

Year of Advt: 2025

Date of Exam: 17-June-2026

10173

Booklet Serial No.

DO NOT BREAK THE SEAL OF THE BOOKLET UNTIL YOU ARE TOLD TO DO SO

QUESTION BOOKLET

SERIES : I

Subjects : General English, General Knowledge & Current Affairs,
Reasoning & Quantitative Aptitude and Mechanical
Engineering /Automobile Engineering

Full Marks : 300

Time Allowed : 2½ Hours

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

INSTRUCTIONS TO CANDIDATES

1. This Booklet contains 150 questions to be answered in a separate OMR Answer Sheet using Black Ballpoint Pen in the following four Parts :

Part—A : General English : 25 questions

Part—B : General Knowledge & Current Affairs : 15 questions

Part—C : Reasoning & Quantitative Aptitude : 10 questions

Part—D : [Choose any ONE subject from the following]
Mechanical Engineering/Automobile Engineering : 100 questions

2. All questions are compulsory.
3. You will be supplied the Answer Sheet separately by the Invigilator. You must complete the details of particulars asked for.
4. Answer must be shown by completely blackening the corresponding circle in the Answer Sheet against the relevant question number by Black Ballpoint Pen. OMR Answer Sheet without marking Series shall not be evaluated.

Example :

Suppose the following question is asked :

The Capital of Meghalaya is

- (A) Guwahati
(B) Kohima
(C) Shillong
(D) Delhi

You will have four alternatives in the Answer Sheet for your response corresponding to each question of the Question Booklet as below :

(A) (B) (C) (D)

In the above illustration, if your chosen response is alternative (C), i.e., Shillong, then the same should be marked on the Answer Sheet by blackening the relevant circle with a Black Ballpoint Pen only as below :

(A) (B) ● (D)

The example shown above is the only correct method of answering.

5. Answer the questions as quickly and as carefully as you can. Some questions may be difficult and others easy. Do not spend too much time on any one question.
6. There will NOT be any negative marking for wrong answers.
7. The Answer Sheet must be handed over to the Invigilator before you leave the Examination Hall.
8. No Rough Work is to be done on the Answer Sheet. Space for Rough Work has been provided in the Question Booklet.

SEAL

PART—A : GENERAL ENGLISH

(Marks : 50)

Each question carries 2 marks

Directions (Q. Nos. 1-13) : Choose the correct options to fill in the blanks.

1. She _____ to the market every Sunday.

- (A) go
- (B) goes
- (C) going
- (D) gone

2. He is taller _____ his brother.

- (A) then
- (B) than
- (C) to
- (D) of

3. She hasn't seen him _____ last year.

- (A) for
- (B) from
- (C) since
- (D) at

4. The book on the table is _____.

- (A) her
- (B) hers
- (C) she
- (D) herself

5. Neither Riya nor her friends _____ coming today.

- (A) is
- (B) are
- (C) was
- (D) has

6. She sings _____ than her sister.

- (A) well
- (B) better
- (C) good
- (D) best

7. Can you pass me _____ salt?

- (A) a
- (B) an
- (C) the
- (D) No article

8. She is _____ honest person.

- (A) a
- (B) an
- (C) the
- (D) No article

9. I'm not interested ____ playing cards.

- (A) on
- (B) by
- (C) in
- (D) to

10. I wish I ____ a car.

- (A) have
- (B) had
- (C) has
- (D) having

11. He is looking forward ____ his vacation.

- (A) for
- (B) to
- (C) at
- (D) from

12. The train ____ before we reached the station.

- (A) left
- (B) has left
- (C) had left
- (D) leaves

13. If I ____ rich, I would travel the world.

- (A) am
- (B) was
- (C) were
- (D) been

Directions (Q. Nos. 14-17) : In the questions given below, choose from the alternatives the one that expresses the correct meaning of the given phrase or idiom.

14. What does the idiom "break the ice" mean?

- (A) Shatter glass
- (B) Make people feel comfortable
- (C) Start a fight
- (D) Break a rule

15. "Bite the bullet" means

- (A) to avoid a problem
- (B) to endure a painful situation
- (C) to fire a gun
- (D) to get angry

16. If someone is "feeling under the weather", they are

- (A) feeling happy
- (B) feeling sick
- (C) feeling cold
- (D) feeling excited

17. The idiom "Hit the sack" means

- (A) to attack a bag
- (B) to go to sleep
- (C) to start working
- (D) to leave abruptly

Directions (Q. Nos. 18–21) : In the following questions, choose the word which is the opposite (antonym) of the given word.

18. Abundant

- (A) Scarce
- (B) Plentiful
- (C) Overflowing
- (D) Rich

19. Complex

- (A) Simple
- (B) Intricate
- (C) Complicated
- (D) Elaborate

20. Generous

- (A) Kind
- (B) Selfish
- (C) Charitable
- (D) Giving

21. Victory

- (A) Success
- (B) Win
- (C) Defeat
- (D) Achievement

Directions (Q. Nos. 22–25) : Given below is a passage for comprehension. Answer the following questions by choosing the correct option.

Maria loved to read since her childhood. Every evening, she would sit by the window and lose herself in the world of stories. Her parents encouraged this habit, knowing it would help her imagination grow. As she grew older, Maria began writing short tales of her own. At first, she shared them only with her friends, but soon her teachers noticed her talent. One day, her English teacher submitted one of her stories to a young writers' competition. To Maria's surprise, she won first prize! That moment changed her life and inspired her to dream of becoming a writer someday.

