

SSC JE 2014 General Engineering Mechanical

JN

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

DB 2014
PAPER I
प्रश्न-पत्र I

Test Form No.
टेस्ट फॉर्म सं.
542 PK 6

Time Allowed : 2 Hours
निर्धारित समय : 2 घंटे

Maximum Marks : 200
अधिकतम अंक : 200

Read the following instructions carefully before you begin to answer the questions. This Booklet contains questions in English as well as in Hindi.
प्रश्नों के उत्तर देने से पहले नीचे लिखे अनुदेशों को ध्यान से पढ़ लें। इस पुस्तिका में प्रश्न अंग्रेजी तथा हिन्दी दोनों में दिये गये हैं।

INSTRUCTIONS TO CANDIDATES

- This Booklet contains 200 questions in all comprising the following three tests :
Test (i) : General Intelligence and Reasoning (50 Questions)
Test (ii) : General Awareness (50 Questions)
Test (iii) : Part A : General Engineering (Civil and Structural) (100 Questions)
OR
Part B : General Engineering (Electrical) (100 Questions)
OR
Part C : General Engineering (Mechanical) (100 Questions)
- In questions set bilingually in English and Hindi, in case of discrepancy, the English version will prevail.
- Test (i) General Intelligence and Reasoning and Test (ii) General Awareness are compulsory for all the candidates. Candidates are required to attempt only one Section in Test (iii) General Engineering i.e. Part A Civil and Structural OR Part B Electrical OR Part C Mechanical as per option in the application form given by the candidates failing which you will be awarded 'ZERO' mark.
- All questions are compulsory and carry equal marks.
- The paper carries negative marking, 0.25 marks will be deducted for each wrong answer.
- Before you start to answer the questions you must check up this Booklet and ensure that it contains all the pages (1-80) and see that no page is missing or repeated. If you find any defect in this Booklet, you must get it replaced immediately.
- You will be supplied the Answer-Sheet separately by the Invigilator. Before you actually start answering the questions, you must complete and code the details of Name, Roll Number, Ticket Number, Name of the examination as mentioned in the admission certificate, Date of birth, Test Form Number and Stream i.e. Civil and Structural OR Electrical OR Mechanical etc., on Side-I of the Answer-Sheet carefully. You must also put your signatures and left hand thumb impression on the Answer-Sheet at the prescribed place before you start answering the questions. These instructions must be fully complied with, failing which, your Answer-Sheet will not be evaluated and you will be awarded 'ZERO' mark.
- Answers must be shown by completely blackening the corresponding ovals on Side-II of the Answer-Sheet against the relevant question number by Black/Blue Ball-point Pen only. Answers which are not shown by Black/Blue Ball-point Pen will not be awarded any mark.
- A machine will read the coded information in the OMR Answer-Sheet. In case the information is incomplete or different from the information given in the application form, such candidate will be awarded 'ZERO' mark.
- The Answer-Sheet must be handed over to the Invigilator before you leave the Examination Hall.
- Failure to comply with any of the above instructions will render a candidate liable to such action/penalty as may be deemed fit.
- The manner in which the different questions are to be answered has been explained at the back of this Booklet (Page No. 80), which you should read carefully before actually answering the questions.
- 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 question.
- No rough work is to be done on the Answer-Sheet. Space for rough work has been provided below the questions.
- "Mobile phones and wireless communication devices are completely banned in the examination halls/rooms. Candidates are advised not to keep mobile phones/any other wireless communication devices with them even switching it off, in their own interest. Failing to comply with this provision will be considered as using unfair means in the examination and action will be taken against them including cancellation of their candidature."

