A.E.E's (ASSISTANT EXECUTIVE ENGINEERS)

(CIVIL ENGINEERING-1 – 2012)

1. The ratio between the change in volume and orginal volume of the body is called

1) tensile strain
2) compressive strain
3) volumetric strain
4) shear strain

2. The ratio between tensile stress and tensile strain or compressive stress and compressive strain is termed as

1) modulus of rigidity
2) modulus of elasticity
3) bulk modulus
4) modulus of subgrade reaction

3. Relation between E, K and C is given dy

1) $E = \frac{3K + C}{6KC}$
2) $E = \frac{6KC}{K + 3C}$
3) $E = \frac{3KC}{3K + C}$
4) $E = \frac{9KC}{3K + C}$

4. The elongation of a conical bar due to its self weight is

1) $\frac{yl^2}{6E}$
2) $\frac{yl^2}{2E}$
3) $\frac{y^2l}{2E}$
4) $\frac{yl^2}{E}$

where y = unit weight of the material

5. Stran in a direction at right angles to the direction of applied force is known as

1) shear strain
2) lateral strain
3) longitudinal strain
4) volumetric strain

6. Factor of safety is defined as the ratio of

1) $\frac{\text{working stress}}{\text{ultimate stress}}$
2) $\frac{\text{ultimate load}}{\text{design safe load}}$
3) $\frac{\text{ultimate stress}}{\text{working stress}}$
4) $\frac{\text{design safe load}}{\text{ultimate load}}$

7. The strain due to a temperature change in a simple bar is

1) αt
2) $\frac{\alpha}{t}$
3) $\frac{t}{\alpha}$
4) $\alpha + t$

8. The ratio of total elengation of a bar of uni−form cross−section produced under its own weight to the elongation produced by an external load equal to the weight of the bar is

1) 1
2) 2
3) $\frac{1}{2}$
4) $\frac{1}{4}$

9. Two bars A and B are of equal length but B has an area half that of A and bar A has Young's modulus double that of B. When a load 'P' is applied to the two bars, the ratio of deformation between A and B is

1) $\frac{1}{2}$
2) 1
3) 2
4) $\frac{1}{4}$

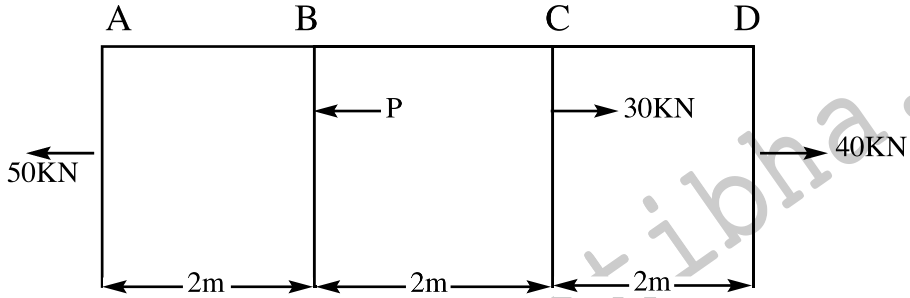
10. The elongation of beam of length 'l' and cross- sectional area 'A' subjected to a load 'p' is 8I. If the modulus of elastictity is halved, the new elongation will be

1) $\frac{8I}{4}$
2) 2(8I)
3) 8I
4) $\sqrt{2}\,8I$

11. A 16 mm diameter central hole is bored out of a steel red of 40 mm diameter and length 1.6m. The tensile strength because of this operation.

1) increases 2) remains constant 3) decreases 4) None of these

12. The force p for equilibrium of the bar shown in the figure is



Cross−sectorial area = 800 mm^3

1) 60 KN 2) 40 KN 3) 120 KN 4) 20 KN

13. The relationship between Young's modulus and shear modulus when $1/m = 0$, is

1) $E = 2C$ 2) $E = 3C$ 3) $E = 2C + 1$ 4) $C = 2E$

14. If a rigidly connected bar of steel and copper is cooled, the copper bar will be subjected to

1) compression 2) shear 3) tension 4) None of these

15. The force required to punch a 10 mm diameter hole in a mild steel plate 10mm thick, if the shear strength of mild steel is 360 MPa is

1) 9π kN 2) 36π kN 3) 18π kN 4) 2.25 kN

16. The shear stress on principal plane is

1) minimum 2) maximum 3) zero 4) infinity

17. If a body carries two unlike principal stresses, the maximum shear stress is given by

1) sum of the principal stresses 2) difference of the principal stresses

3) half the difference of the principal stresses 4) half the sum of the principal stresses