22. Who encouraged Maria's habit to read?

- (A) Her friends (B) Her teachers
- (C) Her parents (D) Her sister

23. What did Maria start doing as she grew older?

- (A) Writing short tales
- (B) Drawing pictures
- (C) Joining competitions
- (D) Watching movies

24. Who sent her story to the competition?

- (A) Her mother (B) Her friend
- (C) Her teacher (D) Her father

25. What was the result of the competition?

- (A) Maria lost
- (B) Maria got second place
- (C) Maria won first prize
- (D) Maria didn't participate

PART—B : GENERAL KNOWLEDGE & CURRENT AFFAIRS

(Marks : 30)

Each question carries **2** marks

- 26.** Who is known as the 'Missile Man of India'?
- (A) Mahatma Gandhi
(B) Dr. A. P. J. Abdul Kalam
(C) Dr. Homi Bhabha
(D) Vikram Sarabhai
- 27.** Which is the largest gland in the human body?
- (A) Pancreas
(B) Thyroid
(C) Liver
(D) Adrenal
- 28.** Who was the first woman to receive the Nobel Prize?
- (A) Marie Curie
(B) Mother Teresa
(C) Rosalind Franklin
(D) Florence Nightingale
- 29.** Which country is the host of the Global Peace Prayer Festival, 2025?
- (A) India
(B) Myanmar
(C) Bhutan
(D) Bangladesh
- 30.** Which planet is known as the 'Red Planet'?
- (A) Venus
(B) Jupiter
(C) Mars
(D) Saturn
- 31.** Eturnagaram Wildlife Sanctuary is located in which State?
- (A) Telangana
(B) Maharashtra
(C) Gujarat
(D) Karnataka
- 32.** What is the SI unit of electric current?
- (A) Ampere
(B) Volt
(C) Ohm
(D) Joule

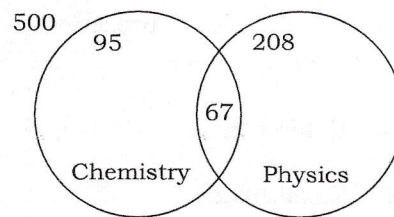
33. Which Indian State is the largest in terms of area?
- (A) Uttar Pradesh
(B) Maharashtra
(C) Rajasthan
(D) Madhya Pradesh
34. Who discovered penicillin?
- (A) Alexander Fleming
(B) Louis Pasteur
(C) Joseph Lister
(D) Edward Jenner
35. What is the currency of Japan?
- (A) Yuan
(B) Yen
(C) Won
(D) Ringgit
36. The Ayni Airbase, where India recently ended its military presence, is located in which country?
- (A) Uzbekistan
(B) Kazakhstan
(C) Tajikistan
(D) Kyrgyzstan
37. The 'Aabhar' online store has been launched on which platform?
- (A) MyGov portal
(B) e-Shram portal
(C) Government e-Marketplace (GeM) portal
(D) Bharat Craft portal
38. Which State has become the first in India to eradicate extreme poverty?
- (A) Andhra Pradesh
(B) Tamil Nadu
(C) Kerala
(D) Maharashtra
39. Which State has become the first in India to launch air ambulance and helicopter tourism services?
- (A) Himachal Pradesh
(B) Madhya Pradesh
(C) Uttar Pradesh
(D) Gujarat
40. Where was the Asian Youth Games, 2025 held?
- (A) Malaysia
(B) Bahrain
(C) Vietnam
(D) China

PART—C : REASONING & QUANTITATIVE APTITUDE

(Marks : 20)

Each question carries **2** marks

- 41.** Find the sum of first 90 even natural numbers.
(A) 8180 (B) 8190
(C) 8100 (D) 8110
- 42.** Find the sum of two numbers, whose product is 200 and difference is minimum.
(A) 30 (B) 27
(C) 35 (D) 33
- 43.** A number when divided by 91 leaves a remainder 65. If the same number is divided by 13, find the remainder.
(A) 7 (B) 0
(C) 5 (D) 12
- 44.** Find the HCF of 405, 585, 765 and 900.
(A) 35 (B) 15
(C) 45 (D) 90
- 45.** Find the smallest number that should be added to 2190 to make it a perfect cube.
(A) 21 (B) 7
(C) 29 (D) 13
- 46.** Find the odd one out from the given set of numbers.
14, 28, 35, 46, 56, 84
(A) 56 (B) 84
(C) 35 (D) 46
- 47.** Find odd one out from the given jumbled words.
LNUAIMMIU, ELEST, OPERPC,
NMKOYE, INCKLE
(A) NMKOYE (B) OPERPC
(C) INCKLE (D) ELEST
- 48.** If the letters of the word 'PRODUCT' are arranged alphabetically, then which letter would be farthest from the second letter of the word?
(A) T (B) R
(C) U (D) P
- 49.** Milly introduced a boy as the son of the only daughter of the mother of her maternal uncle. How is Milly related to that boy?
(A) Nephew (B) Son
(C) Brother (D) Sister
- 50.** From the figure given below, determine the number of students who did not study any of the two subjects.