उम्मीदवारों के लिए अनुदेश

- इस पुस्तिका में कुल 200 प्रश्न हैं, जिनमें निम्नलिखित तीन परीक्षण शामिल हैं :
परीक्षण (i) : सामान्य बुद्धि और तर्क (50 प्रश्न)
परीक्षण (ii) : सामान्य जानकारी (50 प्रश्न)
परीक्षण (iii) : भाग क : सामान्य इंजीनियरी (100 प्रश्न)
(सिविल एवं संरचनात्मक)
अथवा
भाग ख : सामान्य इंजीनियरी (100 प्रश्न)
(विद्युत)
अथवा
भाग ग : सामान्य इंजीनियरी (100 प्रश्न)
(यांत्रिक)
- अंग्रेजी और हिन्दी भाषा में तैयार किए गए द्विभाषी प्रश्नों में कोई विसंगति होने की स्थिति में अंग्रेजी विवरण मान्य होगा।
- परीक्षण (i) सामान्य बुद्धि और तर्क एवं परीक्षण (ii) सामान्य जानकारी सभी उम्मीदवारों के लिए अनिवार्य हैं। उम्मीदवारों को आवेदन-पत्र में दिए विकल्प के अनुसार परीक्षण (iii) सामान्य इंजीनियरी का केवल एक ही भाग क सिविल एवं संरचनात्मक अथवा भाग ख विद्युत अथवा भाग ग, यांत्रिक को हल करना होगा अन्यथा आपको 'शून्य' अंक दिया जाएगा।
- सभी प्रश्न अनिवार्य हैं तथा सबके बराबर अंक हैं।
- प्रश्न पत्र में नकारात्मक अंकन होगा। हर गलत उत्तर के लिए 0.25 अंक काटा जाएगा।
- प्रश्नों के उत्तर देने से पहले आप इस पुस्तिका की जाँच करके देख लें कि इसमें पूरे पृष्ठ (1-80) हैं तथा कोई पृष्ठ कम या दुबारा तो नहीं आ गया है। यदि आप इस पुस्तिका में कोई त्रुटि पाएँ, तो तत्काल इसके बदले दूसरी पुस्तिका ले लें।
- निरीक्षक द्वारा आपको उत्तर-पत्रिका अलग से दी जाएगी। प्रश्नों के उत्तर वास्तव में शुरू करने से पहले आप उत्तर-पत्रिका के Side-I में नियमावली के अनुसार अपना नाम, रोल नम्बर, टिकट नम्बर, परीक्षा का नाम जैसे प्रवेश पत्र में दिखाया गया है, जन्म तिथि, टेस्ट फॉर्म संख्या तथा विषय अर्थात् सिविल एवं संरचनात्मक या विद्युत या यांत्रिक आदि अवश्य लिखें। प्रश्नों के उत्तर देने से पहले उत्तर-पत्रिका पर निर्धारित स्थान में आप अपने हस्ताक्षर एवं बाएँ हाथ के अंगूठे का निशान भी अवश्य लगाएँ। उपर्युक्त अनुदेशों का पूरी तरह अनुपालन किया जाए, अन्यथा आपकी उत्तर-पत्रिका को जाँचा नहीं जाएगा और 'शून्य' अंक दिया जाएगा। उत्तर-पत्रिका में सभी उत्तर Side-II में प्रश्न संख्या के सामने दिये गये सम्बन्धित अण्डाकार खानों को केवल काला/नीला बॉल-पॉइंट पेन से पूरी तरह काला करके दिखाएँ। जो अण्डाकार खाने काला/नीला बॉल-पॉइंट पेन से नहीं भरे जाएँ, उनके लिए कोई अंक नहीं दिया जाएगा।
- ओ.एम.आर. उत्तर-पत्रिका में भरी गई कूट सूचना को एक मशीन पढ़ेगी। यदि सूचना अपूर्ण है अथवा आवेदन प्रपत्र में दी गई सूचना से भिन्न है, तो ऐसे अभ्यर्थी को 'शून्य' अंक दिया जाएगा।
- परीक्षा-भवन छोड़ने से पहले परीक्षार्थी को उत्तर-पत्रिका-निरीक्षक के हवाले कर देनी चाहिए।
- ऊपर के अनुदेशों में से किसी एक का भी पालन न करने पर उम्मीदवार पर विवेकानुसार कार्यवाही की जा सकती है या दण्ड दिया जा सकता है।
- विभिन्न प्रश्नों के उत्तर देने की विधि इस पुस्तिका के पीछे (पृष्ठ संख्या 80) में छपे हुए निर्देशों में दे दी गई है, इसे आप प्रश्नों के उत्तर देने से पहले ध्यानपूर्वक पढ़ लें।
- प्रश्नों के उत्तर जितनी जल्दी हो सके तथा ध्यानपूर्वक दें। कुछ प्रश्न आसान तथा कुछ कठिन हैं। किसी एक प्रश्न पर बहुत अधिक समय न लगाएँ।
- कोई रफ कार्य उत्तर-पत्रिका पर नहीं करना है। रफ कार्य के लिए स्थान प्रश्नों के नीचे दिया गया है।
- "परीक्षा हॉल/कमरों में मोबाइल फोन तथा बेतार संचार साधन पूरी तरह निषिद्ध हैं। उम्मीदवारों को उनके अपने हित में सलाह दी जाती है कि मोबाइल फोन/किसी अन्य बेतार संचार साधन को स्विच ऑफ करके भी अपने पास न रखें। इस प्रावधान का अनुपालन न करने को परीक्षा में अनुचित उपायों का प्रयोग माना जाएगा और उनके विरुद्ध कार्रवाई की जाएगी, उनकी अभ्यर्थिता रद्द कर देने सहित।"