18. The radius of Mohr's circle for two unlike principal stresses of magnitude σ is

1) $\frac{\sigma}{2}$ 2) σ 3) $\frac{\sigma}{4}$ 4) Zero

19. A solid circular shaft is subjected to a maximum shearing stress of 140 MPa. The magnitude of maximum normal stress developed in the shalt is

1) 140 MPa 2) 80 MPa 3) 70 MPa 4) 60 MPa

20. If the principal stresses at a point in a strained body are σ_x and σ_y ($\sigma_x > \sigma_y$), then the resultant stress on a plane carrying the maximum shear stress is equal to

1) $\sqrt{\sigma_x^2 + \sigma_y^2}$ 2) $\sqrt{\sigma_x^2 - \sigma_y^2}$ 3) $\sqrt{\frac{\sigma_x^2 + \sigma_y^2}{2}}$ 4) $\sqrt{\frac{\sigma_x^2 - \sigma_y^2}{2}}$

21. A body is subjected to two normal stresses 20 kN/m^2 (tensile) and 10 kN/m^2 (compressive) acting mutually perpendicular to each other. The maximum shear stress is

1) 30 kN/m^2 2) 5kN/m^2 3) 15 kN/m^2 4) 10kN/m^2

22. Principal planes will be free of

1) normal stress
2) shoar stress
3) both normal and shear stresses
4) None of these

23. On two perpendicular planes there are normals stresses σ_1 and σ_2 shear stress q. If q = $\sigma_1\sigma_2$ the major and minor principal stresses respectively are

1) $\sigma_1 + \sigma_2$ and zero
2) $\sigma_1 + \sigma_2$ and $\sigma_1 - \sigma_2$
3) zero and $\sigma_1 - \sigma_2$
4) $\sigma_1 - \sigma_2$ and $\sigma_1 + \sigma_2$

24. Angel between the principal planes is

1) 270°
2) 180°
3) 90°
4) 45°

25. For a two-dimensional stress system the coordinates of the centre of Mohr's circle are

1) $\left[\frac{\sigma_x - \sigma_y}{2}, 0\right]$
2) $\left[\frac{\sigma_x + \sigma_y}{2}, 0\right]$
3) $\left[0, \frac{\sigma_x - \sigma_y}{2}\right]$
4) $\left[0, \frac{\sigma_x + \sigma_y}{2}\right]$

26. For a maximum bending moment shear force at the section should be

1) zero
2) maximum
3) minimum
4) None of these

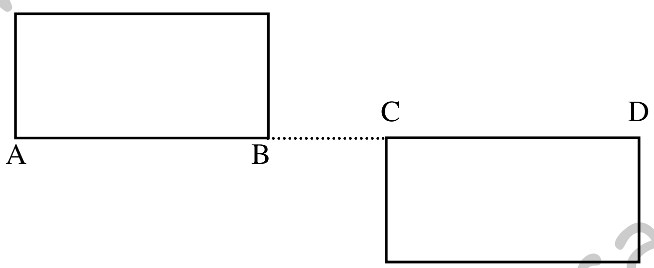
27. For uniform stress force throughout the span of a simply supported beam. it should carry

1) a concentrated lead at the mid-span
2) a couple anywhere in the section
3) udl over its entire span
4) two concentrated loads equally spaced

28. Maximum bending moment in a centilever carrying a concentrated load at the free end occurs.

1) at the fixe end
2) at the free and
3) at the mid−span
4) None of these

29. The given figure shows the shear force diagram for the beam ABCD



Bending moment in the portion BC of the beam

1) is zero
2) varies linearly from B to C
3) parabolic variation between B and C
4) is a non−zero constant

30. At the point of contraflexure in a beam

1) B.M. is zero
2) B.M.changes its sign
3) S.F. is zero
4) Both S.F. and B.M. change sign

31. In a double overbanging beam carrying udl throughout its length, the number of point of contraflexure are

1) 1
2) 2
3) zero
4) 3

32. A beam ABCD is simpley supported at B and C. The simpley supported span BC = 1. The overhangs are each 'a'. If the beam carries a udl of w/metre over the entire length, the maximum BM at the centre is

1) $\frac{WI^2}{8} - \frac{wa^2}{4}$
2) $\frac{wa^2}{4}$
3) $\frac{wa^2}{2}$
4) $\frac{wI^2}{8} - \frac{wa^2}{2}$

33. Rate of change of shear force is equal to

1) Bending moment
2) Inteisity of loading
3) Maximum deflection
4) Slope

34. A cantilever is subjected to udl throughout the length. If the maximum shear foce is 200 kN and maximum bending moment is 400 kN, thespan, "L" of the beam in metres is

1) 3
2) 2
3) 4
4) 8

35. A cantilever beam AB of length l is subjected to an anticlockwise couple of 'M' at a section C, distance 'a' from support. Then the maximum shear force is equal to