- (A) 175 (B) 295
(C) 264 (D) 135

PART—D : [Choose any ONE subject from the following]

MECHANICAL ENGINEERING

(Marks : 200)

Each question carries **2** marks

- 51.** The primary function of cutting fluid in machining is to
- (A) increase cutting temperature
 - (B) reduce friction and cool the cutting zone
 - (C) harden the workpiece
 - (D) decrease tool life
- 52.** A bevel protractor is primarily used to measure
- (A) linear dimensions
 - (B) angular dimensions
 - (C) surface roughness
 - (D) thread pitch
- 53.** The SI unit of stress is
- (A) N
 - (B) N/m
 - (C) N/m^2
 - (D) J
- 54.** Strain is defined as
- (A) change in length
 - (B) change in length/original length
 - (C) force/area
 - (D) energy stored
- 55.** In a four-stroke IC engine, the strokes are
- (A) intake, compression, power, exhaust
 - (B) intake, power, compression, exhaust
 - (C) suction, discharge, power, idle
 - (D) None of the above
- 56.** The principle of a Vernier caliper allows measurement by
- (A) optical interpolation
 - (B) Vernier scale alignment
 - (C) laser micrometry
 - (D) ultrasonic waves
- 57.** Bernoulli's equation is a statement of conservation of
- (A) mass
 - (B) momentum
 - (C) energy
 - (D) density
- 58.** The Reynolds number indicates
- (A) laminar vs. turbulent flow
 - (B) loss coefficient
 - (C) viscosity
 - (D) pressure drop

59. The Lewis form factor is used in designing
- (A) bolted joints
 - (B) spur gear teeth
 - (C) bearings
 - (D) springs
60. The typical application of a flywheel is to
- (A) store angular momentum
 - (B) convert heat to work
 - (C) reduce friction
 - (D) pump fluids
61. A Talysurf instrument measures
- (A) surface roughness
 - (B) hardness
 - (C) tensile strength
 - (D) temperature
62. A CMM is mainly used for
- (A) cutting materials
 - (B) coordinate measurement in 3D
 - (C) welding
 - (D) painting
63. The main function of a governor in engines is to
- (A) increase power
 - (B) control speed
 - (C) reduce fuel consumption only
 - (D) filter lubricants
64. The standard symbol for diameter on drawings is
- (A) \emptyset
 - (B) \times
 - (C) \pm
 - (D) \approx
65. The hardness test using a steel ball is known as
- (A) Rockwell
 - (B) Brinell
 - (C) Vickers
 - (D) Charpy
66. Spur gears are used when shafts are
- (A) parallel
 - (B) intersecting
 - (C) skew
 - (D) coaxial
67. Feed in turning is measured as
- (A) mm/rev
 - (B) mm/min
 - (C) r.p.m.
 - (D) m/s
68. The continuity equation for incompressible flow is
- (A) $A_1 V_1 = A_2 V_2$
 - (B) $P_1 V_1 = P_2 V_2$
 - (C) $F = ma$
 - (D) $Q = It$

69. The modulus of elasticity is
- Young's modulus
 - bulk modulus
 - shear modulus
 - Poisson's ratio
70. A lathe operation used to create external threads is
- knurling
 - threading
 - facing
 - boring
71. A simply supported beam carries a central load W . The maximum bending moment is
- $WL/2$
 - $WL/4$
 - $WL^2/8$
 - $WL^2/4$
72. The efficiency of a screw jack is given by
- $\tan \alpha / (\tan \alpha + \mu)$
 - $\mu / \tan \alpha$
 - α / μ
 - $\tan \alpha + \mu$
73. In a venturimeter, as the cross-sectional area decreases, the velocity
- increases
 - decreases
 - remains constant
 - becomes zero
74. The Lewis form factor in gear design is related to
- tooth shape
 - hardness
 - bearing load
 - helix angle
75. The velocity ratio of a belt drive increases when
- driving pulley diameter increases
 - driven pulley diameter increases
 - belt thickness decreases
 - belt slip increases
76. In Rankine cycle, the process of condensation occurs at
- constant temperature
 - constant pressure
 - Both (A) and (B)
 - None of the above
77. The modulus of rigidity relates to
- shear stress and shear strain
 - tensile stress and strain
 - volume strain
 - axial load
78. Poisson's ratio is the ratio of
- lateral strain/axial strain
 - axial strain / lateral strain
 - stress/strain
 - force/area

79. The head loss due to friction in a pipe is given by
- (A) $hf = 4f(L/D)(V^2/2g)$
 - (B) $hf = 2f(L/D)(V^2/2g)$
 - (C) $hf = f(V^2/2g)$
 - (D) $hf = f(L/D)$
80. The law of belting states that
- (A) belt leaves pulley at right angles
 - (B) belt leaves pulley at angle of wrap
 - (C) belt leaves pulley at the point of contact
 - (D) belt leaves pulley tangentially
81. In a centrifugal pump, cavitation occurs when
- (A) pressure at suction < vapor pressure
 - (B) pressure at suction > vapor pressure
 - (C) head is high
 - (D) velocity is low
82. A spring used to absorb shock loads should have
- (A) low stiffness
 - (B) high stiffness
 - (C) medium stiffness
 - (D) constant stiffness
83. For a thin cylinder under internal pressure p , hoop stress is
- (A) pr/t
 - (B) pt/r
 - (C) $2pr/t$
 - (D) $p/2$
84. The process of annealing is carried out to
- (A) increase hardness
 - (B) soften material
 - (C) improve brittleness
 - (D) increase strength
85. The main function of a superheater in a boiler is
- (A) to remove moisture
 - (B) to increase steam temperature
 - (C) to reduce boiler pressure
 - (D) to preheat feedwater
86. The maximum efficiency of a heat engine depends on
- (A) working fluid
 - (B) temperature difference
 - (C) pressure ratio
 - (D) speed

