is applied at $t = 0$ to a first order system without time delay. The response has the value of 1.264 units @ $t = 10$ mins, and 2 units of steady state. The transfer function of the system is ————

(A) $3/[1 + 600s]$ (B) $2/[1 + 500s]$

(C) $5/[1 + 220s]$ (D) $2/[1 + 600s]$

70. A car is running at a constant speed of 50 km/hr, which of the following is the feedback element for the driver?

(A) clutch
(B) eyes
(C) needle of the speedometer
(D) steering wheel

71. In master cylinder, the primary piston is the piston that is

(A) Directly operated by the pushrod
(B) Nearest the front end of the car
(C) Hydraulically operated by the secondary piston
(D) Needed only on vehicles with drum brakes

72. Rear end squat in coil spring suspension occurs

(A) During braking
(B) During acceleration
(C) As the front-end dives
(D) Only when the front suspension is defective

73. Zinc liners between the leaves of spring are sometimes used to

(A) Improve fatigue life
(B) Decrease vibrations
(C) Provide damping
(D) Prevent squeaking

74. To ensure an assisted stop if the engine starts, a hydro-boost unit uses

(A) An accumulator in the booster
(B) A check valve in the hydraulic hose
(C) An electric motor-driven hydraulic pump
(D) Brake fluid for the booster and brake hydraulic systems

75. The defect of spray painting as the result of too much varnish applied is

(A) Peeling
(B) Wrinkling
(C) Blistering
(D) Pitting

76. Lead Compounds were added in gasoline to

(A) reduce HC emission
(B) reduce knocking
(C) reduce exhaust temperature
(D) increase power output

77. Rhodium promotes the reduction of

(A) HC
(B) CO
(C) NOx
(D) CO and HC

78. The measurement principle for CO emission is

(A) Non-dispersive infrared
(B) Non-destructive infrared
(C) Non-despersive ionization detector
(D) Non-destructive ionization detector

79. BS II emission standard for motor cycles was introduced in India in

(A) 1995
(B) 2000
(C) 2005
(D) 2010

80. The highly toxic gas among all the automobile emissions is

(A) CO_2
(B) CO
(C) NOx
(D) Smoke

81. Efficient operation of Catalytic Converters require maintenance of

(A) Temperature
(B) Equivalence ratio
(C) Temperature and Equivalence ratio
(D) Pressure

82. Fumigation technique is used to control

(A) HC
(B) NOx
(C) CO
(D) Smoke

83. The incandescent lamp light source used in absorption type strokemeters is provided with a colour temperature range of

(A) 1000 - 1570 K
(B) 2000 - 2750 K
(C) ✓ 2800 - 3250 K
(D) 3300 - 4050 K

84. NPIR analyzers are not suitable for measurement of NO_x because

(A) NO_x is colourless
(B) NO_x may explode in the analyzer
(C) ✓ Due to its weak absorbance
(D) NO_x does not receive sensitivity from NPIR

85. Steening link rod is also called as ————

(A) Track rod
(B) Tie rod
(C) ✓ Drag link
(D) Pitman arm

86. All these statements about ball joints are true except

(A) A non load carrying ball joint wears faster than a load carrying ball joint
(B) If the lower control arm is mounted above the lower end of the stearing knuckle, the ball joint between these components is compressed loaded
(C) A load carries ball joint supports the vehicle weight
(D) ✓ In a ball joint with wear indicating capabilities, the grease fitting shoulder should be extended from the joint housing

87. All of these statements about gear's and gear sets are true except

(A) Helical gear teeth are cut an angle in relation to the gear centre line
(B) In an over drive gear set, the driven gear is larger than the drive gear
(C) ✓ Back cash is the amount of movement between the teeth on two gears
(D) Helical gear teeth create axial thrust on the gear

88. A vehicle with a hydraulic clutch has a clutch slipping problem that allows the engine rpm to increase without the proper increases in vehicle speed. The clutch master cylinder has the proper level and type of fluid. The cause of this problem could be

(A) Air in the hydraulic clutch system
(B) Improper clutch free play adjustment
(C) ✔ Oil contamination on the clutch facings
(D) Fluid leaking part the slave cylinder piston

89. Piston rings installed upside down may cause

(A) ✔ Excessive oil consumption
(B) Broken piston lands
(C) Rapid cylinder-wall wear
(D) Over heating