1) M
2) $\frac{M}{a}$
3) Zero
4) Ma

36. If SFD between two sections varies linearly, BM between these sections varies

1) linearly
2) parabolically
3) constant
4) None of these

37. At section of a beam sudden change in BM indicates the action of

1) point load
2) couple
3) point load or couple
4) udl

38. In a double equal overhang beam, for maximum BM to be as small as possible, the supports must be placed at a distance 'x' from the ends of the beam. The value of x is

1) 0.5 l
2) 0.207 l
3) 0.53 l
4) 0.7 l

where l = span of the beam

39. A freely supported beam of span 6 m is subjected a point load of 60 kN at mid span. The maximum BM is equal to

1) 300 kN − m
2) 180 kN − m
3) 90 kN − m
4) 270 kN − m

40. If a freely supported beam is subjected to udl throughout the span, the shape of the BMD is

1) rectangle
2) straight line
3) equalateral triangle
4) parabola

41. Section modulus of a beam is defined as

1) IY
2) $\frac{Y}{I}$
3) $\frac{l}{Ymax}$
4) Y^2I

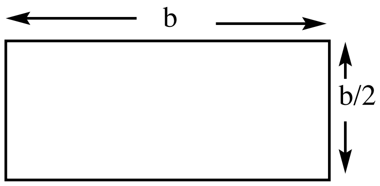
42. A beam of uniform strength is one which has same

1) bending moment throughout the section
2) shearing force throughout the section
3) deflection throughout the beam
4) Bending stress at every section

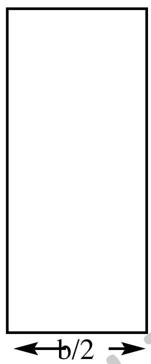
43. Neutral axis of a beam is the axis at which

1) the shear force is zero
2) the section modulus is zero
3) the bending stress is maximum
4) the bending stress is zero

44. A beam cross – section is used in two different orientions as shown is figure:



(A)



(B)

Bending moments applied in both cases are same. The maximum bending stresses induced in cases (A) and (B) are related as

1) $\sigma_A = \sigma_B$ 2) $\sigma_A = 2\sigma_B$ 3) $\sigma_A = \frac{\sigma_B}{2}$ 4) $\sigma_A = \frac{\sigma_B}{4}$

45. The ratio of flexural strength of a square section with its two sides horizontal to its diagonal horizontal is

1) $\sqrt{2}$ 2) 2 3) $2\sqrt{2}$ 4) $\frac{\sqrt{2}}{5}$

46. The ratio of maximum shear stress to the average shear stress in case of a rectangular beam is equal to

1) 1.5 2) 2.0 3) 2.5 4) 3

47. The nature of distribution of horizontal shear stress in a rectangular beam is

1) linear 2) parabolic 3) hyperbolic 4) elliptic

48. Section modulus of a circular section about an axis through its centre of gravity is

1) $\frac{\pi}{32}d^3$ 2) $\frac{\pi}{16}d^3$ 3) $\frac{\pi}{8}d^3$ 4) $\frac{\pi}{64}d^3$

49. A steel plate 50 mm wide and 100 mm thick is to be bent into a circular are of radius 10 m. If $E = 2 \times 105$ N/mm^2, then the maximum bending stress induced will be

1) 200 N/mm^2 2) 100 N/mm^2 3) 10,000 N/mm^2 4) 1000 N/mm^2

50. A beam of square section is placed with one diagonal placed horizontally. The maximum shear stress occurs at

1) the N.A. 2) $\frac{3}{8}$ d from top 3) $\frac{3}{8}$ d from N.A. 4) at the extreme fibres

where d = depth of the beam

51. Torsional rigidity of a shaft is given by

1) $\frac{T}{I}$ 2) $\frac{T}{J}$ 3) $\frac{T}{E}$ 4) $\frac{T}{r}$

52. Shear stress for a circular shaft due to torque varies

1) from surface to centre parabelically

2) from surface to centre linearly

3) from centre to surfce parabelically

4) from centre to surface linearly

53. If two shfats of the same length, one of which is hollow, transmit equal torques and have equal maximum stress, then they should have equal

1) angle of twist
2) polar modulus of section
3) polar moment of inertia
4) diameter

54. A circular shaft subjected to torsion undergoes a twist of I° in a length of 1.2 m. If the maximum shear stress induced is 100 MPa and the rigidity modulus is 0.8×10^5 MPa, the radius of the shaft in mm should be

1) $\frac{270}{\pi}$
2) $\frac{\pi}{270}$
3) $\frac{180}{\pi}$
4) $\frac{\pi}{180}$