87. The hardness of steel increases with
- carbon content
 - oxygen content
 - nickel
 - phosphorus
88. A dynamometer measures
- speed
 - torque and power
 - pressure
 - flow rate
89. A clutch is used to
- engage and disengage power transmission
 - increase torque
 - reduce friction
 - control engine temperature
90. The torsional shear stress in a shaft is
- $(T \times r) / J$
 - $(M \times y) / I$
 - P / A
 - $E \times \epsilon$
91. A nozzle converts
- pressure energy to kinetic energy
 - heat to work
 - kinetic to potential energy
 - None of the above
92. The thermal conductivity of a perfect insulator is
- zero
 - infinite
 - very high
 - very low
93. The efficiency of an ideal Rankine cycle increases with
- increase in condenser pressure
 - decrease in boiler pressure
 - superheating of steam
 - Both (A) and (B)
94. A bearing is used to
- support rotating shafts
 - increase torque
 - provide lubrication
 - absorb shocks
95. An idler gear is used to
- reverse direction of rotation
 - change speed ratio
 - transmit torque
 - reduce vibration
96. The moment of inertia of a circular section about neutral axis is
- $\pi d^4 / 64$
 - $\pi d^4 / 32$
 - $\pi r^4 / 4$
 - $\pi r^2 / 2$

97. For a cantilever beam, maximum deflection occurs at
 (A) fixed end
 (B) free end
 (C) mid-span
 (D) None of the above
98. The unit of viscosity is
 (A) N-s/m²
 (B) N/m
 (C) N/m²
 (D) J/kg
99. Lathe operation for finishing and sizing holes is called
 (A) reaming
 (B) boring
 (C) facing
 (D) drilling
100. For a simply supported beam with UDL w , maximum bending moment is
 (A) $wL^2/8$
 (B) $wL^2/4$
 (C) $wL/4$
 (D) $wL/8$
101. The tool used for measuring small internal diameters is
 (A) vernier caliper
 (B) inside micrometer
 (C) height gauge
 (D) bevel protractor
102. The modulus of resilience is given by
 (A) $\sigma_y^2/2E$
 (B) σ_y/E
 (C) σ/E^2
 (D) $2E/\sigma_y$
103. In Otto cycle, the efficiency depends on
 (A) pressure ratio
 (B) compression ratio
 (C) cut-off ratio
 (D) expansion ratio
104. In a cam-follower mechanism, the follower motion is controlled by
 (A) spring
 (B) cam profile
 (C) shaft speed
 (D) valve timing
105. In spur gears, the contact ratio is the ratio of
 (A) arc of approach to pitch circle diameter
 (B) length of contact path to circular pitch
 (C) addendum to dedendum
 (D) velocity ratio
106. Brinell hardness number (BHN) depends on
 (A) load and indenter diameter
 (B) material density
 (C) time of loading
 (D) cooling rate

107. The braking torque in a band brake is given by
- (A) $(T_1 - T_2) \times r$
 - (B) $T_1 r$
 - (C) $T_2 r$
 - (D) $(T_1 + T_2) \times r$
108. For a thin spherical shell, hoop stress is
- (A) $pr/2t$
 - (B) $2pr/t$
 - (C) pr/t
 - (D) $p/2$
109. In convection heat transfer, the dimensionless number relating buoyancy and viscous forces is
- (A) Grashof number
 - (B) Reynolds number
 - (C) Nusselt number
 - (D) Prandtl number
110. Pitch circle diameter of a gear is
- (A) diameter of the rolling circle
 - (B) addendum circle
 - (C) dedendum circle
 - (D) root circle
111. The main function of a carburizing process is to
- (A) harden surface
 - (B) soften steel
 - (C) remove impurities
 - (D) increase ductility
112. The moment of inertia of a rectangle about base is
- (A) $bh^3/3$
 - (B) $bh^2/6$
 - (C) $bh^3/12$
 - (D) $bh^3/36$
113. The pressure ratio in a gas turbine is 6, then efficiency increases with
- (A) decreasing turbine inlet temperature
 - (B) increasing turbine inlet temperature
 - (C) decreasing pressure ratio
 - (D) increasing air flow
114. For a reciprocating compressor, clearance volume affects
- (A) volumetric efficiency
 - (B) isothermal efficiency
 - (C) compression ratio
 - (D) friction losses

- 115.** The function of differential in an automobile is to
- (A) transmit equal torque to wheels
 - (B) allow wheels to rotate at different speeds
 - (C) lock the wheels
 - (D) reverse rotation
- 116.** An idler pulley is used to
- (A) maintain belt tension
 - (B) transmit power
 - (C) reduce friction
 - (D) adjust velocity ratio
- 117.** In a reciprocating pump, air vessel is used to
- (A) reduce friction
 - (B) smooth discharge and suction flow
 - (C) increase efficiency
 - (D) reduce noise
- 118.** In a pressure gauge, the Bourdon tube converts pressure into
- (A) angular displacement
 - (B) linear force
 - (C) torque
 - (D) electrical signal
- 119.** Cast iron is preferred for machine beds because
- (A) it is hard
 - (B) it is vibration damping
 - (C) it is lightweight
 - (D) it has low cost only
- 120.** Specific speed of turbine is the speed at which
- (A) turbine develops unit power under unit head
 - (B) flow rate is maximum
 - (C) head is maximum
 - (D) efficiency is minimum
- 121.** The unit of thermal conductivity is
- (A) W/m-K
 - (B) W/m²-K
 - (C) J/kg-K
 - (D) N/m²
- 122.** A cotter joint is used to
- (A) join coaxial rods under axial load
 - (B) connect gears
 - (C) transmit rotation
 - (D) couple shafts at an angle
- 123.** If Young's modulus = 2×10^5 MPa and bulk modulus = 1.66×10^5 MPa, Poisson's ratio is
- (A) 0.25
 - (B) 0.3
 - (C) 0.35
 - (D) 0.4
- 124.** A Pelton wheel is a/an
- (A) tangential flow turbine
 - (B) axial flow turbine
 - (C) radial flow pump
 - (D) mixed flow turbine

