SCREENING TEST TO THE POST OF ASSISTANT EXECUTIVE ENGINEERS IN CIVIL AND MECHANICAL ENGINEERING[PAPER CODE-500C]

150 QUESTIONS, 150 MARKS, 150 MINUTES.

PART A

GENERAL STUDIES AND MENTAL ABILITY

50 QUESTIONS 50 MARKS

Q. 1. In which of the following city The Saha Institute of Nuclear Physics is situated?

Ans: **Kolkata**

Q. 2. Which of the following is/are correct?

a. ASTROSAT is the India's first astronomical satellite.

b. GSAT-6 is the 25th geostationary communication satellite of India built by DRDO.

c. Kepler is a space observatory launched by ISRO.

Ans: **only a**

Q. 3. Recently India has funded for Public Library in which of the following country?

Ans: **Afghanistan**

Q. 4. Which of the following country has hosted the 13th G-20 Summit?

Ans: **Argentina**

Q. 5. Which of the following statements is/are correct about United Nations?

a) 'United Nations' name was devised by Franklin D. Roosevelt.

b) All the member states meet once after every two years in General Assembly Hall, New York.

c) It is the General Assembly which elects all the 54 members for Economic and Social Council.

d) Judges of the International Court of Justice are elected for 8 years.

Ans: **a and c**

Q. 6. When was Asia Pacific Economic Cooperation (APEC) established?

Ans: **1989**

Q. 7..'Operation Greens' is related with which of the following Ministry?

Ans: **Ministry of food Processing Industries**

Q. 8. Match the following List (I) Year with List (II) Chief Guest:

List (I) Republic Day Year	List (II) Chief Guest
a. January 26, 2014	I. Francois Hollande
b. January 26, 2015	II. Mohammed Bin Zayed Al Nahyan
c. January 26, 2016	III. Shizo Abe
d. January 26, 2017	IV. Barack Obama

Ans:

III IV I II

Q. 9. Which city of India hosted 'Owl Festival'?

Ans: **Pune**

Q. 10. Which of the following cities of Andhra Pradesh are the part of 'Ease of Living Index 2018?

a. Vijayawada

b. Warangal

c. Nellore

d. Kakinada

Ans: **a and d**

Q.11. Which of the following state has topped the ‘Ease of Doing Business Ranking-2018’?

Ans: **Andhra Pradesh**

Q.12. In which year Election Commission of India has introduced NOTA on EVMs?

Ans: **2013**

Q.13. Which of the following is/are correct about East Asia Summit?

a. 13th East Asia Summit held in Singapore.

b. It is an ASEAN-Centered Forum.

c. It can only be chaired by an ASEAN Member.

d. East Asia Summit comprises the ten member states of the ASEAN.

Ans: **All of the above**

Q.14. ‘Blue Economy is related with:

Ans: **Ocean Resources**

Q. 15. Which was the first state to be re-organized on the basis of language?

Ans: **Andhra Pradesh**

Q.16. Which of the following Article enables High court to issue writs?

Ans: **Article 226**

Q.17. Which of the following statements is/are correct about the Governor?

a. He can nominate one member to the state legislature assembly from the Anglo Indian Community.

b. He can seek any information relating to the administration of the affairs of the state and proposals for legislation from the Chief Minister.

c. A person completed the age of 30 can be appointed as governor.

d. The governor acts as agent of the central government.

Ans: **a,b and d**

Q. 18. Who among the following has not been the governor of Andhra Pradesh?

Ans: **Nikhil Kumar**

Q. 19. Who among the following has served as the shorted-term as a Chief Minister of Andhra Pradesh?

Ans: **N. Bhaskara Rao**

Q. 20. Which of the following statement is/are incorrect about Election Commission of India?

a. Election Commission of India conducts elections for Lok Sabha, Vidhan Sabha and Gram Sabha.

b. Election Commission of India conducts elections only for Lok Sabha.

c. Election Commission of India conducts elections only for Vidhan Sabha.

d. Election Commission of India conducts elections for only Lok Sabha and Vidhan Sabha.