90. A typical piston clearance in the cylinder is

(A) 0.100 inch or 2.5 mm
(B) 0.010 inch or 0.25 mm
(C) ✔ 0.001 inch or 0.025 mm
(D) 0.0001 inch or 0.0025 mm

91. Suspension topping or bottoming out occurs due to

(A) Loose stabilizer bars
(B) Loose U bolts
(C) ✔ Defective shock absorber
(D) Weak leaf spring clamps

92. Worn lining, warped brake shoes, worn brake drums and loose parts results in

(A) grabing brakes
(B) good braking
(C) ✔ noisy brakes
(D) pulls to one side when braking

93. Clutch dragging is noticeable

(A) during acceleration
(B) during starting
(C) at high speed
(D) ✔ when shifting gears

94. The function of Antilock brake system(ABS) is that

(A) Reduces the stopping distance
(B) Minimizes the brake fade
(C) ✔ Maintains directional control during braking by preventing the wheels from locking
(D) Prevents nose drives during braking and thereby postpones locking of the wheels

95. Limitation of air cooling system is

(A) Applicable only to large engines

(B) Overcooling

(C) Higher working temperature compared to liquid cooling

(D) Complicated system

96. An effective method of prevention of detonation is the

(A) Cooling of the change

(B) Heating of the change

(C) Locating spark plug at one end of the combustion chamber

(D) Reducing the quantity of aromatics in the fuel used

97. The purpose of thermostat is to keep the engine

(A) hot (B) cool

(C) at desired temperature (D) at low pressure

98. At very low temperatures, the ice tends to form in the carburettor in the

(A) Air cleaner (B) Venturi

(C) Idle jet (D) Float

99. In a six cylinder car engine the angle between the successive crank throws is

(A) 60° (B) 90°

(C) 120° (D) 180°

100. Decreasing the cooling water temperature in SI engines, the knocking tendency.

(A) Increases (B) Decreases

(C) Remains unaltered (D) Increases and then decreases

101. Stoichiometric air-fuel ratio of Petrol is roughly

(A) 50 : 1
(B) 25 : 1
(C) ✓ 15 : 1
(D) 1 : 1

102. In a four-storke 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) Four times the speed of the Crank Shaft

103. Maximum Flame Temperature is obtained when the equivalence ratio is

(A) ✓ 1.1 to 1.2
(B) 2.1 to 2.5
(C) 1.5 to 2.0
(D) 5 to 10

104. The device used for increasing the amount of charge inside to engine cylinder is known as

(A) ✓ Super Charger
(B) Pump
(C) Condenser
(D) Evaporator

105. The Ignition quality of petrol is measured by

(A) Calorific Value
(B) Specific Fuel Consumption
(C) ✓ Octane number
(D) Cetane number

106. The function of quench area in a wedge-shaped Combustion Chamber is to

(A) Improve the Compression ratio
(B) ✓ Cool the end gases
(C) Decrease the volume of Combustion Chamber
(D) Increase the area of Combustion Chamber

107. The primary function of lubrication is to

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

108. A tyre is designated as P 205/65 R16 95V. Identify the aspect ratio of the tyre

(A) 205 (B) 65

(C) 16 (D) 95

109. Identify the INCORRECT statement with respect to semi-floating axle :

(A) The wheel hub is directly connected to the axle shaft

(B) The inner end of the axle shaft is splined and is supported by the final drive unit

(C) The outer end is supported by a single bearing inside the axle casing

(D) All the loads are taken by differential care

110. ———— allows the driving wheels to turn by different speed, when the vehicle goes around a curve and at the same time delivers power to both the wheels.

(A) Differential (B) Axle shafts

(C) Transfer case (D) Axle casing

111. During dynamic conditions, the change in effective length of the propeller shaft is compensated by ————

(A) Universal joints (B) Sliding joints

(C) Turning joints (D) Shackles

112. In case of power assisted steering system failure, identify the correct statement:

(A) Steering system will not work

(B) Steering system will work but directional stability is affected

(C) Steering system will work with decreased mechanical effort

(D) Steering system will work with increased mechanical effort

113. ———— does not influence wheel wander.

