General Foreman and Technical Asst

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RCVM

Booklet Series **C**

Register Number

2011
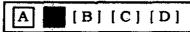# AUTOMOBILE ENGINEERING

Time Allowed : 3 Hours]   **[Maximum Marks : 300**

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

IMPORTANT INSTRUCTIONS

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

2. This Question Booklet contains **200** questions.

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

4. The Test Booklet is printed in *four* series *e.g.* [A] [B] [C] or [D] (See Top left side of this page). The candidate has to indicate in the space provided in the Answer Sheet the series of the booklet. For example, if the candidate gets [A] series booklet, he/she has to indicate in the side 2 of the Answer Sheet with Blue or Black Ink Ball point pen as follows :

[A] ■ [B] [C] [D]

5. 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.

6. An Answer Sheet will be supplied to you separately by the Invigilator to mark the answers. You must write your Name, Register No. and other particulars on side 1 of the Answer Sheet provided, failing which your Answer Sheet will not be evaluated.

7. You will also encode your Register Number, Subject Code etc., with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, your Answer Sheet will not be evaluated.

8. 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.

9. In the Answer Sheet there are **four** brackets [A] [B] [C] and [D] against each question. To answer the questions you are to mark with Ball point pen ONLY ONE bracket 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, (B) is the correct answer, you have to mark as follows :

[A] ■ [C] [D]

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

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

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

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

| **F 687** | xx | **5001** | **1501** | **[Turn over** |

1. In the diesel engine, engine power and speed are controlled by

    A) the position throttle valve

    B) the amount of air taken into the cylinders

    C) the amount of fuel sprayed into the cylinders

    D) the amount of air-fuel mixture the carburetor delivers.

2. The spray cone angle in pintle nozzle is generally

    A) 15°   B) 30°

    C) 45°   D) 60°.

3. The specific gravity of diesel is

    A) 0·50   B) 0·75

    C) 0·85   D) 0·90.

4. The type of governing mechanism adopted in compression ignition engine is

    A) quality governing

    B) quantity governing

    C) hit and miss governing

    D) no such governing mechanism is there.

5. Which of the following is NOT used as an ignition accelerator in compression ignition engine ?

    A) Acetone peroxide   B) Ethyl nitrate

    C) Tetraethyl lead   D) Isoamyl nitrate.

6. Maximum pour point for diesel is

    A) − 30°C   B) − 18·5°C

    C) − 16°C   D) − 15·5°C.

7. In the diesel engine, the fuel is ignited by

    A) the ignition system   B) the glow plugs

    C) heat of compression   D) spark plugs.

8. In diesel engines, anti-dribble device is provided in

A) fuel injector B) delivery valve

C) fuel filters D) fuel feed pump.

9. The degree of atomization of the fuel jet does NOT depend upon

A) relative velocity of fuel & air stream

B) density of fuel

C) surface tension of the fuel

D) calorific value of the fuel.

10. Cetane number of diesel fuel normally available in market is in the range of

A) 45 – 50 B) 60 – 65

C) 75 – 80 D) 90 – 100.

11. A thick oil film establishes between a journal and the bearing bush according to

A) hydrodynamic lubrication theory B) boundary lubrication theory

C) elastohydrodynamic theory D) all of these.

12. Viscosity of a lubricating oil is measured by

A) Pensky Martins apparatus B) Bomb calorimeter

C) Saybolt viscometer D) none of these.

13. Most commonly used lubricant in automobile engines is

A) vegetable oil B) mineral oil

C) animal oil D) synthetic oil.

14. In addition to providing lubrication and acting as a cooling agent, the engine oil must

A) clean, dry and absorb shocks B) oxidise, carburise and burn

C) absorb shocks, seal and clean D) none of these.

15. Two types of engine oil pumps are

A) pressure feed and force feed   B) gear and rotor

C) centrifugal and impeller   D) splash and nozzle.

16. Flash point of oil is

A) temperature at which solidifies or congeals

B) temperature at which it catches fires without external aid

C) indicated by 90% distillation temperature

D) minimum temperature at which oil is heated in order to give off inflammable vapours to ignite momentarily when brought in contact with a flame.

17. When the temperature increases, the viscosity of the oil will

A) decrease   B) increase

C) remain constant   D) first increase and then decrease.

18. The system of lubrication used for small 2 stroke petrol engine is

A) splash lubrication

B) applying grease under pressure

C) mixing about 5% lub oil with petrol

D) wet sump lubrication.

19. The purpose of crankcase ventillation is to

A) remove liquid petrol and water

B) remove vaporised water and petrol

C) cool the oil

D) supply oxygen to the crankcase.

20. Viscosity can be defined as

A) ease of flow and fluidity .   B) foaming and flowing

C) resistance to flow   D) body and penetration.

21. The battery performs all the following *except*

   A)   supplies current to crank the engine

   B)   supplies current when the charging system cannot handle the load

   C)   supplies current to the ignition system with the engine off

   D)   supplies current to the engine computer while the engine is off.