SEAL

TEST (iii)
PART C : GENERAL ENGINEERING
(MECHANICAL)

- 101.** Which law of motion (of Newton) gives the measure of force ?
 (A) Newton's first law
 (B) Newton's second law
 (C) Newton's third law
 (D) None of these
- 102.** The shear stress at the centre of a circular shaft under torsion is
 (A) maximum
 (B) minimum
 (C) zero
 (D) unpredictable
- 103.** The direction of frictional force acting on a body which can slide on a fixed surface is
 (A) in the direction of motion
 (B) normal to the direction of motion
 (C) unpredictable
 (D) opposite to the direction of motion
- 104.** What strength of the material is to be considered for design of a ductile component under cyclic load ?
 (A) Ultimate strength
 (B) Yield strength
 (C) Endurance strength
 (D) Fracture strength
- 105.** For any given power and permissible shear stress, the rotational speed of shaft and its diameter are correlated by the expression
 (A) $ND^3 = \text{constant}$
 (B) $ND^2 = \text{constant}$
 (C) $ND = \text{constant}$
 (D) $\sqrt{ND} = \text{constant}$
- 106.** The angle turned by a wheel while it starts from rest and accelerates at constant rate of 3 rad/s^2 for an interval of 20 sec is
 (A) 900 rad . (B) 600 rad
 (C) 1200 rad (D) 300 rad
- 107.** Stress due to change in temperature developed in a bar depends upon
 (A) coefficient of thermal expansion
 (B) thermal conductivity
 (C) density
 (D) Poisson's ratio
- 108.** Strength of the beam depends on
 (A) Bending moment
 (B) Density
 (C) Section modulus
 (D) c.g. of the section
- 109.** A reversible heat engine working at the rate of 100 kW has an efficiency of 20%. The magnitudes of heat transfer rate from the source and to the sink in kW would be, respectively,
 (A) 200, 100 (B) 300, 200
 (C) 500, 400 (D) 1000, 900
- 110.** The friction between objects that are stationary is called
 (A) static friction
 (B) rolling friction
 (C) kinetic friction
 (D) dynamic friction
- 111.** Fatigue of a component is due to
 (A) cyclic load
 (B) static load
 (C) constant heating
 (D) collision