55. Two shafts are of same length and same material. The diameter and maximum shear stress of the second shaft is twice that of the first shaft. Then the ratio of power developed between the first and second shaft is

1) 16
2) $\frac{16}{\sqrt[3]{3}}$
3) $\frac{1}{16}$
4) $\frac{3}{16}$

56. The differential equation which gives the relation between BM, slope and deflection of beam is

1) $EJ \frac{d^2y}{dx^2} = \frac{M}{I}$
2) $\frac{d^2y}{dx^2} = M$
3) $EI \frac{d^2y}{dx^2} = M$
4) $EI \frac{dy}{dx} = \frac{M}{F}$

57. A rolled steel beam having a span of 4 m carries a point load of 20 kN at 3 m from the left support. IF the moment of inertia of the section is 1×10^7 mm4 and E = 200 kN/m^2, then the deflection of the beam under the point loud is equal to

1) 25 mm
2) 7.5 mm
3) 13.33 mm
4) 50 mm

58. A cantilever of length 'I' carries a udl of a w per unit run, over the whole length. If the free end be supported over a rigid prop. the reaction of the prop will be

1) $\frac{2wl}{8}$
2) $\frac{5wl}{8}$
3) $\frac{3wl}{8}$
4) $\frac{7wl}{8}$

59. Radius of curvature of the beam is equal to

1) $\frac{ME}{I}$
2) $\frac{M}{EI}$
3) $\frac{EI}{M}$
4) $\frac{MI}{E}$

60. A simply supported beam span 3 m is subjected to a central point load of 5 kN. Then the slope at the mid span is equal to

1) $\frac{25}{24EI}$
2) $\frac{256}{EI}$
3) $\frac{40}{48EI}$
4) Zero

61. In a porpped cantiflever beam, the number of points of contraflexure is

1) 1
2) 2
3) 3
4) 4

62. A fixed beam 'AB' 6 m long carries a vertical load 90 kN at 2 m from 'A'. The fixed end moments at 'A' and 'B' are

1) 40 kNm, 80kN – m
2) 40 kN – m, 120 kN – m
3) 80kN – m, 40kN – m
4) 120kN – m, 80kN – m

63. In a fixed beam, at the fixed ends

1) slope is zero and deflection is maximum
2) slope is maximum and deflection is zero
3) both slope and deflection are maximum
4) slope and deflection are zero

64. If a fixed beam is subjected to a point load at mid span, total number of points of contraflexure are

1) 1 2) 2 3) 3 4) Zero

65. A beam of length I, fixed at both ends carries a uniformly distributed load of w per unit length. If EI is the flexural rigidity, then the maximum deflection in the beam is

1) $\frac{wl^4}{192EI}$ 2) $\frac{wl^4}{24EI}$ 3) $\frac{wl^4}{384EI}$ 4) $\frac{wl^4}{12EI}$

66. Slenderness ratio of a column may be defined as the ration of its effective length to the

1) radius of column 2) minimum radius of gyration

3) maximum radius of gyration 4) are a of the cross-section

67. The crippling load of a column with one end fixed and other end hinged is

1) $\sqrt{2}$ times that of a both ends hinged column

2) Two times that of a both ends hinged column

3) Four times taht of a both ends hinged column

4) Eight times that of a both ends hinged column

68. The formula given by I.S. code in calculatingallowable stress for the design of eccentrically loadded columns is based on

1) Johnson's parabolic formula 2) Straight line formula

4) Perry's formula 4) Secant formula

69. The Rankine constant (A) in Rankine's formula is equal to

1) $\frac{\pi^2 E}{\sigma C}$ 2) $\frac{\sigma C}{\pi^2 E}$ 3) $\frac{\pi^2 E}{\sigma\ CE}$ 4) $\frac{E\sigma\ C}{\pi^2}$

70. When both ends of the column are pinned, then the formula for crippling load (p) is equal to

1) $P = \frac{\pi^2 EI}{I^2}$ 2) $P = \frac{4\pi^2 EI}{I^2}$ 3) $P = \frac{2\pi^2 EI}{I^2}$ 4) $P = \frac{\pi^2 EI}{I^2}$

71. In Rankine's formula, the material constant for mild teel is

1) $\frac{1}{9000}$ 2) $\frac{1}{5000}$ 3) $\frac{1}{1600}$ 4) $\frac{1}{7500}$

72. If the flexural rigidity of the column is doubled, then the strength of the column is increased by

1) 16 2) 8 3) 2 4) 4

73. The diameter of the core for no tension in a column of diameter 120 mm is

1) 30 mm 2) 15 mm 3) 40 mm 4) 20 mm

74. The leat radius of gyraion for solid circular column is

1) d 2) $\frac{d}{2}$ 3) $\frac{d}{4}$ 4) $\frac{d}{3}$

75. In a mild steel tube 4 m long, the flexural rigidity of the tube is 1.2×10^{10} N? mm^2. The tube is used as a strut with both ends hinged. The crippling load in kN is given by