125. Reynolds number for laminar flow in pipe is
(A) < 2000
(B) 4000
(C) > 4000
(D) between 2000–4000
126. Governor controls
(A) mean speed of engine
(B) power output
(C) engine temperature
(D) air-fuel ratio
127. The material commonly used for journal bearing is
(A) babbitt metal
(B) brass
(C) cast iron
(D) bronze
128. The function of a reamer is to
(A) enlarge and finish holes
(B) drill holes
(C) bore holes
(D) cut threads
129. The compression ratio in a diesel engine is
(A) 6–10
(B) 10–15
(C) 14–22
(D) 25–35
130. In a nozzle, choking occurs when
(A) Mach number = 1 at throat
(B) pressure ratio = 1
(C) flow velocity = 0
(D) static pressure = total pressure
131. The material used for making gauges is
(A) high carbon steel
(B) cast iron
(C) stainless steel
(D) brass
132. If a bar is subjected to equal tensile and compressive stresses on perpendicular planes, the condition is
(A) pure shear
(B) biaxial stress
(C) hydrostatic stress
(D) simple tension
133. In a refrigeration cycle, the evaporator functions as
(A) heat absorber
(B) heat rejector
(C) compressor
(D) condenser
134. The function of a governor in an engine is to
(A) maintain constant speed
(B) maintain fuel ratio
(C) reduce vibration
(D) increase torque

- 135.** Hydraulic machines work on the principle of
- (A) Pascal's law
 - (B) Bernoulli's law
 - (C) Boyle's law
 - (D) Newton's law
- 136.** A beam of rectangular cross-section is stronger in bending about
- (A) longer side
 - (B) shorter side
 - (C) neutral axis
 - (D) diagonal axis
- 137.** In a four-stroke engine, inlet valve opens
- (A) before TDC
 - (B) after TDC
 - (C) at BDC
 - (D) after BDC
- 138.** A clutch plate works on the principle of
- (A) friction
 - (B) adhesion
 - (C) magnetism
 - (D) centrifugal force
- 139.** The best tool material for high-speed cutting is
- (A) HSS
 - (B) tungsten carbide
 - (C) cast iron
 - (D) mild steel
- 140.** The function of a flywheel is to
- (A) store kinetic energy
 - (B) control engine temperature
 - (C) reduce noise
 - (D) increase torque
- 141.** The degree of freedom of a mechanism is given by
- (A) $3(n - 1) - 2j - h$
 - (B) $2(n - 1) - 3j$
 - (C) $3n - j - h$
 - (D) $n + j$
- 142.** The calorific value of a fuel is the amount of heat
- (A) liberated per unit mass
 - (B) absorbed per unit mass
 - (C) liberated per unit volume
 - (D) stored per unit time

143. In a compound gear train, the speed ratio is
- (A) product of driving/driven gears
 - (B) ratio of largest to smallest gear
 - (C) average of teeth numbers
 - (D) None of the above
144. The process of removing burrs from a machined surface is called
- (A) deburring
 - (B) polishing
 - (C) grinding
 - (D) honing
145. In arc welding, electrode coating provides
- (A) flux and shielding gas
 - (B) electricity
 - (C) cooling
 - (D) machining
146. The mechanical advantage of an inclined plane for ideal conditions is
- (A) $1/\sin \theta$
 - (B) $1/\cos \theta$
 - (C) $\tan \theta$
 - (D) $\sin \theta$
147. A body subjected to equal tensile stresses in all directions is under
- (A) hydrostatic stress
 - (B) pure shear
 - (C) uniaxial stress
 - (D) bending stress
148. The process of joining two metals by melting a third metal is
- (A) brazing
 - (B) soldering
 - (C) riveting
 - (D) welding
149. A heat exchanger is a device which
- (A) transfers heat between fluids
 - (B) generates heat
 - (C) stores heat
 - (D) converts heat into work
150. In a Kaplan turbine, flow is
- (A) axial
 - (B) radial
 - (C) tangential
 - (D) mixed

AUTOMOBILE ENGINEERING

(Marks : 200)

Each question carries 2 marks

51. The four-stroke spark-ignition engine cycle consists of
- (A) intake → compression → power → exhaust
 - (B) intake → power → compression → exhaust
 - (C) suction → compression → power → exhaust
 - (D) intake → compression → exhaust → power
52. The main purpose of a clutch in a vehicle is to
- (A) increase engine speed
 - (B) engage/disengage engine from transmission
 - (C) act as main brake
 - (D) change gear ratios
53. Which device is used to change the speed and torque between engine and wheels?
- (A) Differential
 - (B) Clutch
 - (C) Gearbox (transmission)
 - (D) Shock absorber
54. The correct SI unit for torque is
- (A) N
 - (B) N-m
 - (C) J
 - (D) W
55. In a lead-acid battery, during discharge the positive plate reaction mainly involves
- (A) lead oxidizing to lead dioxide
 - (B) lead sulfate formation
 - (C) formation of lithium salts
 - (D) oxidation of aluminum
56. Which component reduces engine speed fluctuations by storing rotational energy?
- (A) Flywheel
 - (B) Governor
 - (C) Differential
 - (D) Carburetor
57. When fuel-air mixture is lean, then
- (A) higher is the maximum temperature
 - (B) efficiency is less
 - (C) power output is less
 - (D) higher is the maximum pressure
58. The device that allows wheels to rotate at different speeds while cornering is the
- (A) differential
 - (B) gearbox
 - (C) clutch
 - (D) propeller shaft