Ans: **a, b and c**

Q. 21. Which of the following statements is/are correct about NITI Ayog?

a. NITI Ayog was introduced by Government of India in 2014.

b. Vice-Chairperson of NITI Ayog is appointed by President of India.

c. It has Governing Council comprising the Chief Ministers of all the states and Lt. Governors of Union Territories.

d. Regional Councils of NITI Ayong are formed for specified tenure.

Ans**: c and d**

Q.22. In which year Telugu language got the classical status?

Ans. **2008**

Q. 23. Which of the following statements regarding ‘Stupa’ are correct?

a. They are pre Buddhist structures.

b. They are built on the relics of Buddha.

c. They are built as objects of devotion by Buddhist monasteries.

d. They are built to commemorate important events in Buddha’s life

Select the correct code from the following:

Ans: **All of the above**

Q. 24. On the demand for exams in India, Lord Dufferin appointed Atchison Commission in 1886. It suggested for:

a. Recruit young men from high class families and social positions

b. Simultaneous exams in London and India

c. To strengthen the provincial services

d. To establish imperial, provincial and subordinate Civil Services

Which among the above is/are the correct suggestions?

Code:

Ans: **c and d**

Q. 25. Which of the following statement is not correct?

Ans: **The Swadeshi movement was exclusively a political movement which remained aloof from the cultural sphere.**

Q.26. Consider the following statements:

a. Individual Satyagraha was launched by Congress in 1940 to oppose the August Declaration.

b. VinobaBhave was the first to offer Individual Satyagrah in 1940.

Which of the statements given above is/are correct?

Ans: **Only b**

Q.27. Consider the following statements:

a. Lord Mountbatten came to India as Viceroy in 1945.

b. In February 1947, Clement Attlee, British Premier, declared that the British would Quit India by June 1948.

Which of the above statements is/are correct?

Ans: **Only b**

Q.28. Which of the following statements is/are incorrect regarding the Dual system of administration prevalent in Bengal in the 18th century:

a. The Nawab controlled the defence of Bengal, while the East India Company controlled its finances.

b. The system was advantageous to the East India Company as it had power without responsibility.

c. The weaving industry of the Bengal mostly suffered due to the dual system of the administration.

d. The separation of power resulted in efficient administration and checked the drain of wealthSelect the correct answer using the code given below:

Ans: **a and d**

Q. 29. Amravati, the designated capital of Andhra Pradesh, was historical capital of:

Ans: **Satavahanas Dynasty**

Q. 30. Andhra Pradesh comes under which earthquake classified zone:

Ans: **Zone 2 and Zone 3**

Q.31. Which of the following pair is/are correctly matched:

	Indian State		Founders
a.	Hyderabad	:	Nizam-ul-Mulk
b.	Bengal	:	Saadat Ali Khan
c.	Awadh	:	MurshidQuli Khan

Ans: **only a**

Q.32. With reference to the First Factory Act, 1881, consider the following statements:

a. The Act tried to limit the working hours for children and also fix a minimum age limit for employment in a factory.

b. The Act got wide support from early nationalists, especially moderates.

Which of the following statements given above is/are correct?

Ans: **only a**

Q. 33. Consider the following statements regarding the role of the Reserve Bank of India (RBI):

a. The RBI manages the public debt on behalf of the Central and State governments in India.

b. The RBI acts as a banker to various State governments in India.

Which of the statements given above is/are incorrect?

Ans: **Neither a nor b**

Q.34. Which of the following state does not share a boundary with Andhra Pradesh?

Ans**: Madhya Pradesh**

Q.35. Which of the following is a part of Union Territory located in Andhra Pradesh?

Ans: **Yanam**

Q. 36. Which of the following is the smallest Ocean:

Ans: **Arctic Ocean**

Q.37. Kaziranga National Park is situated in which of the following state:

Ans: **Assam**

Q.38. Tawa Project is associated with which of the following state:

Ans: **Madhya Pradesh**

Q. 39. Consider the following statements in respect of financial emergency under Article 360 of the Constitution of India:

a. A proclamation of financial emergency issued shall cease to operate at the expiration of two months, unless before the expiration of that period it has been approved by their solutions of both Houses of Parliament.

b. If any proclamation of financial emergency Is in operation it is competent for the President of India to issue directions for the reduction of salaries and allowances of all or any class of persons serving in connection with the affairs of the Union but excluding the Judges of the Supreme Court and the High Courts.