112. If V_i be the inlet absolute velocity to blades, V_b be the tangential blade velocity and α be the nozzle angle, then for maximum blade efficiency for single-stage impulse turbine

(A) $\frac{V_b}{V_i} = \cos \alpha$

(B) $\frac{V_b}{V_i} = \frac{\cos \alpha}{2}$

(C) $\frac{V_b}{V_i} = \cos^2 \alpha$

(D) $\frac{V_b}{V_i} = \frac{\cos^2 \alpha}{2}$

113. In diesel engines, the duration between the time of injection and ignition, is known as

- (A) pre-ignition period
- (B) delay period
- (C) ignition period
- (D) burning period

114. The process of supplying the intake air to the engine cylinder at a density more than the density of the surrounding atmosphere is known as

- (A) scavenging
- (B) detonation
- (C) supercharging
- (D) polymerisation

115. Which of the following expressions gives the entropy change in an isobaric heating process from T_1 to T_2 ?

(A) $m C_p \ln \frac{T_2}{T_1}$

(B) $m C_p (T_2 - T_1)$

(C) $m C_p (T_2 - T_1) / T_0$

(D) $m C_p (T_1 + T_2)$

116. Morse test is conducted on

- (A) vertical engines
- (B) horizontal engines
- (C) single cylinder engines
- (D) multi cylinder engines

117. In spark ignition (SI) engines, the possibility of knocking can be reduced by

- (A) increasing compression ratio
- (B) decreasing compression ratio
- (C) increasing the coolant temperature
- (D) advancing the spark timing

118. Higher compression ratio in diesel engine results in

- (A) lower temperature
- (B) lower pressure
- (C) same pressure
- (D) higher pressure

119. What salts of calcium and magnesium cause temporary hardness of boiler feed water?

- (A) Chlorides
- (B) Bicarbonates
- (C) Nitrates
- (D) Sulphites

120. Which of the following does *not* relate to steam engine?

- (A) Crank shaft
- (B) Cross head
- (C) Steam chest
- (D) Steam separator

121. Self-ignition temperature of diesel as compared to petrol

- (A) is higher
- (B) is lower
- (C) is same
- (D) varies considerably

122. The binding material used in cemented carbide tools is
 (A) Nickel (B) Cobalt
 (C) Chromium (D) Carbon
123. The water hammer pressure in a pipe can be reduced by
 (A) using pipe of greater diameter
 (B) using a more elastic pipe
 (C) using pipe of greater wall thickness
 (D) increasing the velocity of pressure wave
124. When a fluid is in motion, the pressure at a point is same in all directions. Then the fluid is
 (A) Real fluid
 (B) Newtonian fluid
 (C) Ideal fluid
 (D) Non-Newtonian fluid
125. Density of water is maximum at
 (A) 0°C (B) 4 K
 (C) 4°C (D) 100°C
126. The ability of a tool material to resist shock or impact forces is known as
 (A) wear resistance
 (B) toughness
 (C) red hardness
 (D) machinability
127. The tool material which has high heat and wear resistance is
 (A) Ceramics
 (B) Cemented carbide
 (C) Carbon steels
 (D) Medium alloy steel
128. To improve the surface finish of castings, the following additive is used in the moulding sand :
 (A) Resins (B) Oils
 (C) Wood flour (D) Sea coal
129. Cereals are added to the moulding sand to improve the following :
 (A) Porosity
 (B) Green strength
 (C) Hot strength
 (D) Edge hardness
130. Plastic toys are usually produced by using
 (A) shell moulding
 (B) green sand moulding
 (C) plaster moulding
 (D) injection moulding
131. Generally used fuel gas in gas welding is
 (A) N₂ (B) CO₂
 (C) C₂H₂ (D) He
132. Spot welding, projection welding and seam welding belong to the category of
 (A) electric resistance welding
 (B) forge welding
 (C) thermit welding
 (D) arc welding
133. Which one of the following is an example of solid state welding ?
 (A) Gas welding
 (B) Arc welding
 (C) Thermit welding
 (D) Forge welding
134. The shape and size of sand grains affects the following property :
 (A) Adhesiveness
 (B) Porosity
 (C) Refractoriness
 (D) Strength