22. On a top-terminal battery, the negative terminal post is

   A)   smaller than the positive terminal post

   B)   the same size as the positive terminal post

   C)   larger than the positive terminal post

   D)   on the side of the battery.

23. The time in minutes that a fully charged battery at 27°C can deliver 25 amperes is the

   A)   charging rate   B)   reverse capacity

   C)   cold-cranking rate   D)   ampere-hour rate.

24. As the battery is discharged, the active materials in both negative and positive plates are changed to

   A)   sulphuric acid   B)   lead oxides

   C)   lead sulphate   D)   spongy lead.

25. The phenomenon in which the active material leaves off positive plates is called as

   A)   self discharge   B)   buldging

   C)   buckling   D)   shedding.

26. In slow rate charging, the method should be adopted is

   A)   constant power   B)   constant voltage

   C)   constant current   D)   none of these.

27. The no. of negative plates in a 17 plate battery will be

   A)   8   B)   9

   C)   7 or 11   D)   17.

28. The of specific gravity electrolyte can be measured by

    A) voltmeter
    B) ammeter
    C) hydrometer
    D) galvanometer.

29. The specific gravity of electrolyte in a new battery will be

    A) $1·10 - 1·12$ g/cm^3
    B) $1·12 - 1·15$ g/cm^3
    C) $1·15 - 1·20$ g/cm^3
    D) $1·25 - 1·28$ g/cm^3.

30. The electrolyte used in lead-acid batteries is

    A) 40% of nitric acid with 60% of distilled water

    B) 40% of sulphuric acid with 60% of distilled water

    C) 60% of nitric acid with 40% of distilled water

    D) 60% of sulphuric and with 40% of distilled water.

31. Match **List I** correctly with **List II** and select your answer using the codes given below :

	List I		**List II**
a)	Anti-roll bar	1.	reduces the chances of wheel wobbling
b)	Rubber spring suspension	2.	safeguard rusting of leaves
c)	Independent suspension system	3.	reduces the sideway rolling of the wheels
d)	Zinc-lead inserts	4.	occupies less space.

    Codes :

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

32. End ply of gears of an oil pump may be checked by using

   A)   inside caliper

   B)   outside caliper

   C)   vernier caliper and feeler gauge

   D)   straight edge and feeler gauge.

33. Maximum oil pressure in the lubrication system is controlled by

   A)   oil filter

   B)   pump rotor

   C)   pressure relief valve

   D)   pressure switch.

34. The cylinder bore oversize for reboring is calculated on the basis of

   A)   minimum ovality in any cylinder

   B)   maximum ovality in any cylinder

   C)   average value of ovality in the cylinders

   D)   size of the piston available.

35. While lapping a valve, the lapping compound is applied to its

   A)   face

   B)   guide

   C)   stem

   D)   tip.

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

   A)   15 Nm

   B)   50 Nm

   C)   150 Nm

   D)   1500 Nm.

37. The carbon from the cylinder head is removed with

   A)   water

   B)   caustic soda

   C)   scraper

   D)   soap.

38. To ensure that the fuel gallery is free from leakage, the machine is designed to produce a hydraulic pressure up to

   A)   10 kgf/cm^2

   B)   20 kgf/cm^2

   C)   30 kgf/cm^2

   D)   40 kgf/cm^2 .

39. The engine requires overhauling in case of

   A)   poor combustion

   B)   excessive consumption of lubricating oil

   C)   mechanical failure

   D)   all of these.

40. Water in lubrication oil leads to

    A) blowby losses
    B) formation of sludge

    C) fumes in oil
    D) none of these.

41. A square type engine

    A) has geometrical shape as square

    B) has two cylinders horizontal and two cylinders vertical

    C) has cylinder bore equal to stroke length

    D) has four cylinders with phase shift of 90° between any two consecutive cylinders.

42. The front axles are manufactured by

    A) casting
    B) drop forging

    C) sheet metal forming
    D) machining.

43. The frame is made narrow at the front in order to have

    A) better aerodynamics

    B) better engine support

    C) low wheel track

    D) short turning radius.

44. The engine is supported on the frame at

    A) 3 points
    B) 5 points

    C) 6 points
    D) 7 points.

45. The passenger car frames are made of

    A) cast iron
    B) aluminium

    C) high carbon steel
    D) low carbon steel.

46. Mopeds are using engines of which of the following capacities ?

    A)   25 cc   B)   50 cc

    C)   75 cc   D)   100 cc.

47. Look up the table and select the correct answer :

Cylinder No.	One revolution		Two revolutions	
	0° – 180°	180° – 360°	360° – 540°	540° – 720°
1.	Power	Exhaust	Intake	Compression
2.	Compression	Power	Exhaust	Intake
3.	Exhaust	Intake	Compression	Power
4.	Intake	Compression	Power	Exhaust

    The firing order of the above engine is

    A)   1 – 2 – 3 – 4   B)   1 – 4 – 3 – 2

    C)   1 – 2 – 4 – 3   D)   1 – 4 – 2 – 3.