Which of the statements given above is/are correct?

Ans: **Only a**

Q. 40. Which one of the following statements correctly describes the Fourth Schedule of the Constitution of India?

Ans: **It allocates seats in the Council of States**

Q. 41. Which of the following district of Andhra Pradesh has highest number of Mandals?

Ans: **Chittoor**

Q 42. The Planning commission of India was set up in March, 1950 by:

Ans: **A resolution of the government of India**

Q 43. Which of the following programme was announced on 1st July, 1975 as part of Fifth Five Year Plan?

Ans: **20-Point Economic Programme**

Q 44 . In partnership with Government of Andhra Pradesh, which of the following has created a *dashboard* for monitoring the real time progress of the districts?

Ans: **NITI Aayog**

Q 45. According to the UNDP report on Human Development Index-2018, the HDI rank of India, out of 189 countries, is:

Ans: **130**

Q 46. The Central Pollution Control Board (CPCB) was constituted in September-1974 under:

Ans: **The Water (Prevention and Control of Pollution) Act-1974**

Q 47. In the union budget 2016-17, *tax on coal* was renamed as:

Ans: **Clean Environment Cess**

Q 48. What is the “Population Ratio” of successor states of Andhra Pradesh and Telangana as per 2011 Census.

Ans: **58.32: 41.68**

Q 49. When was the Andhra Pradesh Reorganization Bill passed in the Lok Sabha?

Ans: **18 th February, 2014**

Q 50 . When does APCRDA has been formed

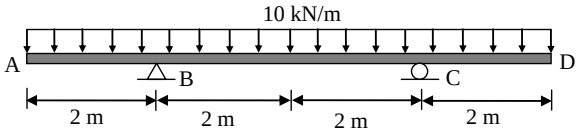
Ans: **30 th December, 2014**

PART - B

CIVIL AND MECHANICAL ENGINEERING

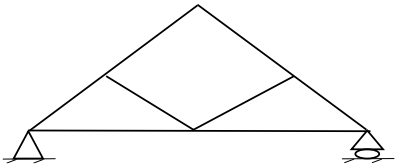
100 QUESTIONS 100 MARKS

51. Calculate the shear force and bending moment at the mid-point of the beam



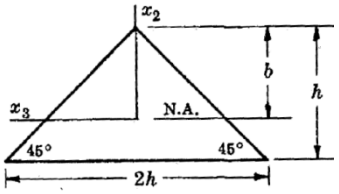
Ans: **0 kN, 0 kN-m**

52. Choose the correct combination of the stability and indeterminacy of the truss given.



Ans: **Unstable**

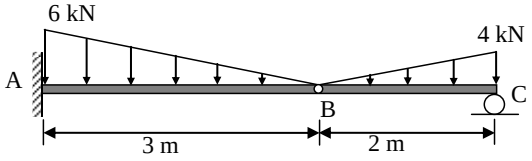
53. The beam of triangular cross-section as shwon in figure below, is subjected to pure bending. If a plastic hinge develops at a section, determine the location of neutral axis (distance *b* from top) at that section. The beam material is elastic-perfectly plastic (i.e., yield stress is constant).



Ans: $\boldsymbol{h/\sqrt{2}}$

54. In 3 dimension how many degrees of freedom a fixed support have?
Ans: **0**

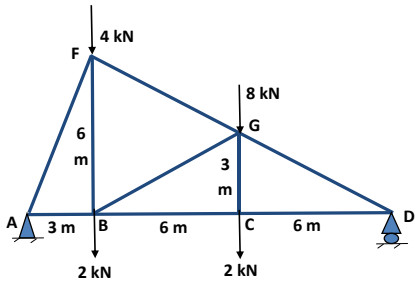
55. Calculate the shear force and bending moment atpoint B for the beam AB subjected to linearly varying load as shown in the figure. Value of the linearly varying load at point is 6 kN/m and 4 kN/m, respectively.Point B is an internal hinge.