135. The velocity distribution for flow over a flat plate is given by $u = (y - y^2)$ in which u is velocity in metres per second at a distance y metres above the plate. What is the shear stress value at $y = 0.15$ m? The dynamic viscosity of fluid is 8.0 poise.
- (A) 12.4 N/m² (B) 1.24 N/m²
(C) 0.56 N/m² (D) 5.6 N/m²
136. Froude's Number relates to
- (A) inertia force and gravity force
(B) inertia force and pressure force
(C) inertia force and surface tension force
(D) inertia force and elastic force
137. In pitot-tube the velocity of flow at a point is reduced to zero. That point is called as
- (A) stagnation point
(B) critical point
(C) metacentre
(D) equilibrium point
138. The velocity distribution in a pipe flow is parabolic if the flow is
- (A) uniform, turbulent
(B) uniform, laminar
(C) non-uniform, steady
(D) rotational, compressible
139. Mercury does *not* wet the glass surface. This property of mercury is due to
- (A) adhesion (B) cohesion
(C) surface tension (D) viscosity
140. Loss of head due to friction in a uniform diameter pipe with viscous flow is
- (A) Re (B) $1/Re$
(C) $4/Re$ (D) $16/Re$
141. Maximum theoretical efficiency of Pelton wheel is obtained when the ratio of bucket speed to jet speed is
- (A) 0.26 (B) 0.98
(C) 0.46 (D) 0.58
142. The velocity at a point on the crest of a model dam was measured to be 1 m/s. The corresponding prototype velocity for a linear scale ratio of 25, in m/s, is
- (A) 25 (B) 2.5
(C) 5 (D) 0.04
143. Pressure force on the 15 cm diameter headlight of an automobile travelling at 0.25 m/s is
- (A) 10.4 N (B) 6.8 N
(C) 4.8 N (D) 3.2 N
144. A piece of metal of specific gravity 7 floats in mercury of specific gravity 13.6. What fraction of its volume is under mercury?
- (A) 0.5 (B) 0.4
(C) 0.515 (D) 0.415
145. The friction head lost due to flow of a viscous fluid through a circular pipe of length L and diameter d with a velocity v and pipe Fanning friction factor f is
- (A) $\frac{4 f L}{d} \cdot \frac{v^2}{2g}$ (B) $\frac{4 f L}{\pi d^2} \cdot \frac{v^2}{2g}$
(C) $\frac{v^2}{2g}$ (D) $\frac{4 f L}{\pi d} \cdot \frac{v^2}{2g}$
146. The ratio of pressures between two points A and B located respectively at depths 0.5 m and 2 m below a constant level of water in a tank is
- (A) 1 : 1 (B) 1 : 2
(C) 1 : 4 (D) 1 : 16
147. A hydraulic turbine runs at 240 rpm under a head of 9 m. What will be the speed (in rpm) of the turbine if operating head is 16 m?
- (A) 320 (B) 426
(C) 264 (D) 230
148. The discharge of a liquid of kinematic viscosity 4×10^{-2} m²/s through a 80 mm diameter pipe, is $3200\pi \times 10^{-4}$ m³/s. The flow is
- (A) laminar (B) turbulent
(C) transition (D) critical

149. Assertion (A) :

If a hot metal ball is quenched in a liquid of low temperature, heat transfer will take place from metal ball to liquid and not in the reverse direction.

Reason (R) :

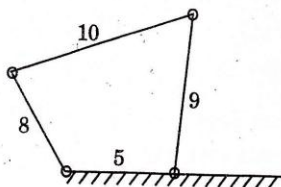
Heat transfer process from hot metal ball to liquid at lower temperature complies with the increase of entropy principle i.e. $S_{gen} \geq 0$ and the reverse process does not.