48. The three basic cylinder arrangements for automotive engines are

    A)   flat, radial, V   B)   in a row, in line, opposed

    C)   in line, V, opposed   D)   V, double line, opposed.

49. The firing order in case of six cylinder in-line engine is usually

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

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

50. In commercial vehicle layouts engine is located forward, rear or under floor mainly to

    A)   better utilise the space

    B)   increase fuel economy

    C)   have better weight distribution

    D)   minimize the tendency to overturn.

51. In a torque converter, maximum torque multiplication is achieved when

    A) the turbine is stationary and impeller runs fast

    B) the turbine runs fast and impeller is stationary

    C) both turbine and impeller are stationary

    D) both turbine and impeller are running fast.

52. The type of clutch widely used in motor cycles is

    A)   single plate clutch   B)   diaphragm clutch

    C)   cone clutch   D)   multi-plate clutch.

53. Which of the following friction materials is having highest co-efficient of friction ?

    A)   Cotton fabric   B)   Leather

    C)   Cork   D)   Asbestos with binders.

54. In fluid coupling, the vortex flow is maximum, when the slip is

    A)   0%   B)   50%

    C)   75%   D)   100%.

55. The mean effective radius of clutch plate, in case of cone clutch with uniform intensity of pressure, is

    A) $\left(r_o + r_i \right) / 2 \sin \theta$

    B) $2 \sin \theta / \left(r_o + r_i \right)$

    C) $2 / 3 \sin \theta \left[\left(r_o^3 - r_i^3 \right) / \left(r_o^2 - r_i^2 \right) \right]$

    D) $2 \sin \theta / 3 \left[\left(r_o^3 - r_i^3 \right) / \left(r_o^2 - r_i^2 \right) \right]$

    where, θ is half cone angle

            r_o = outer radius of clutch plate

            r_i = inner radius of clutch plate.

56. The action which takes place in the clutch when the pedal is depressed, is

    A) . pressure plate comes to rest

    B)   pressure plate moves away from the flywheel

    C)   driven plate moves towards the flywheel

    D)   driven plate slows down to the flywheel speed.

57. The damping force on the linings of a single plate clutch is given by a

    A) pneumatic cylinder   B) hydraulic cylinder

    C) diaphragm spring   D) coil spring.

58. Two types of overrunning clutches are

    A) ball and roller

    B) sprag and roller

    C) needle bearing and friction bearing

    D) taper bearing and anti-friction bearing.

59. The oil flow that is used to multiply torque in a torque converter is

    A) the vortex flow   B) the rotary flow

    C) the turbulent flow   D) none of these.

60. The fluid coupling has maximum efficiency when the driven and driving members are turning at

    A) high speed   B) low speed

    C) different speeds   D) the same speed.

61. A two-piece propeller shaft requires

    A) one universal joint   B) a centre support bearing

    C) the shaft is to be solid   D) none of these.

62. Critical whirling speed of a shaft is increased by

    A) increasing its length   B) decreasing its length

    C) decreasing its diameter   D) none of these.

63. Constant velocity universal joint is used at

    A) front end of the propeller shaft

    B) rear end of the propeller shaft

    C) road wheel end of the shaft on front wheel drive vehicles

    D) differential end of the shaft on front wheel drive vehicles.

64. To take care of the lengthening and shortening of the drive shaft with rear-axle movement, the drive shaft has a/an

    A) slip joint   B) elbow joint

    C) release joint   D) universal joint.

65. The crown wheel and pinion is called the

    A) differential   B) rear axle

    C) final drive   D) rear drive.

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

    A) road springs   B) radius rods

    C) swinging shackle   D) propeller shaft.

67. When a vehicle is taking a turn, the inner wheels rotate

    A) faster than outer wheels

    B) slower than outer wheels

    C) at same speed of the outer wheels

    D) twice the speed of the outer wheels.

68. Which one of the following is NOT taken by hollow tube in the case of torque tube drive ?

    A) Torque reaction   B) Braking torque

    C) Driving thrust   D) Side thrust.

69. The driving and driven shafts connected by a Hooke's joint will rotate at equal speeds when

    A) $\tan \theta = 1/\cos \alpha$ B) $\tan \theta = \cos \alpha$

    C) $\tan \theta = \alpha^2$ D) $\tan \theta = \pm (\cos \alpha)^{1/2}$

    where, α = angle of inclination of member of driving shaft,

           θ = angle of inclination of driven shaft members.

70. The less ground clearance can be achieved in which of the following types of final drive ?

    A) Straight teeth bevel and crown wheel arrangement

    B) Spiral teeth bevel and crown wheel arrangement

    C) Hypoid teeth bevel and crown wheel arrangement

    D) Worm and worm wheel arrangement.