1) 14.80 2) 7.40 3) 29.60 4) 1.85

76. The ratio of pressures between two points X and Y located respectively at depths of 0.5 m and 8 m below water level in a tank is

1) $1 : \sqrt{2}$ 2) 1 : 2 3) 1 : 8 4) 1 : 16

77. The hydrostatic pressure in kgf exerted on one side of an annular area enclosed by concentric circles of radii 2m and 1m, and having its concetric 4 m below water surface is

1) 10000 π 2) 11000 π 3) 12000 π 4) 24000 π

78. The depth of the centre of pressure of a vertical semi-circular plane of diameter 'd' submerged in a liquid, with diameter located at the free surface is

1) $\frac{\pi d}{12}$ 2) $\frac{\pi d}{32}$ 3) $\frac{\pi d}{64}$ 4) $\frac{3\pi d}{32}$

79. A vertical rectangular plane surface is submerged in water with its top surface and bottom surface at 1.5 m and 6.0 m below the free water surface. The depth of centre of pressure below the free water surface is

1) 4.0 m 2) 4.5 m 3) 4.375 m 4) 4.2 m

80. In a inclined plane submerged in water, the centre of pressure is located

1) at the concentric 2) below the concentric

3) above the concentric 4) anywhere in the plane

81. When a body floating in a liquid is given a small angular displacement, it stands usellating about a point known as

1) centre of pressure 2) centre of gravity 3) centre of buoyaney 4) metacentre

82. A vertical triangular plane area, submerged in water, with one side coineiding the free surface, vartex downward, with altitude 'h', has the centre of pressure below the free surface by

1) $\frac{h}{4}$ 2) $\frac{h}{3}$ 3) $\frac{2h}{3}$ 4) $\frac{h}{2}$

83. A vertical wall is subjected to a pressure due to a liquid on one of its sides. The total pressure on the wall per unit length is

1) wH 2) $\frac{wH^2}{2}$ 3) $\frac{wH}{2}$ 4) $\frac{wH^2}{3}$

84. A vertical gate closes a horizontal tunnel 5 m high and 3 m wide running full with water. The pressure at the bottom of the gate is 196.2 kN/m^2. The total pressure on the gate is

1) 2.0MN 2) 2.575 3) 5.525 MN 4) 1.75 MN

85. A body floating in a liquid is said to be in neutral equilibrium, if its metacentre

1) coincides with its centre of gravity

2) lies above its cnetre of gravity

3) lies below its centre of gravity

4) lies below the centre of buoyancy and centre of gravity

86. A flow whose stream line is represented by a curve is called

1) one dimensional flow 2) two cimensional flow

3) three dimensional flow 4) four dimensional flow

87. The Bernoulli constants for point lying on the same stream line and those which lie on other stream line will have the same value, if the flow is

1) imcompreasible 2) steady 3) irrotational 4) uniform

88. The Bernoullis equation written in converntional form represents total energy per unit of a certain quantity. Identify this quantity.

1) energy per unit volume
2) energy per unit mass
3) energy per unit weight
4) energy per unit specific weight

89. The total energy line is always higher than the hydraulie grade line, and the vertical distance between the two represents

1) the datum head
2) the pressure head
3) the velocity head
4) the piezometric head

90. The total energy represented by the Eernoulli's equation $\left(\frac{u^2}{2g}+\frac{p}{y+z}\right)$ has the units

1) N – m/m
2) N – m/N
3) N – m^2/s
4) N – m/s

91. The kinetic energy correction factor X is a measure of effect of non−uniform distribution of velocity which is caused on account of viscous and other resistances. It is expressed by

1) $\frac{1}{A}\int_A \left[\frac{u}{V}\right]^2 dA$
2) $\frac{1}{A}\int_A \left[\frac{u}{V}\right] dA$
3) $\frac{1}{A}\int_A \left[\frac{u}{V}\right]^2 dA$
4) $\frac{1}{A}\int_A \left[\frac{u}{V}\right]^3 dA$

92. A stagnation point is a point where

1) pressure is zero
2) total energy is zero
3) total energy is maximum
4) velocity of flow reduces to zero

93. Cavitation in fluid flow occurs when

1) the total energy suddenly increases
2) total energy decreasses suddenly
3) velocity head reduces to zero
4) pressure of flow decreases to a value close to its vapour pressure

94. The momentum correction factor β is used to account for

1) change is pressure
2) change in mass rate of flow
3) change in total energy
4) non−uniform distribution of velocities at inlet and outlet sections