- (A) Both A and R are true and R is the correct explanation of A
- (B) Both A and R are true, but R is *not* the correct explanation of A
- (C) A is true, but R is false
- (D) R is true, but A is false
150. The boiling and freezing points for water are marked on a temperature scale P as 130°P and -20°P respectively. What will be the reading on this scale corresponding to 60°C on Celsius scale ?
- (A) 60°P (B) 70°P
- (C) 90°P (D) 110°P
151. In a reaction turbine, the heat drop in fixed blade is 8 kJ/kg and total heat drop per stage is 20 kJ/kg . The degree of reaction is
- (A) 40% (B) 60%
- (C) 66.7% (D) 80%
152. A closed balloon containing 10 kg of helium receives 5 kJ/kg of heat. During this process, the volume of the balloon slowly increases by 0.2 m^3 at constant pressure of 100 kPa . The change in internal energy, in kJ , is
- (A) 10 (B) 20
- (C) 30 (D) 70
153. A gas in a container A is in thermal equilibrium with another gas of the same mass in container B. If the corresponding pressures and volumes are denoted by suffixes A and B, then which of the following statements is true ?
- (A) $P_A \neq P_B; V_A = V_B$
- (B) $P_A = P_B; V_A \neq V_B$
- (C) $\frac{P_A}{V_A} = \frac{P_B}{V_B}$
- (D) $P_A V_A = P_B V_B$
154. A liquid flows from low level Z_1 , pressure P_1 to a higher level Z_2 , pressure P_2 . It can be concluded
- (A) first law of thermodynamics has been violated
- (B) second law of thermodynamics has been violated
- (C) $Z_2 < Z_1$
- (D) $P_2 < P_1$
155. The food compartment of a refrigerator is maintained at 4°C by removing heat from it at a rate of 360 kJ/min . If the required power input to the refrigerator is 2 kW , the COP of the refrigerator is
- (A) 2.0 (B) $1/3$
- (C) 0.5 (D) 3.0
156. For a 4-stroke diesel engine, the compression ratio is $21 : 1$ and the cut-off ratio is $2 : 1$. What is its expansion ratio ?
- (A) 7 : 1 (B) 10.5 : 1
- (C) 12 : 1 (D) 19 : 1

157. A ball is dropped vertically downwards, it hits the floor with a velocity of 9 m/s and bounces to a distance of 1.2 m. Coefficient of restitution between the floor and the ball is
- (A) 0.54 (B) zero
(C) 1 (D) 0.27
158. For a material with Poisson's ratio 0.25, the ratio of modulus of rigidity to modulus of elasticity will be
- (A) 0.4 (B) 1.2
(C) 2.0 (D) 3.6
159. If equal and opposite forces applied to a body tend to elongate it, then the stress produced is
- (A) tensile stress
(B) bending stress
(C) compressive stress
(D) shear stress
160. What type of contact occurs during meshing of helical gears ?
- (A) Point (B) Line
(C) Area (D) Volume
161. Which one of the following drives is used for transmitting power without slip ?
- (A) Belt drives
(B) Rope drives
(C) Cone pulleys
(D) Chain drives
162. The contact between cam and follower is to form a
- (A) lower pair
(B) higher pair
(C) sliding pair
(D) rolling pair
163. Which of the following is antifriction bearing ?
- (A) Needle bearing
(B) Pedestal bearing
(C) Collar bearing
(D) Hydrostatic bearing
164. Helical gears have their teeth
- (A) inclined to wheel rim
(B) straight over the wheel rim
(C) curved over the wheel rim
(D) cut on the surfaces of the frusta of cones
165. When the speed of governor increases, then
- (A) height of governor and radius of rotation increase
(B) height of governor and radius of rotation decrease
(C) height of governor decreases but radius of rotation increases
(D) height of governor increases but radius of rotation decreases
166. A body of weight 30 N rests on a horizontal floor. A gradually increasing horizontal force is applied to the body which just starts moving when the force is 9 N. The coefficient of friction between the body and the floor will be
- (A) 10/3 (B) 3/10
(C) 1/3 (D) 1/9
167. A body of weight W is placed on a rough inclined plane. The inclination of the plane with the horizontal is less than the angle of friction. The body will
- (A) be in equilibrium
(B) move downwards
(C) move upwards
(D) None of the above