(A) Excessive caster (B) Loose steering linkages

(C) Worn steering gears (D) Excessive side thrust

114. One purpose of a recirculating ball type steering gear is to reduce the

(A) operating friction
(B) operating cost
(C) toe-out during turns
(D) number of parts

115. The frame may get distorted to a parallelogram shape due to

(A) weight of the vehicle
(B) weight of passengers
(C) cornering force
(D) wheel impact with road obstacle

116. On most floating-caliper brakes, the caliper mounting bracket is bolted securely to the;

(A) Rear axle
(B) steering knuckle
(C) lower control arm
(D) caliper

117. The uniform wear of frictional pads is a feature of ———— brake system.

(A) drum
(B) disc
(C) parking
(D) electric

118. The parking brakes employed in vehicles are ———— operated.

(A) mechanically
(B) hydraulically
(C) pneumatically
(D) electrically

119. If the braking force on the wheel is less than the force of adhesion, the vehicle gradually

(A) accelerates
(B) decelerates
(C) move with constant speed
(D) tends to pitch

120. With respect to leaf springs, identify the INCORRECT statements from the following.

(i) Smallest blades has eyes on its ends.

(ii) Lengthiest blade is called master leaf.

(iii) All the blades are bound together by means of steel straps.

(iv) Spring is supported on the axle by means of thrust washers.

(A) (i) and (ii) only (B) (ii) and (iii) only

(C) (iii) and (iv) only (D) (i) and (iv) only

121. Identity the correct choice.

Statements:

The oscillations are restricted to a lower level by the ———— and the energy of road shock causes the ———— to oscillate.

(A) Spring, Spring eye (B) Spring eye, Spring

(C) Spring, Damper (D) Damper, Spring

122. The Alternator Produces on Alternating Current in its

(A) rotor field coil (B) stator windings

(C) regulator (D) load circuit

123. The minimum distance required to stop the vehicle by the application of brake is called

(A) braking distance (B) stopping distance

(C) holding distance (D) deceleration distance

124. The braking torque developed by the leading shoe is

(A) lesser than that of trailing shoe (B) equal to that of trailing shoe

(C) higher than that of trailing shoe (D) double that of trailing shoe

125. Air brakes are commonly used in

(A) Two wheelers
(B) Cars
(C) Trucks
(D) Three Wheelers

126. 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) flywheel
(C) clutch shaft
(D) release levers

127. The gears in sliding mesh gear box are

(A) Spur gears
(B) Helical gears
(C) Bevel gears
(D) Worm gears

128. Clutch slip occurs if

(A) the resisting torque on the driven shaft is equal to the friction torque at the clutch
(B) the resisting torque on the driven shaft is less than the friction torque at the clutch
(C) the resisting torque on the driven shaft exceeds the friction torque at the clutch
(D) the resisting torque on the driven shaft becomes zero

129. In the friction disc, torsional vibration is absorbed by the

(A) cushion bolts
(B) coil springs
(C) waved pads
(D) friction pads

130. The merit of hypoid gear as final drive is

(A) smooth power flow
(B) lower floor board
(C) high torque multiplication
(D) cheap to manufacture

131. When the slip is 100%, the fluid coupling can

(A) transmit 100% of engine torque
(B) not transmit torque
(C) transmit very little torque
(D) cause engine stall

132. The following component is missing in diaphragm clutch in comparison with coil spring clutch

(A) Throwout bearing
(B) Friction plate
(C) Release Lever
(D) Pressure plate

133. The component of the torque converter that allows multiplication of torque is the

(A) turbine
(B) impeller
(C) free wheel
(D) stator

134. The most comfortable position of the driver's body is achieved when bulk of the body weight is taken by the

(A) Ischial bone
(B) Spinal cord
(C) Thigh bones
(D) Calf muscles

135. Bevel gears are used to transmit power

(A) from one shaft to another at an angle
(B) in opposite direction
(C) in the same direction
(D) at right angle

136. The use of reverse idler is to

(A) change the direction of rotation/power flow
(B) change the gear ratio
(C) change the speed ratio
(D) change the torque ratio

137. The usual clutch lining material is

(A) cement sheet
(B) asbestos fibres
(C) hard rubber
(D) natural rubber

138. In automobile airconditioning system, High pressure Vapour refrigerant is obtained using

(A) Condensor
(B) Compressor
(C) Throttle Valve
(D) Evaporator

139. Technician *A* says compressing Refrigerant vapour increases its pressure and reduces its temperature. Technician *B* says compressing refrigerant vapour increases the rate of heat transfer through the condensor. Who is right?