71. A three wire wiring system is suitable for a

    A) 6 V moped system   B) 12 V car system

    C) 24 V bus system   D) 36 V industrial truck system.

72. The centre of fog lamp should be at a minimum of

   A) 1·2 m above the ground   B) 1·0 m above the ground

   C) 0·8 m above the ground   D) 0·6 m above the ground.

73. 1 ton air conditioner removes heat of

   A) 50 kcal/min   B) 75 kcal/min

   C) 100 kcal/min   D) 120 kcal/min.

74. The distance travelled by a vehicle can be measured with

   A) speedometer   B) odometer

   C) tachometer   D) ammeter.

75. Match **List I** correctly with **List II** and select your answer using the codes given below :

List I		List II	
a)	tachometer	1.	bimetal electric type
b)	odometer	2.	decibel
c)	fuel gauge	3.	90 km/hr
d)	pressure horn	4.	600 rpm
		5.	3750 km.

Codes :

	a	**b**	**c**	**d**
A)	4	5	1	2
B)	5	4	2	1
C)	3	4	2	1
D)	4	2	1	3.

76. Two types of automotive fuses are

   A) printed and link   B) blade and breaker

   C) blade and cartridge   D) cartridge and breaker.

77. Three basic electric circuit problems are

   A) open, closed and grounded

   B) low resistance, high voltage and no current

   C) high temperature, low resistance and no voltage

   D) open, short and grounded.

78. Headlamp aiming is done by

    A)   moving the light bulb back of the lens

    B)   turning spring-loaded adjustment screws

    C)   rotating the headlamps in their sockets

    D)   bending adjustment brackets.

79. In balancing-coil type of fuel gauge, filling the tank causes the resistance of the tank unit to be

    A)   increased   B)   reduced

    C)   held steady   D)   cut off.

80. Constant operation of the compressor in automotive air conditioning systems is prevented by

    A)   a solenoid   B)   a servomagnet

    C)   an electromagnetic clutch   D)   any of these.

81. The tyre construction employing two separate air chambers is known as

    A)   tubeless tyre   B)   bullet proof tyre

    C)   dual tyre   D)   captive air tyre.

82. The orientation of ply cords in a tyre is along the direction of tyre axis. Such a tyre is named as

    A)   cross ply tyre   B)   bias belted tyre

    C)   radial tyre   D)   "S" speed rated tyre.

83. Unbalanced and non-concentric rotation of wheels with the jerks and side pulls is called as

    A)   wobble   B)   bounce

    C)   tramp   D)   shimmy.

84. The disc wheels are made of

    A)   aluminium alloy   B)   magnesium alloy

    C)   grey cast iron   D)   pressed steel.

85. The tyre aspect ratio is given by

    A)   height of tyre section/width of tyre section

    B)   width of tyre section/height of tyre section

    C)   (height of tyre section × width of tyre section)$^{1/2}$

    D)   width of tyre section × height of tyre section.

86. Wheel hop is generally associated with

    A) static unbalance   B) dynamic unbalance

    C) out-of-round wheels   D) none of these.

87. The number of plies in a truck tyre is usually

    A) 3   B) 5 – 8

    C) 8 – 10   D) 12 – 16.

88. Compared with a radial ply tyre, one advantage of a cross ply tyre is

    A) longer life

    B) lower rolling resistance

    C) smoother ride at low speeds

    D) full width of tread held on road when vehicle is cornering.

89. An automobile tyre will wear rapidly in case

    A) it is incorrectly inflated   B) it is misaligned

    C) it is overloaded   D) any of these.

90. To static balance a wheel assembly, the compensating weight is placed

    A) 90° from the heavy spot   B) 180° from the heavy spot

    C) 45° from the heavy spot   D) none of these.

91. A crankshaft is made by

    A) forging   B) casting

    C) pressing   D) turning.

92. In a 4 cylinder 4 stroke diesel engine operating at 1200 rpm, the duration of fuel injection is 20°. The time in seconds during which fuel injected would be

    A) 1/360 sec   B) 1/720 sec

    C) 1/180 sec   D) 1/90 sec.

93. Piston pins are usually either a press-fit in connecting rod or

    A) locked to the connecting rod with a bolt

    B) free-floating in the connecting rod and piston

    C) locked to the piston with a bolt

    D) a press-fit in the piston.

94. What is the material of connecting rod ?

    A) Mild steel   B) Forged steel

    C) Tool steel   D) Cast iron.

95. Offsetting the piston pin helps prevent

    A) excessive oil   B) combustion knock

    C) excessive ring wear   D) piston slap.

96. The purpose of valve clearance is to

    A) allow the valve to expand

    B) allow the valve to slide in the guide

    C) ensure that the crankshaft is free to rotate

    D) ensure that the valve closes fully.