59. Which of the following is a primary function of the radiator in an automobile cooling system?
- (A) Generate heat
 - (B) Convert heat to work
 - (C) Reject heat from coolant to atmosphere
 - (D) Mix coolant
60. The main measurement provided by a tachometer is
- (A) torque
 - (B) engine speed (r.p.m.)
 - (C) power
 - (D) fuel flow
61. Brake fade in drum brakes is commonly caused by
- (A) overcooling
 - (B) excessive heating reducing friction
 - (C) increased pad friction
 - (D) increased tyre pressure
62. The mean effective pressure (MEP) is useful because it is directly related to
- (A) engine displacement and power
 - (B) fuel type only
 - (C) lubrication type
 - (D) color of engine
63. In a gearbox, synchromesh mechanism primarily helps to
- (A) lubricate gears
 - (B) synchronize speeds of gears for smooth shifting
 - (C) increase torque
 - (D) reduce engine power
64. A catalytic converter in the exhaust system reduces which emissions primarily?
- (A) CO, HC and NO_x
 - (B) CO₂ only
 - (C) Nitrogen only
 - (D) Water vapour
65. The unit kW refers to
- (A) kilogram weight
 - (B) kilowatt = 1000 W
 - (C) kilowatt-hour
 - (D) kinetic work
66. In engine lubrication, an oil's SAE grade primarily indicates its
- (A) viscosity rating
 - (B) color
 - (C) additive content
 - (D) flashpoint

67. Which of the following improves thermal efficiency of an engine cycle?
- (A) Increasing compression ratio
 - (B) Decreasing compression ratio
 - (C) Retarding ignition timing
 - (D) Removing intercooler
68. A remedial method for brake squeal typically involves
- (A) removing pads
 - (B) using dampers/shims or better pad material
 - (C) harder pads only
 - (D) increasing tyre pressure
69. The basic role of an alternator in a vehicle is to
- (A) store energy
 - (B) convert mechanical to electrical energy and charge battery
 - (C) start the engine
 - (D) reduce emissions
70. For under-square engine, bore by stroke ratio should be
- (A) > 1
 - (B) $= 1$
 - (C) < 1
 - (D) $= 0$
71. A petrol engine has a bore of 80 mm and stroke of 88 mm (single cylinder). Calculate the swept volume.
- (A) ~ 443 cc
 - (B) ~ 4430 cc
 - (C) ~ 44300 cc
 - (D) ~ 44 cc
72. For a simple centrifugal pump, NPSH is required to avoid
- (A) cavitation
 - (B) lubrication
 - (C) overheating
 - (D) increased viscosity
73. A rolling wheel with radius 0.3 m and angular speed 50 rad/s has linear speed $v =$
- (A) 15 m/s
 - (B) 150 m/s
 - (C) 1.5 m/s
 - (D) 0.15 m/s
74. The compression ratio of a diesel engine is typically
- (A) 6:1
 - (B) 8:1
 - (C) 16:1
 - (D) 3:1

75. Let mean effective pressure (MEP) = 0.8 MPa, displacement per cycle = 0.002 m^3 , engine 3000 r.p.m. (4-stroke). The approximate indicated power is
 (A) ~ 80 kW (B) ~ 8 kW
 (C) ~ 0.8 kW (D) ~ 800 kW
76. The function of a thermostat in an engine cooling system is to
 (A) pump coolant
 (B) regulate coolant flow to radiator
 (C) increase fuel flow
 (D) act as a pressure sensor
77. In clutch, the torque capacity $T = \mu Wr$, with $\mu = 0.3$, $W = 2000 \text{ N}$, $r = 0.12 \text{ m}$. $T =$
 (A) 72 N-m
 (B) 720 N-m
 (C) 7.2 N-m
 (D) 0.72 N-m
78. If gearbox shaft rotates at 3600 r.p.m. and transmits 5 kW, then torque \approx
 (A) 13.27 N-m
 (B) 83.78 N-m
 (C) 6.25 N-m
 (D) 0.9 N-m
79. The advantage of disk brakes over drum brakes includes
 (A) better heat dissipation and less fade
 (B) lower cost always
 (C) worse stopping power
 (D) more complex cooling
80. The factor of safety (FoS) is defined as
 (A) ultimate stress/working stress
 (B) working stress/ultimate stress
 (C) yield stress/ultimate stress
 (D) None of the above
81. A helical gear produces axial thrust because of
 (A) helix angle causing axial force
 (B) tooth profile
 (C) lubrication
 (D) material
82. If engine speed $N = 2400 \text{ r.p.m.}$, then angular speed ω is
 (A) 251.33 rad/s
 (B) 2400 rad/s
 (C) 25.13 rad/s
 (D) 150.8 rad/s
83. Engine detonation (knock) causes
 (A) increased efficiency
 (B) pounding and possible damage
 (C) reduced octane requirement
 (D) better combustion
84. Which of the following is **not** a classification of leaf springs?
 (A) Elliptic
 (B) Transverse
 (C) Helper spring
 (D) Vertical