(A) *A* only
(B) *B* only
(C) Both *A* and *B*
(D) Neither *A* nor *B*

140. To maintain Pressure difference between the condenser and evaporator of car A/C, the following device is used.

(A) Flow control valve/expansion valve
(B) Compressor
(C) Rectifier
(D) Generator

141. Modern Vehicle air conditioners use ———— as refrigerant

(A) R-11
(B) R-12
(C) R-22
(D) R-134 c

142. Spark plug gap varies from

(A) 0.4 mm to 1.0 mm
(B) 2 mm to 5 mm
(C) 6 mm to 10 mm
(D) 12 mm to 15 mm

143. The dwell angle is

(A) number of degrees travelled by distributor cam while the ignition points are closed
(B) the distance between the cam lobes.
(C) the angle at which the heat contacts the cam
(D) the time for which the points remains opened

144. The starter motor is driven by
(A) chain drive
(B) gear drive
(C) flat belt drive
(D) v-belt drive

145. The specific gravity of electrolyte in a lead-acid battery is approximately
(A) 1.0
(B) 1.22
(C) 1.28
(D) 1.30

146. The time in minutes that a fully charged battery at 27°C can deliver 25 amperes is the
(A) charging rate
(B) reserve capacity
(C) cold – cranking rate
(D) ampere – hour rate

147. Identify the correct statement(s)
The interior of the bonnet is provided with materials that ensures
(i) Acoustic insulation
(ii) Better visualization
(iii) Directional stability
(iv) Thermal insulation
(A) (ii) and (iii)
(B) (iii) only
(C) (i) and (iv)
(D) (ii) only

148. _____ is in between engine compartment and passenger compartment in a vehicle.
(A) Firewall
(B) Body sill
(C) Scuttle panel
(D) Tunnel

149. What type of windtunnel is used for full scaled car model testing?
(A) Sub-sonic
(B) Trans-sonic
(C) Super-sonic
(D) Hyper-sonic

150. Solar radiation is increased inside the passenger compartment by increasing _____ of a car.
(A) Roof camber
(B) Windshield angle
(C) Bonnet angle
(D) Diffuser angle

151. Unitized body is used for

(A) increased vibration in vehicle structure

(B) ✔ substantial weight reduction

(C) higher cargo floor

(D) less noise transmission to passenger compartment

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

(A) perpendicular

(B) ✔ parallel

(C) at an angle

(D) opposite

153. A body designed to provide a desired reaction force when in motion relative to surrounding air is

(A) front spoiler

(B) ✔ air foil

(C) wake

(D) semifast back

154. Which one is not aerodynamic force?

(A) lift force

(B) drag force

(C) ✔ cornering force

(D) side force

155. The angular oscillation of the vehicle about longitudinal axis is

(A) pitching

(B) rolling

(C) ✔ yawing

(D) bouncing

156. The combination of tractor and semi trailer unit is

(A) double deck

(B) two level single deck

(C) luxury coach

(D) ✔ articulated vehicle

157. Two springs have spring stiffness of 1500 N/m and 2000 N/m respectively. If they are connected in series, what is the spring stiffness if they are replaced by an equivalent system?

(A) 3500 N/m
(B) 1750 N/m
(C) 1166 N/m
(D) ✔ 857.63 N/m

158. The frequency of oscillation of the response of a system will be higher if the imaginary part of the rmf is

(A) Smaller
(B) ✔ Zero
(C) Larger
(D) Infinite

159. For a Single Degree Of Freedom (SDOF) system, when the mass (m) increases, what is the effect of natural period (T) and base shear (V)?

(A) T decreases and V increases
(B) T decreases and V decreases
(C) T increases and V increases
(D) ✔ T increases and V decreases

160. The angle between the king-pin centre line and the vertical in the plane of the wheel is called

(A) ✔ Castor angle
(B) Camber angle
(C) King-pin inclination
(D) Toe-out

161. A worm gear is used as the pinion for the rack and pinion type of steering gearbox, because it

(A) reduces the amount of kick back for large steering angles
(B) makes the steering more responsive
(C) ✔ improves steering comfort when steering wheel is turn to affect small changes in the direction of forward motion
(D) allien the steering wheel to be turned by a greater amount when steering

162. The equation of motion of the two degree of freedom quarter-car suspensions for semi-active suspension system is referred as;

(A) ✓ $\dot{m}_u[\ddot{Z}_u] + k_t[Z_u - Z_r] - b_s[\dot{Z}_s - \dot{Z}_u] - k_s[Z_s - Z_u] = b\,Semi(t)[\dot{Z}_s - \dot{Z}_u]$