97. Piston rings are plated with chromium, cadmium or phosphate in order to

    A) improve surface finish

    B) prevent clogging

    C) improve heat transfer

    D) reduce wear and eliminate scuffing.

98. If the intake air temperature of an internal combustion engine increases, its efficiency will

    A) increase   B) decrease

    C) remain constant   D) unpredictable.

99. The camshaft of a 4 stroke petrol engine rotates at

    A) 1/4 of crankshaft speed   B) 1/2 of crankshaft speed

    C) 2 × crankshaft speed   D) 4 × crankshaft speed.

100. The size of the inlet valve of an engine in comparison to exhaust valve is

    A) same   B) smaller

    C) bigger   D) varies from design to design.

101. Consider the following statements :

Assertion (A) :   Hypoid gears require special lubricant.

Reason (R) :   Tooth is made of soft material.

Now select your answer according to the coding scheme given below :

A)   *(A)* is true, but *(R)* is false

B)   *(A)* is false, but *(R)* is true.

C)   Both *(A)* and *(R)* are true, but *(R)* is not the reason

D)   Both *(A)* and *(R)* are true and *(R)* is reason.

102. To obtain second reduction gear ratio in a planetary gearbox, which one is made as a driving member ?

A)   Sun gear   B)   Planet carrier

C)   Ring or internal gear   D)   All gears held stationary.

103. The transfer box is placed

A)   before the clutch and after the engine flywheel

B)   before the propeller shaft and after the gearbox

C)   before the gearbox and after the clutch

D)   before the differential and after the propeller shaft.

104. *One reason for fitting a gearbox is to overcome which one of the following drawbacks of I.C. engine ?*

A)   High torque at low speed   B)   Low torque at high speed

C)   High power at low speed   D)   Low torque at low speed.

105. To which gearbox type does the following statement apply ?

Dog clutches are used to obtain the gears and double declutching is necessary.

A)   Crash type   B)   Sliding mesh

C)   Constant mesh   D)   Synchromesh.

106. The purpose of the interlocking plungers fitted between the gearbox selector rods is

   A) to stop the gear jumping out of mesh

   B) to hold the gear in the engaged position

   C) to resist reverse being engaged when the vehicle is moving forward

   D) to prevent two gears being obtained at the same time.

107. Two control mechanisms used with a planetary gear system are

   A) valve and pump

   B) torque converter and sun gear

   C) bands and clutches

   D) driving gear and sun gear.

108. Three actions of the planetary gears in an automatic transmission are to provide reverse, direct drive and

   A) high gear

   B) gear reduction

   C) gear locking

   D) braking.

109. The advantages of using helical gears rather than spur gear in a transmission are

   A) strength and cost

   B) strength and end thrust

   C) low noise level and more strength

   D) low noise level and economy.

110. A free wheel

   I. is mounted just after the gearbox

   II. can be locked automatically

   III. construction involves a cam and spring loaded balls

   IV. is always in action during vehicle's motion.

   Of these :

   A) I, II, III and IV are correct

   B) I, II and IV are correct

   C) II, III and IV are correct

   D) I, II and III are correct.

111. The instrument used to measure CO and CO_2 emission in the exhaust gases of an engine is

   A) FID analyser

   B) NDIR analyser

   C) Chemiluminescent analyser

   D) λ sensor.

112. One method of reducing NO_x in the exhaust gas is to

    A)   increase valve overlap   B)   reduce valve overlap

    C)   prevent valve overlap   D)   all of these.

113. The reason for cars with catalytic converters must use unleaded petrol is that

    A)   lead increases detonation   B)   lead coats valve and valve seats

    C)   lead coats the catalyst   D)   none of these.

114. State and Federal Emission Standards have been set for

    A) H_2O, HC and CO   B)   HC, CO and CO_2

    C)   C, H and H_2O D)   HC, CO and NO_x.

115. Limit of speed for motor vehicles, if the vehicle is a heavy motor vehicle, maximum speed is

    A)   30 kmph   B)   40 kmph

    C)   50 kmph   D)   60 kmph.

116. 'Light motor vehicle' means a transport vehicle the registered laden weight of which

    A)   does not exceed 4000 kilograms   B)   does not exceed 5000 kilograms

    C)   does not exceed 6000 kilograms   D)   does not exceed 7000 kilograms.

117. A registration certificate issued in India is valid for

    A)   3 years   B)   5 years

    C)   10 years   D)   15 years.

118. Idling CO emission limit for all two and three wheeled petrol vehicles should not exceed

    A)   3% by volume   B)   4·5% by volume

    C)   6% by volume   D)   7·5% by volume.

119. A traffic sign of 'cross roads' is shown on a road side. Its indication to the driver is to

    A)   slow down and proceed cautiously

    B)   stop

    C)   keep special vigil on the traffic

    D)   drive at 20 kmph.

120. In Motor Vehicles Act 1988, the Chapter IV deals with

    A) licensing of drivers of motor vehicles

    B) registration of motor vehicles

    C) control of transport vehicles

    D) traffic signs.