85. Higher vehicle center of gravity increases the risk of
- (A) rolling over
 - (B) better stability
 - (C) reduced body roll
 - (D) None of the above
86. Brake power = 20 kW, engine speed = 3000 r.p.m. The torque is approximately
- (A) 63.66 N-m
 - (B) 31.83 N-m
 - (C) 127.32 N-m
 - (D) 6.36 N-m
87. Tapered roller bearings primarily support
- (A) radial and axial loads
 - (B) only radial load
 - (C) only axial load
 - (D) None of the above
88. Why is supercharger hardly preferred in gasoline engine?
- (A) High emission
 - (B) Knocking
 - (C) Difficulty of cold start
 - (D) Low power
89. A pressure sensor specification in mV/V refers to
- (A) mV output per volt excitation
 - (B) temperature coefficient
 - (C) frequency response
 - (D) None of the above
90. An intercooler's primary purpose in turbocharged engines is to
- (A) heat intake charge
 - (B) cool compressed air to increase density
 - (C) reduce oil temperature
 - (D) increase exhaust temperature
91. Volumetric efficiency $\eta_v = 0.85$, $V_d = 0.001 \text{ m}^3$, air density = 1.2 kg/m^3 . Mass per cycle \approx
- (A) 0.00102 kg
 - (B) 0.00102 g
 - (C) 1.02 kg
 - (D) 0.00085 kg
92. A dial indicator measures
- (A) small linear displacements
 - (B) torque
 - (C) temperature
 - (D) pressure
93. Choke valve in a carburetor primarily serves to
- (A) enrich air-fuel mixture for cold start
 - (B) increase airflow
 - (C) decrease fuel
 - (D) lubricate
94. Spark timing is usually advanced at higher speeds to
- (A) compensate for increased combustion time
 - (B) reduce power
 - (C) increase oil consumption
 - (D) cause knock

95. Camber angle refers to
- (A) tilt of wheel in vertical plane (top in/out)
 - (B) toe-in/out
 - (C) caster angle
 - (D) wheelbase
96. Toe-in and toe-out in vehicle alignment refer to
- (A) steering geometry of front wheels
 - (B) suspension stiffness
 - (C) brake balance
 - (D) engine tuning
97. Ackermann steering geometry ensures
- (A) all wheels roll about a common turning centre
 - (B) zero steering effort
 - (C) equal slip angles
 - (D) constant wheelbase
98. The universal joint in a drive shaft compensates for
- (A) angular misalignment between shafts
 - (B) temperature changes
 - (C) gear wear
 - (D) oil leakage
99. Shock absorbers are used to
- (A) absorb shocks from road and damp spring oscillations
 - (B) carry vehicle weight
 - (C) reduce tyre wear
 - (D) supply fuel
100. A governor in an engine primarily controls
- (A) speed by adjusting fuel supply
 - (B) cooling water flow
 - (C) ignition timing
 - (D) exhaust gas temperature
101. The turbocharger in a diesel engine is driven by
- (A) exhaust gases
 - (B) crankshaft
 - (C) timing belt
 - (D) electric motor
102. Supercharging an engine primarily
- (A) decreases air intake
 - (B) increases power by forcing more air-fuel mixture
 - (C) reduces torque
 - (D) lowers compression ratio
103. The function of piston rings is to
- (A) seal combustion chamber and control oil
 - (B) increase compression ratio only
 - (C) support crankshaft
 - (D) drive camshaft
104. The connecting rod connects
- (A) crankshaft to camshaft
 - (B) piston to crankshaft
 - (C) valve to rocker arm
 - (D) clutch to flywheel

- 105.** The main purpose of a flywheel is to
 (A) increase speed variations
 (B) smooth cyclic torque fluctuations
 (C) reduce mean torque
 (D) store electrical energy
- 106.** In a four-cylinder engine, the crankshaft has how many crank throws?
 (A) 2 (B) 3
 (C) 4 (D) 1
- 107.** The octane number of a fuel indicates its
 (A) calorific value
 (B) knock resistance
 (C) viscosity
 (D) density
- 108.** The cetane number of diesel fuel represents
 (A) ignition delay characteristics
 (B) viscosity
 (C) power output
 (D) sulfur content
- 109.** Which of the following materials is commonly used for engine cylinder blocks?
 (A) Cast iron (B) Brass
 (C) Lead (D) Copper
- 110.** Valve overlap refers to
 (A) time both intake and exhaust valves open
 (B) valve clearance
 (C) delay in valve timing
 (D) camshaft wear
- 111.** The function of a carburetor is to
 (A) mix air and fuel in correct ratio
 (B) filter fuel
 (C) pump oil
 (D) control exhaust
- 112.** The air-fuel ratio for maximum power in a petrol engine is approximately
 (A) 12 : 1
 (B) 14.7 : 1
 (C) 18 : 1
 (D) 10 : 1
- 113.** The stoichiometric air-fuel ratio for petrol is
 (A) 14.7 : 1
 (B) 12 : 1
 (C) 16 : 1
 (D) 10 : 1
- 114.** A diesel engine does not require an ignition system because
 (A) high compression causes auto-ignition
 (B) it uses spark plugs
 (C) fuel is preheated
 (D) it has a glow plug
- 115.** Glow plugs are used in
 (A) petrol engines
 (B) diesel engines
 (C) gas turbines
 (D) electric vehicles