168. An adiabatic process in a thermodynamic system is one in which there is
- (A) a limited heat transfer to or from the system through the boundary
 (B) no heat transfer to or from the system through the boundary
 (C) no energy transfer to or from the system through the boundary
 (D) no internal energy change in the system
169. A device used to increase the temperature of saturated steam without raising its pressure is called
- (A) fusible plug (B) blow off cock
 (C) economiser (D) superheater
170. Maximum diagram efficiency for Parson's reaction turbine is given by
- (A) $2 \cos^2 \alpha / (1 + \cos \alpha)$
 (B) $\cos^2 \alpha / (1 + 2 \cos \alpha)$
 (C) $\cos^2 \alpha / (1 + 2 \cos^2 \alpha)$
 (D) $2 \cos^2 \alpha / (1 + 2 \cos^2 \alpha)$
171. In an isothermal process, the internal energy
- (A) always increases
 (B) always decreases
 (C) increases or decreases
 (D) remains constant
172. Which of the following is a boiler mounting ?
- (A) Safety valve
 (B) Economizer
 (C) Superheater
 (D) Feed pump
173. Which part of a petrol engine would need modifications if the engine is to be made to run on LPG ?
- (A) Piston (B) Crank shaft
 (C) Valves (D) Carburettor
174. The compression ratio for a practical diesel engine usually lies in the range
- (A) 5-7 (B) 7-9
 (C) 10-15 (D) 16-22
175. For a four-cylinder engine, the firing order for evenness of torque is
- (A) 1-2-3-4 (B) 1-3-2-4
 (C) 1-4-3-2 (D) 1-3-4-2
176. The drag coefficient is defined as
- (A) $(F_D/A) / (\rho v_0^2)$
 (B) $(F_D/A) / (2 \rho v_0^2)$
 (C) $F_D / (0.5 \rho v_0^2)$
 (D) $F_D / (0.5 \rho v_0^2 A)$
177. The length of the divergent portion of venturimeter in comparison to convergent portion is
- (A) same
 (B) more
 (C) less
 (D) depending upon the type of flow
178. The delay period in a petrol engine is of the order of
- (A) 0.001 sec (B) 0.002 sec
 (C) 0.01 sec (D) 0.05 sec
179. Octane number of iso-octane is
- (A) 50 (B) 70
 (C) 0 (D) 100
180. The silencer of an IC engine
- (A) reduces noise
 (B) decreases brake specific fuel consumption
 (C) increases brake specific fuel consumption
 (D) has no effect on efficiency

181. Figure shows a four bar chain and the number indicates the respective link lengths in cm. The type of the mechanism is known as