121. Ballast resistor is placed in which of the following systems of an ignition system ?

    A) Distributor assembly   B) Primary circuit

    C) Secondary circuit   D) Contact breaker assembly.

122. Which one of the following is NOT an electronic ignition system ?

    A) Magnetic pulse ignition   B) Hybrid ignition

    C) Coil ignition   D) Transistorized ignition.

123. The duration of the spark is of the order of

    A) 0·001 sec   B) 0·01 sec

    C) 0·1 sec   D) 1 sec.

124. Which of the following parameters remains same for both hot plug and cold plug ?

    A) Average temperature of body   B) Carbon deposits

    C) Fuel economy   D) Reach of the plug.

125. The function of the distributor in an ignition system is

    A) to time the spark   B) to step up the voltage

    C) to induce the spark   D) to advance the spark.

126. The dwell angle of the cam in the ignition circuit generally ranges between

    A) 10° – 15°   B) 20° – 25°

    C) 25° – 40°   D) 45° – 60°.

127. In the electronic ignition system, the circuit between the battery and the ignition coil primary winding is closed and opened by

    A) a switch   B) a field relay

    C) solid state devices   D) contact points.

128. A spark plug that runs too hot may

    A)   cause detonation   B)   damage the intake manifold

    C)   cause backfire   D)   result in better fuel mileage.

129. The two basic jobs of the ignition system are

    A)   to operate the engine and car

    B)   to produce high voltage surges and prevent them grounding

    C)   to produce high voltage surges and distribute them to the spark plugs

    D)   to prevent engine overrun and overheating.

130. The heat range of a spark plug is primarily determined by

    A)   how far the electrodes extend into the combustion chamber

    B)   the length of the lower insulator

    C)   the number of ribs on the upper insulator

    D)   the gap between the electrodes.

131. Fins are provided over engine cylinder in scooters for

    A)   higher strength for cylinder

    B)   higher efficiency

    C)   better cooling

    D)   easier handling and ease in manufacturing.

132. The percentage of heat carried by the cooling medium in internal combustion engines is

    A)   20% – 25%   B)   30% – 35%

    C)   40% – 45%   D)   about 50%.

133. The power required to drive the cooling fan varies as

    A)   (speed of the fan)^2 B)   (speed of the fan)^3

    C)   (speed of the fan)$^{1/2}$ D)   speed of the fan.

134. The cooling water requirement for diesel engine is of the order of

    A)   0·2 to 1·0 litre per min per kW

    B)   1 to 3 litres per min per kW

    C)   5 to 10 litres per min per kW

    D)   20 to 30 litres per min per kW.

135. The anti-freeze solution commonly used in automobiles is

    A)   lead ethyl   B)   n-heptane

    C)   iso-octane   D)   glycol.

136. The purpose of a thermostat in an engine cooling system is to

    A)   prevent the coolant from boiling

    B)   allow the engine to warm up quickly

    C)   pressurize the system to raise the boiling point

    D)   indicate the driver of the coolant temperature.

137. The principle of a radiator of an engine cooling system is to

    A)   act as a reservoir for the water

    B)   cause heat flow by convection currents

    C)   spread out the hot water over a large area

    D).   increase the air speed as it flows over the hot surface.

138. Water circulation in a thermo-syphon cooling system is caused by

    A)   conduction currents

    B)   a belt driven water impeller

    C)   a gear driven water pump

    D)   the change in density of the water.

139. What is the main purpose of the water-pump bypass hole in the engine cooling system ?

    A)   To reduce pressure at the water-pump outlet during high engine speeds

    B)   To allow coolant flow within the engine when the thermostat is closed

    C)   To prevent air packets in the water-pump housing

    D)   To prevent collapse of the lower radiator hose.

140. When an alcohol base anti-freeze is used, the thermostat temperature rating should not exceed

    A)   82°C   B)   71°C

    C)   60°C   D)   88°C.

141. Which one of the following suspension springs also acts as a means for locating the axle ?

    A)   Laminated spring   B)   Helical spring

    C)   Torsion bar spring   D)   Rubber spring.

142. In case of coil springs, the stress is maximum at the

    A)   centre of the circular cross-section

    B)   surface

    C)   1/4th distance of mean coil diameter from centre

    D)   1/3rd distance of mean coil diameter from centre.

143. Which one of the following comes under sprung weight ?

    A)   Wheels   B)   Engine

    C)   Axles   D)   Tyres.

144. In closely coiled helical spring, the helix angle α is

    A)   equal to 10°   B)   greater than 10°

    C)   less than 10°   D)   greater than or equal to 10°.

145. In full floating rear axle type, the wheel torque is taken by

   A) axle casing   B) axle shaft

   C) bearings   D) back plate.