95. The change in moment of meomentum of flund due to flow along a curved path results in

1) a dynamic force which passes through the centre of curvature
2) a torque
3) a change in energy
4) a change in pressure

96. The velocity head representing the kinetic energy per unit weight of fluid is denoted by

1) v^2
2) $\frac{v^2}{2}$
3) $\sqrt{2gh}$
4) $\frac{v^2}{2g}$

97. A Pandtl type pitot tube is used to measure the

1) velocity of flow at the required point in a pipe

2) pressure difference between two points in a pipe

3) total pressure of liquid flowing in a pipe

4) discharge through a pipe

98. While using the pitot−tube. It must be ensured that its alignment is such that

1) its horizontal leg is at right angles to the direction of flew

2) its opening faces the downstream direction

3) its opening faces upstream and the horizontal leg is perfectly aligned with the directon of flow

4) the horizontal leg be inclined at 45° in plan

99. The coefficient of discharge 'C_d' of a venturimeter lies within the limits

1) 0.7 − 0.9 2) 0.6 − 0.8 3) 0.75 − 0.95 4) 0.95 − 0.99

100. When the venturimeter is inclined, then for a given flow it will give the reading us

1) same 2) more 3) less 4) no relation

101. the velocity of liquid flowing through the divergent portion of a venturimeter

1) remains constant 2) decreases

3) increases 4) no relationship

102. The head lost is more in a

1) nozzlemeter 2) venturimeter

3) inclined venturimeter 4) orifice meter

103. If successive measurements with a Pandtl−pitot tube indicate that the tip piezometer reading varies only across the flow, and the side piezometer reading varies only in the direction of flow, the flow is evidently

1) uniform, irrotational 2) non−uniform, rotational

3) uniform, rotational 4) non−uniform, irrotational

104. A mechanical device, which has rotation elements, the speed of rotation of which his a function of velocity of flow, and which is used to measure the velocity of liquid in open channels, is

1 Anemometer 2) Orifice meter

3) Current meter 4) Rotameter

105. A mouthpiece and an orifice, both of the same diameter'd', are discharging under the same head 'H'. The discharge through the mouthpiece will be

1) the same as that of the orifice 2) less than that of the orifice

4) morethan that of the orifice 4) no relationship

106. As compared to a rectangular weir, a triangular weir measures lew discharges more accurately, the discharge through the latter being

1) $\frac{2}{3} C_d \sqrt{2}g \tan 6.\ H^{5/2}$ 2) $\frac{8}{15} C_d \sqrt{2}g \tan 0.\ H^{5/2}$

3) $\frac{8}{15} C_d \sqrt{2}g \tan 0.\ H^{5/2}$ 4) $\frac{2}{3} C_d \sqrt{2}g \tan 0.\ H^{3/2}$

107. A Cippoletti weir is a

1) rectangular weir with sharp edges

2) high triangular notch

3) trapezodal notch with 45° slopes

4) trapezoidal notch with sides inclined at 1 H: 4V

108. The time taken for a tank, filled to a height 'h' above its flat base, to empty through an orifice in the base varies as the following power of 'h

1) 1 | 2) $\frac{1}{2}$ | 3) $-\frac{1}{2}$ | 4) $\frac{1}{3}$

109. The equation of state for a perfect gas is

1) $\frac{P}{V} = RT$ | 2) $\frac{P}{T} = V/R$ | 3) PV = RT | 4) $\frac{P}{R} = T$

110. If the compression or expansion of a gas takes place in such a way that the gas neither gives heat nor takes heat from its surroundings, the process is said to

1) Isothermal | 2) Diabatic

3) Isobarie | 4) None of these

111. For an adiabatic process,

1) PV = a constant | 2) PV^n = a constant

3) $\frac{P}{pk}$ = a constant | 4) $\frac{P}{K^p}$ = a constant

112. Momentum equation is completely independent of

1) compressibility effects | 2) frictional effects

3) viscous effects | 4) momentum flax

113. The velocity of elastic pressure wave in a fluid medium is equal to

1) some velocity | 2) half of sonic velocity

3) square root of sonic velocity | 4) Bulk Modulus

114. Mach number is given by

1) $\frac{\text{Acoustic speed}}{\text{stream speed}}$

2) $\frac{\text{Stream speed}}{\text{Acoustic speed}}$

3) product of gas constant and temperature

4) half of Bulk Modulus

115. Mach cone is possible in

1) Stationary fluids | 2) Subsonic flow

3) Transonic flow | 4) supersonic flow

116. The range of Mach number for a subsonic flow is

1) 0 < M < 1 | 2) 0.3 < M < 1

3) 0.8 < M < 1.2 | 4) M > 1

117. The differential form of continuity equation for one dimensional steady flow of compressible fluids with usual terms is