- (A) slider crank
(B) double crank
(C) crank rocker
(D) double rocker
182. A slider sliding at 10 cm/s on a link which is rotating at 60 rpm, is subjected to Coriolis acceleration of magnitude, in cm^2/s ,
- (A) 20π (B) 10π
(C) 40π (D) 80π
183. The twining moment (T) delivered by a flywheel with respect to its angular displacement is given by the following expression :
- $$T = 14000 + 7000 \sin \theta$$
- The values of θ for which delivered torque is equal to mean torque for a single cycle are
- (A) $0^\circ, 180^\circ, 360^\circ$
(B) $90^\circ, 270^\circ, 360^\circ$
(C) $90^\circ, 270^\circ, 180^\circ$
(D) $0^\circ, 270^\circ, 360^\circ$
184. The shearing strength of a rivet is 50 N/mm^2 . If the diameter of the rivet is doubled, then its shearing strength will be
- (A) 100 N/mm^2 (B) 200 N/mm^2
(C) 50 N/mm^2 (D) 300 N/mm^2
185. A differential gear in an automobile is a
- (A) simple gear train
(B) epicyclic gear train
(C) compound gear train
(D) speed reducer
186. Creep in belt drive is due to
- (A) weak material of the belt
(B) weak material of the pulley
(C) uneven extensions and contractions of the belt when it passes from tight to slack side
(D) expansion of the belt
187. The crank shaft turning in a journal bearing forms a
- (A) turning pair
(B) sliding pair
(C) rolling pair
(D) helical pair
188. Name the mechanism in which the Coriolis component of acceleration is to be considered.
- (A) Quick return motion mechanism
(B) Four-bar mechanism
(C) Slider crank mechanism
(D) Beam engine
189. Bevel gears are used to transmit rotary motion between two shafts whose axes are
- (A) Perpendicular
(B) Parallel
(C) Non-intersecting
(D) Non-coplanar

190. The coefficient of discharge (c_d) of an orifice varies with
 (A) Weber number
 (B) Mach number
 (C) Reynold's number
 (D) Froude number
191. Using Blasius equation, the friction factor for turbulent flow through pipes varies as
 (A) Re^{-1} (B) $Re^{-0.5}$
 (C) $Re^{-0.33}$ (D) $Re^{-0.25}$
192. The specific speed (N_s) of a centrifugal pump is given by
 (A) $\frac{N\sqrt{Q}}{H^{2/3}}$ (B) $\frac{N\sqrt{Q}}{H^{3/4}}$
 (C) $\frac{N\sqrt{Q}}{H}$ (D) $\frac{N\sqrt{Q}}{H^{5/4}}$
193. Pressure intensity inside the water droplets is (where σ – surface tension
 d – diameter of bubble)
 (A) $p = \frac{8\sigma}{d}$ (B) $p = \frac{2\sigma}{d}$
 (C) $p = \frac{4\sigma}{d}$ (D) $p = \frac{\sigma}{d}$
194. The length of a rectangular weir is L and height H_1 . The maximum depth of water on the upstream side of the weir is H . Flow rate over the notch (Q) is
 (A) $Q = \frac{2}{3} c_d L \sqrt{2g} H^{5/2}$
 (B) $Q = \frac{2}{3} c_d L \sqrt{2g} (H - H_1)^{5/2}$
 (C) $Q = \frac{2}{3} c_d L \sqrt{2g} H^{3/2}$
 (D) $Q = \frac{2}{3} c_d L \sqrt{2g} (H - H_1)^{3/2}$
195. Low specific speed of a turbine implies that it is
 (A) Propeller turbine
 (B) Francis turbine
 (C) Impulse turbine
 (D) Kaplan turbine
196. Flow of water in a pipe about 3 metres in diameter can be measured by
 (A) Orifice plate (B) Venturi
 (C) Pitot tube (D) Nozzle
197. In a pitot tube, at the stagnation point
 (A) pressure is zero
 (B) total energy is zero
 (C) pressure head is equal to velocity
 (D) all the velocity head is converted into pressure head
198. Navier – Stokes equations are associated with
 (A) Buoyancy
 (B) Supersonic flow
 (C) Vortex flow
 (D) Viscous flow
199. A hydrometer is used to determine
 (A) relative humidity
 (B) surface tension of liquids
 (C) specific gravity of liquids
 (D) viscosity of liquids
200. In flow through a pipe, the transition from laminar to turbulent flow does **not** depend on
 (A) velocity of the fluid
 (B) density of the fluid
 (C) length of the pipe
 (D) diameter of the pipe