(B) $\dot{m}_u[\ddot{Z}_u] + k_t[Z_u - Z_r] - b_s[\dot{Z}_s - \dot{Z}_u] + k_s[Z_s - Z_u] = 0$

(C) $\dot{m}_u[\ddot{Z}_u] + k_t[Z_u - Z_r] + b_s[\dot{Z}_s - \dot{Z}_u] + k_s[Z_s - Z_u] = 0$

(D) $\dot{m}_u[\ddot{Z}_u] + k_t[Z_u - Z_r] + b_s[\dot{Z}_s - \dot{Z}_u] + k_s[Z_s - Z_u] = b\ Semi(t)[\dot{Z}_s - \dot{Z}_u]$

where, k_t, k_s – tire and suspension stiffness.

Z_s, Z_u – spring, unspring mass displacement

Z_r – road profile input. b_s – suspension despring coefficient

(m_u) – unspring mass; $b\,Semi$ –variable despring coefficient for Semi active damper

163. The type of spring used to achieve any linear or non-linear load deflection characteristic is

(A) Spiral spring
(B) ✓ Bellerille (cored disk) spring
(C) Non-Ferrous spring
(D) Torsion spring

164. Due to air conditioning, the fuel consumption of the car will

(A) ✓ Increase
(B) Decrease
(C) Not be affected
(D) Be zero

165. An alternator frame is made of

(A) Cast iron
(B) Brass
(C) ✓ Aluminium
(D) Copper

166. A possible cause of all brakes dragging is

(A) a loose wheel bearing
(B) a piston stuck in a wheel cylinder or caliper
(C) ✓ insufficient brake–pedal free travel
(D) insufficient pedal reserve

167. Thermostat is used in radiators to

(A) Control the velocity of coolant

(B) Control distribution of coolant to various cylinders

(C) ✓ Control the coolant temperature

(D) Control the pressure of coolant

168. Which of the following is not the SI Engine

(A) Constant volume heat addition engine

(B) ✓ Constant pressure heat addition engine

(C) Gasoline engine

(D) Otto cycle engine

169. Spark plugs is located centrally in the combustion chamber resulting in ———— knocking tendency.

(A) Maximum

(B) ✓ Minimum

(C) Uniform

(D) Zero

170. The response time of knock control can be reduced by a feed-forward control angle $[\alpha, \beta]$ which is represented by the following expression,

where, $\alpha_e \rightarrow$ effective ignition angle

$\alpha_i \rightarrow$ open loop ignition angle

$\alpha_k \rightarrow$ knock control ignition angle

$\alpha_l \rightarrow$ Learned ignition angle

(A) $\alpha_e(n) = \alpha_i(n) + \alpha_k(n)$

(B) $\alpha_e(n) = \alpha_k(n) + \alpha_l(n)$

(C) $\alpha_e(n) = \alpha_i(n) + \alpha_l(n)$

(D) ✓ $\alpha_e(n) = \alpha_i(n) + \alpha_k(n) + \alpha_l(n)$

171. The function of oxygen sensor is ————————

(A) Control air flow rate
(B) Sense crank case temperature
(C) Measure vibrations
(D) ✔ Maintain air fuel ratio

172. Transfer function of a system is used to calculate which of the following

(A) The order of the following
(B) The time constant
(C) ✔ The output for any given input
(D) The steady state gain

173. For a first order system having transfer function $\frac{1}{1+ST}$, the unit impulse response is;

(A) $e^{-t/T}$
(B) $T.e^{-t/T}$
(C) ✔ $\frac{1}{T}.e^{-t/T}$
(D) $T^2.e^{-t/T}$

174. The sensors which requires an external power source to produce the output is called;

(A) Active sensor
(B) ✔ Passive sensor
(C) Semi - active sensor
(D) Pneumatic sensor

175. ———————— are specialized industrial devices for interfacing and to controlling analog and digital devices

(A) ✔ PLCs (Programmable Logical Controller)
(B) Drives
(C) Controllers
(D) Motors

176. How many degrees of freedom does the car have?

(A) 2
(B) ✔ 14
(C) 1
(D) 0

177. Lacquers and enamels are used for

(A) bonding
(B) cleaning
(C) levelling
(D) ✓ surface dressings

178. Exhaust Gas Recirculation (EGR) has the disadvantage of

(A) Decreasing thermal efficiency and HC emission
(B) Increasing thermal efficiency and HC emission
(C) Increasing HC emission and aldehydes
(D) ✓ Decreasing thermal efficiency and increasing HC emission