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

   A) reduce inleaf friction

   B) soften the spring action and increase the maximum deflection

   C) allow the leaf to slide during the bump movement

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

147. During the rebound stroke, the load is transmitted from the main leaf to the shorter leaves by a

   A) U-bolt   B) spring clip

   C) centre bolt   D) shackle pin.

148. The torsion bar is mostly made of

   A) cast iron   B) aluminium

   C) spring steel   D) mild steel.

149. In gas filled shock absorbers, the gas commonly employed is

   A) highly pressurized H_2 B) highly pressurized N_2

   C) highly pressurized O_2 D) highly pressurized air.

150. A leaf spring is permitted to change in length by the use of a

   A) spring plate   B) centre bolt

   C) saddle   D) swinging shackle.

151. Ethyl fluid is used

   A) to increase cetane rating of the fuel

   B) to increase octane rating of the fuel

   C) as a defrosting agent

   D) to improve lubricating quality of the fuel.

152. Solex carburetor is which of the following types ?

    A)   Up draught   B)   Down draught

    C)   Cross draught   D)   Variable choke.

153. During the idling stage, the air-fuel ratio in a petrol engine is

    A)   12 : 1   B)   14·7 : 1

    C)   8 : 1   D)   16 : 1.

154. Iso-octane has octane number of

    A)   0   B)   50

    C)   100   D)   more than 100.

155. The octane rating of petrol commercially available is usually

    A)   70 – 85   B)   85 – 90

    C)   90 – 100   D)   100 – 110.

156. When the air-fuel mixture ignites before the spark takes place at the spark plug, this is

    A)   detonation   B)   pre-ignition

    C)   octane number   D)   stalling.

157. Theoretically air required for combustion of one kg of fuel is

    A)   10 kg   B)   14·5 kg

    C)   16·7 kg   D)   17·4 kg.

158. The petrol flow from a constant-vacuum carburettor is increased when the engine load is increased by

    A)   altering the petrol level

    B)   intensifying the choke depression

    C)   speeding up the airflow over the jet

    D)   causing a piston to raise a tapered needle.

159. The reason why petrol flows from the float chamber to the venturi is because

    A)   of the difference in level   B)   of the difference in pressure

    C)   the float level is higher   D)   the air sucks out the petrol.

160. A compensation system is incorporated in a modern fixed choke carburettor to prevent

    A)   flooding at higher speed   B)   richness at high speed

    C)   leanness at high speed   D)   starvation at high speed.

161. In a mechanical linkage actuated clutch, the free play, link leverage and total clutch pedal travel are equal to approximately

    A)   10 mm, 3 : 1 and 15 mm   B)   37·5 mm, 5 : 1 and 37·5 mm

    C)   25 mm, 12 : 1 and 75 mm   D)   75 mm, 36 : 1 and 150 mm.

162. In a disc brake, pad-to-disc adjust is provided by

    A)   caliper   B)   piston

    C)   piston seal   D)   bleed screw.

163. The maximum disc runout allowed on the vehicle is generally

    A)   1 mm   B)   0·5 mm

    C)   0·1 mm   D)   0·01 mm.

164. Clutch rattle is a kind of noise coming during

    A)   engine deceleration

    B)   engine idling

    C)   engine acceleration

    D)   both engine deceleration and acceleration.

165. Most preferred brake drum turning tool used with a brake drum lathe is made of

    A)   ceramics   B)   high carbon steel

    C)   18 – 4 – 1 steel   D)   polycrystalline diamond.

166. In automobile the probable cause for ineffective brakes could be

    A)   grease on lining   B)   excessive lining wear

    C)   drums scored   D)   any of these.

167. Excessive clutch clearance caused by improper adjustment or wear of sliding sleeve, generally results in

A)   clutch failure to disengage   B)   clutch slip

C)   clutch plate overheating   D)   uneven clutch engagement.

168. As a general rule, if facing on the friction disc are worn down to the rivet heads,

A)   rivets should be replaced

B)   rivet heads should be filed

C)   the friction disc should be replaced

D)   the clutch should be replaced.

169. The steps in performing an automotive repair job may include

A)   measuring and disassembling   B)   machining and installing

C)   reassembling and adjusting   D)   all of these.

170. Service specifications are set by the

A)   vehicle manufacturer

B)   technician

C)   service manager

D)   Society of Automotive Engineers (SAE)

171. An alternator does not need use of a

A)   slip-ring   B)   voltage regulator

C)   rectifier   D)   cut-out.

172. The starting motors used on automobiles demand a current of about

A)   400 – 600 A   B)   40 – 60 A

C)   4 – 6 A   D)   30 – 200 A.

173. The current regulator operates

A)   when the battery is fully charged

B)   when the electrical demands are light

C)   when the battery is undercharged

D)   none of these.

174. Alternator output voltage is directly related to

   A)   field strength

   B)   rotor speed

   C)   both field strength and rotor speed

   D)   neither field strength nor rotor speed.

175. A cut-out relay is sometimes called a

   A)   shunt circuit   B)   commutator

   C)   circuit breaker   D)   voltage regulator.