Ans: **1.33 kN and 0 kN-m**

56. Determine the force in the member BG in the given truss.

Ans: **11.18 kN Compression**



57. Consider the following

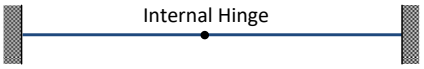
(a) Bending moment is a moment about the longitudinal axis of a beam.

(b) A structural component cannot have axial force and shear force together.
Ans: **both a and b are incorrect**

58. A beam of rectangular section 200 mm $\times$ 300 mm carries certain loads such that bending moment at a section A is M and at another section B it is (M+ΔM). The distance between section A and B is 1m and there are no external loads acting between A and B. if ΔM is 20 kNm, maximum shear stress in the beam section is,
Ans: **0.5 MPa**

59. A mild steel flat of width 100 mm and thickness 12 mm is bent into an arc of a circle of radius of 10m by applying a pure moment M. If Young modulus E = 200 GPa then the magnitude of M is,
Ans: **288 Nm**

60. Find out the Static indeterminacy of the beam in figure.



Ans: **2**

61. At the point of contraflexure is,
Ans: **bending moment changes sign**

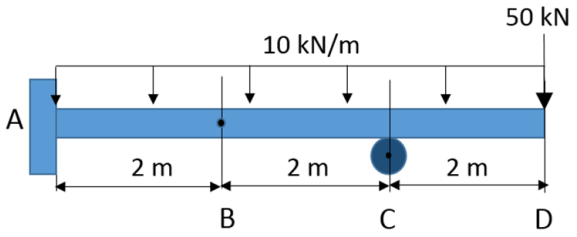
62. Consider the following
(a) In addition to equilibrium equations, compatibility equations are also required for solving indeterminate structures.
(b) A fixed beam (two ends are fixed) is a kinematically determinate structure.

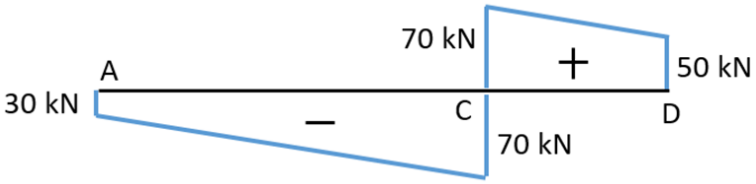
Ans: **both (a) and (b) are correct**

63. Regarding the stability of a truss, the condition $m+r>2j$ is

Ans: **Necessary**

64. Out of the options below, which one is the correct shear force diagram? B is an internal hinge.



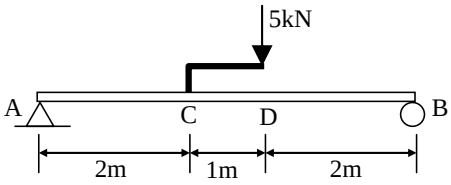


Ans:

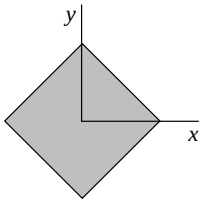
65. A shaft turns at 200 rpm under a torque of 1800 Nm. Power transmitted is
Ans: **12π kW**

66. For the beam shown below the vertical reactions at A and B are respectively

Ans**: 2kN, 3kN**



67. A square section of side *a* is oriented as shown in the figure. Determine the section modulus. of the following section is



Ans: $\boldsymbol{a^3/6\sqrt{2}}$

68. A rectangular beam section with depth 400mm and width 300 mm is subjected to a bending moment of 60kNm. The maximum bending stress in the section is,
Ans: **7.50 MPa**

69. In case of pure bending, the beam will bend into an arc of a
Ans: **circle**

70. For ductile material the suitable failure theory is,
Ans: **both (1) and (2)**

71. For a conservative force the work done is independent of _____.
Ans: **path**

72. Virtual work means
(a) work done by real forces due to virtual displacement
(b) work done by virtual forces during real displacement
Ans: **both (a) and (b) are correct**

73. A member in a truss can take
Ans: **only axial force**

74. Radius of gyration of a circular section with diameter D is
Ans: $D/4$

75. A cylindrical rod with length L, cross sectional area A and Young's modulus E is rigidly fixed at its upper end and hangs vertically. The elongation of the rod due to its self weight W is
Ans**:** $\frac{WL}{2AE}$