179. In Euro IV (2005) norms the CO emission limits for diesel engine

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

180. Maximum allowable hydrocarbons in the car emission are approximately

(A) 10 ppm
(B) ✓ 100 ppm
(C) 1000 ppm
(D) 5000 ppm

181. The PCV valve is located between

(A) Air Cleaner and the Carburettor
(B) Carburettor and the intake manifold
(C) Intake manifold and air Cleaner
(D) ✓ Intake manifold and Crank Case

182. Oxidation Catalytic converter reduces

(A) ✓ CO and HC emissions only
(B) CO emissions only
(C) HC emissions only
(D) CO, HC and NOx emissions

183. NO_x emission in S.I engines will be lowest during

(A) Cruising
(B) Idling
(C) Accelerating
(D) Decelerating

184. The following catalyst is preferred over the others for NO reduction activity

(A) Palladium (Pd)
(B) Platinum (Pt)
(C) Rhodium (Rh)
(D) Ruthenium (Ru)

185. Exhaust gas recirculation reduces NO_x formation because it

(A) Decreases peak combustion temperature
(B) Decreases air–fuel ratio
(C) Decreases quantity of N_2 in the intake
(D) Decreases time required for combustion

186. The dry soot in engine exhaust is nothing but

(A) Solid sulphates
(B) Solid carbon
(C) Soluble organic fraction
(D) Soluble Nitrogen dioxide

187. The following is not a source of HC emissions

(A) Flame Quenching
(B) Adsorption and desorption in lubricating oil film
(C) High Combustion temperature
(D) Poor Combustion

188. NO_x emissions in SI engines are maximum at

(A) Stoichiometric mixture
(B) 5 - 10% leaner than stoichiometric mixture
(C) 5 - 10% richer than stoichiometric mixture
(D) Very rich mixture

189. Air can enter the hydraulic system became of

(A) Self – adjusters not working

(B) Failure of one section of the hydraulic system

(C) Lining contaminated with oil or brake fluid

(D) ✓ Low fluid level in master cylinder

190. A damaged shift mechanism, reverse idler gear or bushing and reverse gear on the main shaft results in

(A) transmission noisy in neutral (B) transmission noisy during starting

(C) ✓ transmission noisy in reverse (D) no power through transmission

191. A dual man fly wheel has all of these design features except;

(A) inner and outer rotating plates connected by a damper mechanism

(B) ✓ a pressure plate that is bolted to the inner and outer flywheel plates

(C) an inner plate that is bolted to the crankshaft flange

(D) an outer plate on which the clutch plate facing makes contact

192. Most commonly used lubrication system in light duty and heavy duty vehicles is the

(A) Splash system (B) ✓ Pressure system

(C) Petroil system (D) Gravity system

193. In safety aspects trucks have very shift chassis members in

(A) lateral direction (B) vertical direction

(C) ✓ longitudinal direction (D) side ways

194. In C.I engines knocking tendency increases with

(A) Increase in compression ratio (B) Increasing inlet temperature of air

(C) ✓ Decrease in compression ratio (D) Increase in coolant water temperature

195. A vehicle with a manual trample has a growing noise only when the clutch pedal is related and the transmission is in neutral. The most likely cause of this problem is
(A) A defective transable input shaft bearing
(B) A rough clutch release bearing
(C) A worn pilot bushing
(D) Worn splines on the input shaft and clutch hub

196. In some engines, oil jet valves squirt oil against the under side of the
(A) Piston to heat the top of the piston
(B) Piston to flows the oil in the top of the piston
(C) Piston to cool the top of the piston
(D) Piston to start the oil in the top of the piston

197. A manual rack and pinion steering gear has a loose mounting bushing. The most likely complaint cause by this problem is
(A) Reduced steering effort
(B) Reduced road fuel
(C) A rattling noise
(D) Excessive steering wheel free play

198. The over drive consists of ———— gear train.
(A) Simple
(B) Compound
(C) Reverted
(D) Epicyclic

199. Information about cleaning and maintenance of the vehicle interior and exterior is form in the
(A) Service manual
(B) Generic service manual
(C) Trouble shooting table
(D) Owner's manual

200. The emission control label provides information about the engine size and the ———— equipment on the vehicle.
(A) Displacement
(B) Assessories
(C) Emission
(D) Cooling system

SPACE FOR ROUGH WORK

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