176. A starter motor is similar in construction to

   A)   an alternator   B)   a *dc* generator

   C)   an *ac* generator   D)   none of these.

177. The EMF generated by a D.C. generator is given by

   A) $(\Phi ZA / 60) (P / N)$ B) $(\Phi ZN / 60) (A / P)$

   C) $(\Phi ZN / 60) (P / A)$ D) $(ZN / 60\Phi) (A / P)$

   N = speed in rpm

   A = the current in ampere

   Z = No. of conductors in armature

   Φ = Mangnetic flux in weber

   P = No. of poles.

178. A current regulator has

   A)   series winding only

   B)   shunt winding only

   C)   both series and shunt windings

   D)   no winding at all.

179. The most preferred type of starting motor on cars is

   A)   shunt wound type   B)   compound wound type

   C)   series wound type   D)   3 pole type.

180. The minimum cranking speed for petrol engines is about

   A)   1/2 of operating speed   B)   1/4 of operating speed

   C)   25 to 50 rpm   D)   80 to 100 rpm.

181. Most anti-skid devices are employed on

    A) rear brakes   B) front brakes

    C) secondary brakes   D) parking brakes.

182. A vehicle is moving at 80 km/hr. It has to be stopped in about 31 metres. If the co-efficient of friction is taken as 0·9, the brake efficiency should be

    A) 60%   B) 75%

    C) 80%   D) 90%.

183. Which one is having the highest braking efficiency ?

    A) Two leading shoe system

    B) Two trailing shoe system

    C) One leading and one trailing shoe system

    D) None of these.

184. The confined liquid transmits pressure intensity equally in all directions. This is

    A) Joule's law   B) Gay Lussac law

    C) Pascal's law   D) Archimedes principle.

185. The braking effort in a booster hydraulic system is adjusted automatically by

    A) pressure differential valve   B) metering valve

    C) unloader valve   D) proportioning valve.

186. As applied to a braking system, the term 'brake-fade' 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) discolouration of the lining when it is oil soaked.

187. The brake system should be dismantled if the reservoir was topped up with mineral oil instead of the correct brake fluid.

    This action is necessary because mineral oil

    A) is compressible   B) will not pressurize

    C) damages the rubber seal   D) boils at a lower temperature.

188. If the pedal of a hydraulically operated brake is 'spongy', it indicates that

   A)   system contains air   B)   shoe clearance is excessive

   C)   brake fluid should be changed   D)   system is in a good condition.

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

   A)   trapping   B)   pressurization

   C)   tapping   D)   bleeding.

190. Compared with an internally expanded shoe brake, a disc brake has which of the following advantages ?

   A)   Fades at a lower temperature

   B)   Greater resistance to fade

   C)   Small effort gives large braking torque

   D)   Greater self-servo action at high speed.

191. Which mechanism is almost universally used for steering purpose ?

   A)   Hart's mechanism   B)   Ackermann mechanism

   C)   Scott Russel's mechanism   D)   Watt's mechanism.

192. On a beam axle the stub-axle pivots about a

   A)   kingpin   B)   ball joint

   C)   track arm   D)   universal joint.

193. Rotary motion of the steering wheel is converted to a reciprocating motion by

   A)   track arm   B)   track rod

   C)   stub axle   D)   steering box.

194. A car will not track properly if the

   A)   caster angles are unequal

   B)   toe-in is incorrect

   C)   wheel base measurements are unequal

   D)   kingpin inclination is incorrect.

195. A certain steering system has a track rod which is equal in length to the distance between the swivel axis centres. When the outer wheel is steered through 20°, the angle steered by the inner wheel is

    A)   less than 20°

    B)   20°

    C)   more than 20° but less than 25°

    D)   more than 25°.

196. When a vehicle is cornering, each wheel should form a right angle to line drawn from the

    A)   centre line of the vehicle

    B)   instantaneons centre of rotation

    C)   centre of the rear axle

    D)   mid-point of the front suspension system.

197. To achieve directional stability, which of the following is provided in a vehicle ?

    A)   Camber

    B)   Castor

    C)   Kingpin inclination

    D)   Combined or included angle.

198. Centre point steering has

    A)   zero camber angle

    B)   zero castor angle

    C)   zero scrub radius

    D)   zero instantaneous centre.

199. The turning circle radius of outer front wheel is

    A) $b/\sin\theta - (a-c)/2$

    B) $b/\sin\phi + (a-c)/2$

    C) $b\cot\phi + (a-c)/2$

    D) $b\cot\theta - (a-c)/2$

    where, θ = the angle of inner wheel lock

            ϕ = the angle of outer wheel lock

            b = wheel base

            a = wheel track

            c = distance between kingpins.

200. The viscosity of oil used in a power steering system is

    A)   SAE 5W

    B)   SAE 40

    C)   SAE 40 W

    D)   SAE 80.

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