1) $\frac{dp}{p} + \frac{dA}{A} = 0$ 2) $\frac{dA}{A} = \frac{dp}{p} + \frac{dV}{V}$

3) $\frac{dA}{P} = \frac{dV}{V} - \frac{dp}{P}$ 4) $\frac{dA}{A} = -\frac{dp}{p} - \frac{dV}{V}$

118. For flow in a nozzle discharging from a tank, "choking" condition occurs, when the flow at the nozzle exit is

1) subsonic   2) supersonic   3) critical   4) transonic

119. Effect of compressibility of a fluid can be neglected if Mech number is

1) equal to 1   2) greater than 1

3) less than 1 but grater than 0.4   4) less than 0.4

120. Laminar flow through a circular tube was studied experimentally by

1) Newton   2) Pascal

3) Hagen and Poiseuille   4) Prandtal

121. Reynolds number which quantities the role of vascous effect is expressed as

1) $\frac{V}{\sqrt{gd}}$ 2) $\frac{pVd}{\mu}$ 3) $\frac{pV2L}{\sigma}$ 4) $V\sqrt{\frac{P}{E}}$

122. The lower limit of the critical Reynolds number below which all disturbances in pipe flow are damped out by viscous action has a value approximately equal to

1) 1   2) 500   3) 1000   4) 2000

123. The shear stress distribution in pipe flow is expressed by

1) $T = \frac{1}{r}\left(\frac{dp}{dx}\right)$ 2) $T = \left(\frac{dp}{dx}\right)\frac{r}{2}$ 3) $T = -2r\left(\frac{dp}{dx}\right)$ 4) $T = \frac{r2}{L}\left(\frac{dp}{dx}\right)$

124. The Hagen – Poiseuille equation which governs the velocity distribution in laminar flow through pipes may be expressed as

1) $\phi = \frac{\pi d^1 \Delta p}{128\ \mu L}$ 2) $\phi = \frac{\pi d^2 \Delta p}{128\ pL}$ 3) $\phi = \frac{128\ \mu L}{\pi d^2 \Delta p}$ 4) $\phi = \frac{128\ \mu L}{\pi d^4 \Delta p}$

125. The pressure drop per unit length of pipe in laminar flow in equal to

1) $\frac{d^2}{32\ \mu V}$ 2) $\frac{32\ \mu VL}{yd^2}$ 3) $\frac{32\ \mu V}{d^2}$ 2) $\frac{8\ \mu V}{d^2}$

126. In laminar flow through a circular tube, the Darcy - Weishach friction factor is related to the Reyonolds number by

1) $f = \left(\frac{1}{R}\right)$ 2) $f = \left(\frac{16}{R}\right)$ 3) $f = \left(\frac{64}{R}\right)$ 4) $f = \left(\frac{0.316}{R^{1/4}}\right)$

127. The discharge in (m^3/s) for laminar flow through a pipe of daimeter 0.04 m bearing a centreline velocity of 1.5 m/s is

1) $\frac{3\pi}{59}$ 2) $\frac{3\pi}{2500}$ 3) $\frac{3\pi}{5000}$ 4) $\frac{3\pi}{10000}$

128. The most essential feature of aturbulent flow in

1) large discharge

2) high velocity

3) velocity and pressure at a point exhibit irregular fluctuations of high frequency

4) velocity at a point remains constant with time

129. The velocity distribution in turbulen flow flolows a

1) parabolic law
2) logarithmic law
3) linear law
4) hyperbolic law

130. Steel and cast iron pipes carrying fluid under pressure are regarded as hydraulically smooth when

1) the boundary surface is relatively smooth

2) the roughness projections are of low height

3) the roughness elements are completely covered by the laminar sub-layer

4) the laminar layer is thin as compared to the average height of roughness elements

131. The darey – Weixbach friction factor 'f which is a direct measure of resistance to flow in pipes is dependent on

1) raughness height, daimeter and velocity

2) relative roughness, diameter and viscosity

3) relative roughness velocity and viscosity

4) relative height, diameter, velocity and kinematic viscosity

132. The parameters which determine the friction factor for turbulent flow in a rough pipe are

1) Froude number and relative roughness

2) Mach number and relative roughness

3) Reynolds number and March number

4) Reynolds number and relative roughness

133. In case of turbulent flow of a fluid through a circular tube, as cimpared to the case of laminar flow, at the same flow rate, the maximum velocity is .... shear stress at the wall is............. and the pressure drop across a given length is ....

1) higher, higher, higher
2) higher, lower, lower
3) lower, higher, higher
4) lower, higher, lower

134. The hydraulic efficiency of an impulse turbine is maximum, when the velocity of wheel is .... that of the jet velocity.