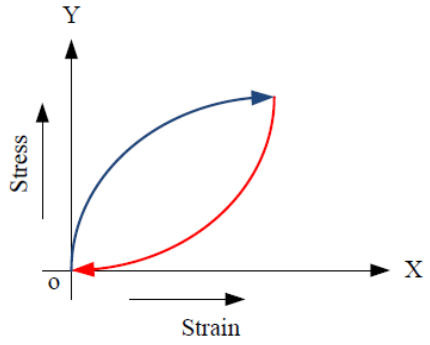
76. A metal sphere of diameter D is subjected to a uniform increase in temperature ΔT. E, ν and α are the Young's modulus, Poisson' ratio and coefficient of thermal expansion respectively. If the ball is free to expand, the hydrostatic stress developed within the ball due to temperature change is
Ans: **0**

77. A helical spring is subjected to an axial load W and corresponding deflection in the spring is δ. Now if the mean diameter of the spring is made half of its initial diameter keeping the material, number of turns and wire cross-section same, the deflection will be
Ans: δ**/8**

78. If for a given material, E=2G (E is modulus of elasticity, G is the shear modulus), then
the bulk modulus K will be
Ans: **E/3**

79. If a material has identical properties in all the directions, it is said to be
Ans**: isotropic**

80. The following diagram shows a stress strain diagram of any material. Which kind of material is it?



Ans: **Visco-elastic**

81. In case of a torsional problem the assumption - "*Plane sections perpendicular to longitudinal axis before deformation remain plane and perpendicular to the longitudinal axis after deformation*" holds true for a shaft having
Ans: **circular cross section**

82. Which of the following statement is correct
Ans: **If free end of a cantilever column is propped then the buckling load increases.**

83. Rankine-Gordon formula is applicable for
Ans: **both (1) and (2)**

84. Find out the Lame's constant (λ & μ) for an isotropic material having modulus of elasticity (E) and Poisson's ratio (ν) as 200 GPa and 0.2, respectively .
Ans: **55.55 GPa, 83.33 GPa**

85. Consider the state of stress at any point as σxx= 250 MPa, σyy= 0 MPa, σzz= 250MPa. The Young's modulus and Poison's ratio of the material is considered as 2 GPa and 0.18, respectively. Determine the ε_{zz} at the point.
Ans: **0.103**

86. What is the number of non-zero strain components for a plane stress problem?
Ans: **4**

87. At a material point the principal stresses are σ_1 = 100 MPa and σ_2 = 20 MPa. If the elastic limit 200 MPa, what is the factor of safety based on maximum shear stress theory?
Ans: **2.5**

88. A solid circular shaft of length L, cross-section A, second polar moment of area J and shear modulus G has one end fixed. A torsion T is applied at the other end.

The volumetric strain at an arbitrary point on the surface will be,
Ans**: 0**

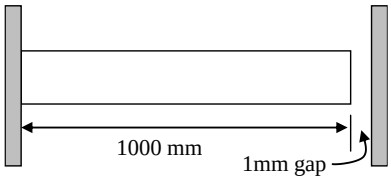
89. If two springs of stiffness k1 and k2 are connected in series, the stiffness of the combined spring is
Ans: $\mathbf{k_1k_2/(k_1+k_2)}$

90. A cantilever beam with rectangular cross section is subjected to uniformly distributed load. The deflection at the tip is δ_1. If the width and depth of the beam are doubled then deflection at tip is δ_2. Then δ_2/δ_1 is,
Ans: **0.0625**

91. Modulus of rigidity is the ratio of
Ans: **shear stress and shear strain**

92. A 1m long rod is fixed at one end. There is a rigid wall at a distance 1mm from the free end of the rod as depicted the figure. What is the thermal stress generated in the rod if its temperature is increased by 100^{O}C? Take E = 200GPa and α = 12×10^{-6} / ^{O}C.