116. A two-stroke engine differs from a four-stroke by
- (A) completing cycle in one crank revolution
 - (B) using more valves
 - (C) requiring water cooling only
 - (D) None of the above
117. Port timing is associated with
- (A) two-stroke engines
 - (B) four-stroke engines
 - (C) jet engines
 - (D) electric motors
118. A knock sensor in modern engines helps to
- (A) detect abnormal combustion and adjust timing
 - (B) measure torque
 - (C) control cooling fan
 - (D) record fuel usage
119. The emission control device that stores fuel vapours and releases them to intake is
- (A) EGR valve
 - (B) catalytic converter
 - (C) charcoal canister
 - (D) turbocharger
120. The EGR (Exhaust Gas Recirculation) system reduces
- (A) CO_2
 - (B) NO_x
 - (C) HC
 - (D) SO_2
121. An alternator produces _____ current.
- (A) alternating
 - (B) direct
 - (C) pulsating
 - (D) constant DC
122. The starter motor converts
- (A) electrical to mechanical energy
 - (B) mechanical to electrical energy
 - (C) chemical to electrical energy
 - (D) thermal to kinetic energy
123. The ignition coil works on the principle of
- (A) electromagnetic induction
 - (B) resistance heating
 - (C) eddy currents
 - (D) piezoelectricity
124. The distributor in older engines serves to
- (A) distribute high voltage to spark plugs in correct firing order
 - (B) supply fuel
 - (C) pump coolant
 - (D) drive fan
125. As per the Bharat Stage VI norms, heavy duty vehicles are defined having gross vehicle weight more than _____ tons.
- (A) 3.5
 - (B) 7.0
 - (C) 10.5
 - (D) 14.0

- 126.** Which of the following sensors measures crankshaft position?
- (A) Hall effect sensor
 - (B) MAP sensor
 - (C) Oxygen sensor
 - (D) Knock sensor
- 127.** Oxygen sensor feedback helps maintain
- (A) stoichiometric air-fuel ratio
 - (B) coolant level
 - (C) oil pressure
 - (D) spark timing only
- 128.** Wheel alignment parameters include
- (A) camber, caster, toe
 - (B) lift, drag, downforce
 - (C) speed, torque, r.p.m.
 - (D) None of the above
- 129.** A differential lock is used to
- (A) prevent wheels from rotating at different speeds
 - (B) aid turning radius
 - (C) reduce braking distance
 - (D) increase fuel economy
- 130.** The ABS (Anti-lock Braking System) prevents
- (A) wheel lock-up during braking
 - (B) steering
 - (C) suspension oscillation
 - (D) gear shifting
- 131.** The purpose of suspension system in a vehicle is to
- (A) absorb road shocks and improve ride comfort
 - (B) increase fuel economy
 - (C) reduce engine vibrations
 - (D) aid steering only
- 132.** Leaf springs are primarily used in
- (A) heavy commercial vehicles
 - (B) motorcycles
 - (C) racing cars
 - (D) electric scooters
- 133.** McPherson strut is a type of
- (A) independent front suspension
 - (B) brake system
 - (C) steering linkage
 - (D) cooling system
- 134.** The function of a shock absorber is to
- (A) dampen spring oscillations
 - (B) carry vehicle weight
 - (C) transfer torque
 - (D) provide alignment

- 135.** The steering ratio is defined as
- (A) steering wheel angle/road wheel angle
 - (B) road wheel angle/steering wheel angle
 - (C) torque ratio
 - (D) gear ratio in transmission
- 136.** Caster angle in steering geometry affects
- (A) self-centering of steering
 - (B) tyre wear
 - (C) braking
 - (D) suspension stiffness
- 137.** Power steering primarily assists the driver by
- (A) reducing steering effort
 - (B) increasing braking force
 - (C) maintaining straight line
 - (D) reducing turning radius
- 138.** In rack and pinion steering, linear rack motion is obtained from
- (A) rotation of steering wheel and pinion gear
 - (B) movement of suspension arm
 - (C) differential gears
 - (D) hydraulic pump
- 139.** The toe-in setting is used to
- (A) counteract wheel spread due to rolling resistance
 - (B) increase top speed
 - (C) reduce caster angle
 - (D) prevent brake fade
- 140.** Understeer in a vehicle means
- (A) front wheels turn less than commanded
 - (B) rear wheels slide outward
 - (C) vehicle turns more sharply
 - (D) neutral steering
- 141.** The coefficient of rolling resistance depends primarily on
- (A) tyre material and road surface
 - (B) brake temperature
 - (C) engine torque
 - (D) gear ratio
- 142.** The braking force in hydraulic brake is transmitted through
- (A) brake fluid
 - (B) air pressure
 - (C) mechanical rods
 - (D) electricity

143. In a drum brake, the leading shoe provides

- (A) more braking force due to self-servo action
- (B) less braking force
- (C) cooling
- (D) no braking

144. The master cylinder converts

- (A) pedal force to hydraulic pressure
- (B) pressure to motion
- (C) electric energy to motion
- (D) None of the above

145. In disc brakes, brake pads act on

- (A) rotor/disc surface
- (B) drum inner surface
- (C) tyre tread
- (D) brake shoe rim

146. The purpose of anti-roll bar (stabilizer bar) is to

- (A) reduce body roll during cornering
- (B) improve acceleration
- (C) reduce noise
- (D) aid steering

147. Hydraulic braking systems follow which fundamental law?

- (A) Pascal's law
- (B) Newton's law
- (C) Hooke's law
- (D) Bernoulli's principle

148. A vacuum booster in braking increases

- (A) pedal assist force
- (B) hydraulic pressure loss
- (C) pedal travel
- (D) brake fade

149. Regenerative braking is typically found in

- (A) electric and hybrid vehicles
- (B) steam engines
- (C) diesel trucks only
- (D) None of the above

150. In electric vehicles, the traction motor directly drives

- (A) the vehicle wheels
- (B) the alternator
- (C) the fuel injector
- (D) exhaust fan