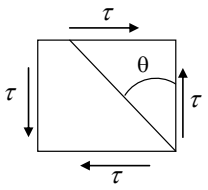
Ans**: 40 MPa**



93. If a material is heated up its Elastic modulus
Ans: **decreases**

94. The state of stress at a point is shown below. θ represent the principal plane corresponding to principal stresses σ_1 and σ_2 ($\sigma_1>\sigma_2$). Values of θ, σ_1 and σ_2 are,

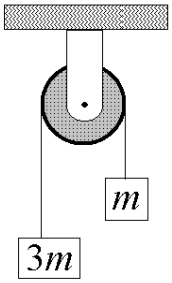
Ans: **45^{O}, 135^{O}; τ and -τ**



95. A thin cylindrical shell of internal diameter D and thickness *t* is subjected to internal pressure *p*. E and ν are respectively the Elastic modulus and Poission's ratio. The change in diameter is,
Ans: $\frac{pD^2}{4tE}(\mathbf{2}-\boldsymbol{\nu})$

96. Let σ_1, σ_2 and σ_3 are the principal stresses at a material point. If the yield stress of the material is σ_y then according to Von-Mises theory yielding will not occur if
Ans: $\mathbf{(\sigma_1-\sigma_2)^2+(\sigma_2-\sigma_3)^2+(\sigma_3-\sigma_1)^2<2(\sigma_y)^2}$

97. What is the minimum coefficient (μ) of friction between the rope and the fixed shaft which will prevent the unbalanced cylinder from moving?

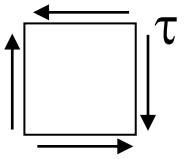


Ans: μ **= 0.350**

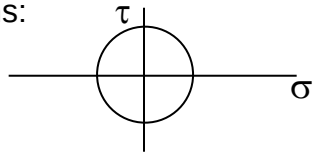
98. A body exerts a force of 1kN on the floor of the lift which moves upward with a retardation of 1.5 m/s^2. What is the mass of the body in kg carried in the lift?

Ans: **120.33**

99. Which represents the Mohr's circle for the state of stress shown below?



Ans:



100. According to the maximum principal stress theory, the yield locus is a/an
Ans: **square**

101. In Newtonian fluids, the shear stress is

Ans: **directly proportional to the deformation rate**

102. The specific gravity of the mercury is

Ans: **13.6**

103. For *pseudoplastic* non-Newtonian fluids, the apparent viscosity

Ans: **decreases with increasing deformation rate**

104. If σ is the surface tension and R is the cylinder radius, the pressure increase (ΔP) in the interior of a liquid cylinder is given by

Ans: **σ/R**

105. If ***dr*** is a directed fluid element, the equation, ***dr*** × ***V*** = 0 refers to a

Ans: **stream line**

106. A water lake has a maximum depth of 100 m. If the atmospheric pressure is 101 kPa, the absolute pressure at this depth is

Ans: **1082 kPa**

107. A floating body is said to be unstable if the metacentre (M) is

Ans: **Below the centre of mass of the body**

108. If a dye is constantly injected into the flow field at a single point, the curve formed by the dye is flow field is a

Ans: **Streakline**

109. Velocity field can be related to stream function as

Ans: $\boldsymbol{u} = \frac{\partial \psi}{\partial y}; \boldsymbol{v} = -\frac{\partial \psi}{\partial x}$

110. If the flow field is steady, the fluid particle will undergo only a

Ans: **Convective acceleration**

111. Resultant pressure of the liquid in case of an immersed body acts through the

Ans: **centre of pressure**

112. If a mercury-oil differential manometer shows a 20 cm difference of mercury level, the difference in the pressure head is (consider the specific gravity of oil = 0.8)

Ans: **3.2 m of oil**

113. In a “free-vortex”, velocity potential line (φ) is a function of

Ans: **Angle**

114. In the category of flow meters, head loss is the least for

Ans: **venturi meter**

115. If A is the cross sectional area and P is the wetted perimeter of a noncircular duct, the hydraulic diameter is defined as

Ans: $\frac{4A}{P}$

116. In an incompressible fluid flow, the density of the medium is

Ans: **Constant**

117. Major losses in the pipe is due to the

Ans: **Frictional effects**

118. For a fluid flow over a flat plate with zero pressure gradient, the boundary layer thickness (δ/x) is proportional to

Ans: $\frac{1}{\sqrt{Re_x}}$

119. Which object generates less drag when subjected to a flow field?

Ans: **Airfoil**

120. A body of volume 3.0 m^3 weighs 2 kN in water. The body's weight in air is

Ans: **31.4 kN**

121. Navier-Stokes equation in fluid mechanics is derived from the

Ans: **Newton's second law of motion**

122. For an ideal and steady flow, "the total energy of a fluid at a point is constant" is the statement of

Ans: **Bernoulli's theorem**

123. Consider a tank attached with an orifice of diameter *d*. If *H* is the head of the liquid above the centre of the orifice, the theoretical velocity of the discharged flow through the orifice is given by

Ans: $\sqrt{2gH}$

124. For a boundary layer flow over a flat plate with zero pressure gradient, if U is the free stream velocity, y is the coordinate perpendicular to the flow direction, and δ is the boundary layer thickness, at y = δ,

Ans: **Both (1) and (2)**

125. The equation, $\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0$, represents

Ans: **two dimensional, incompressible, continuity equation**

126. A Rankine oval body has stagnation point(s) at

Ans: **θ = 0 and θ = π**

127. A Nozzle device is used to convert the

Ans: **total energy to velocity**

128. If θ is the blade angle at the outlet, then the maximum hydraulic efficiency of an ideal impulse turbine is

Ans: **(1+ cos θ)/2**

129. If D and d are the diameters of the runner and jet of the Pelton wheel respectively, the number of buckets on the runner is given by

Ans: **15 + D/2d**

130. The hydraulic efficiency of the Pelton wheel is maximum when the velocity of the wheel is

Ans: **half the velocity of jet**

131. If H is the unit head, the unit power of the turbine is proportional to

Ans: $\mathbf{H^{-(3/2)}}$

132. If the turbine generates 10000 kW under the head of 10 m at the speed 100 rpm, the specific speed of a turbine is

Ans: **562.3 rpm**

133. If V_w and u are the whirl and tangential velocity at the impeller, work done by the impeller on the water per second per unit weight of water striking per second is

Ans: $\mathbf{V_w u/g}$

134. Net positive suction head is

Ans: **pressure head - vapour pressure head + kinetic head**

135. The major drag force experienced by the body at very small velocity is due to

Ans: **skin friction drag**

136. A diffuser blades in the centrifugal pump is used to

Ans: **convert kinetic energy to pressure energy**

137. Pumps are connected in parallel to increase the

Ans: **discharge**

138. If the bulk modulus of elasticity of the water is 2.2×10^6 kN/m^2, the speed of pressure wave is given by

Ans: **1483.2 m/s**

139. Check valve allows the fluid flow

Ans: **Only in one direction**

140. A pressure-relief valve has a pressure setting of 200 bar. The power loss across the valve if all the pump flow of 120 L/min flows back to the reservoir is

Ans: **40 kW**

141. The valve used to control a vertical cylinder to prevent it from descending due to external load is

Ans: **Counterbalance valve**

142. The flow direction to and from a double acting cylinder is typically controlled by a

Ans: **4 way DCV valve**

143. Pressure-reducing valve is actuated by the fluid pressure at

Ans: **Downstream**

144. Kaplan turbine is used for

Ans: **low heads**

145. The unit power of the reaction turbine

Ans: **increases and decreases with the unit speed**

146. A single jet impulse turbine of 10 MW capacity works with a head of 500m. If the specific speed of the turbine is 10, the actual speed of the turbine is

Ans: **236.4 rpm**

147. Basic method to measure the flow rates in hydro power plants is

Ans: **pressure-time method**

148. A centrifugal pump driven by a directly coupled 3 kW motor of 1450 rpm speed is proposed to be connected to another motor of 2900 rpm. The power of the motor should be

Ans: **24 kW**

149. A minimum Net Positive Suction Head is required for a hydraulic pump to

Ans: **prevent the cavitation**

150. Euler equation for water turbine is derived on the basis of

Ans: **rate of change of angular momentum**

Note : Objections not supported by evidence and received after 5:00 pm on 05/03/2019 would not be considered. The format for filling objections is available on the website of the commission.