1) one – fourth
2) one – half
3) three – fourth
4) double

135. The number of buckets on the periphery of a Pelton wheel is given by

1) $\frac{D}{2d} + 5$
2) $\frac{D}{2d} + 10$
3) $\frac{D}{2d} + 15$
4) $\frac{D}{2d} + 20$

136. In a reaction turbine, the draft tube is used

1) to run the turbine full

2) to prevent air to enter the turbine

3) to increase the effective head of water

4) to transport water to downstream

137. In an inward flow reaction turbine

1) the water flows parallel to the axis of the wheel

2) the water enters at the centre of the wheel and from there flows towards the outer periphery of the wheel.

3) the water enters the wheel at outer periphery and then flows towards the centre of the wheel

4) the flow of water is party radial and partly axial

138. In a Kaplan turbine runner, the number of blades are generally

1) 2 to 4 2) 4 to 8 3) 8 to 16 4) 16 to 24

139. The power developed by a turbine is

1) Directly peoportional to $H^{1/2}$ 2) Inversely proportional to $H^{1/2}$

3) Inversely proportional to $H^{3/2}$ 4) Inversely proportional to $H^{3/2}$

140. The specific speed of a turbine is given by

1) $\frac{N\sqrt{P}}{H^{3/2}}$ 2) $\frac{N\sqrt{P}}{H^{5/4}}$ 3) $\frac{N\sqrt{P}}{H^{2}}$ 4) $\frac{N\sqrt{P}}{H^{3}}$

141. The turbine to be used for 450m head of water is

1) Pelton wheel 2) Francis turbin

3) Kaplan turbine 4) None of these

142. The cavitation in a hydranlic machine

1) cause noise and vibration of various parts

2) makes the surface rough

3) reduces the discharge of a turbine

4) cause sudden drop in power output and efficiency

143. The specific speed of a turbine is speed of an imaginary turbine. Identical with the given turbine. which

1) delivers unit discharge under unit load

2) delivers unit discharge under unit speed

3) develops unit H.P. under unit head

4) develops unit H.P. under unit speed

144. In a centrifugal pump, the liquid enters the pump

1) at the centre 2) at the top

3) at the bottom 4) from sides

145. Multistage centrifugal pumps are used to

1) give high discharge
2) pump viscous fluids
3) produce high heads
4) None of these

146. Theoretical power required to drive a reciprocal pump is

1) $\frac{WQH_3}{60}$ 2) $\frac{WQH_3}{75}$ 3) $\frac{WQH_d}{60}$ 4) $\frac{WQ(H_s + H_d)}{75}$

147. The specific speed of a centrifugal pump is given by

1) $\frac{N\sqrt{Q}}{H^{2/3}}$ 2) $\frac{N\sqrt{Q}}{H}$ 3) $\frac{N\sqrt{Q}}{H^{3/4}}$ 4) $\frac{N\sqrt{Q}}{H^{5/4}}$

148. For centrifugal pump impeller, the maximum value of the vane exit angle is

1) 10° to 15° 2) 15° to 20° 3) 20° to 25° 4) 25° to 30°

149. Which of the following pumps is preferred for flood control and irrigation applications?

1) Centrifugal pump
2) Mixed flow pump
3) Axial flow pump
4) Receiprocating pump

150. In order to avoid cavitation in centrifugal pumps

1) the suction pressure should be high
2) the delivery pressure should be high
3) the suction pressure should be low
4) the delivery pressure should be low

ANSWERS

1-3; 2-2; 3-4; 4-1; 5-2; 6-3; 7-1; 8-3; 9-4; 10-2; 11-3; 12-4; 13-1; 14-3; 15-2; 16-3; 17-3,4; 18-2; 19-1; 20-3; 21-3; 22-2; 23-1; 24-3; 25-2; 26-1; 27-2; 28-1; 29-4; 30-2; 31-2; 32-3; 33-2; 34-3; 35-3; 36-2; 37-2; 38-2; 39-3; 40-4; 41-3; 42-4; 43-4; 44-2; 45-1; 46-1; 47-1; 48-1; 49-1; 50-2; 51-3; 52-4; 53-2; 54-1; 55-3; 56-3; 57-2; 58-3; 59-3; 60-4; 61-1; 62-3; 63-4; 64-2; 65-3; 66-2; 67-2; 68-3; 69-2; 70-1; 71-4; 72-3; 73-1; 74-3; 75-2; 76-4; 77-3; 78-4; 79-4; 80-2; 81-4; 82-4; 83-2; 84-2; 85-1; 86-2; 87-3; 88-3; 89-3; 90-2; 91-3; 92-4; 93-4; 94-4; 95-2; 96-4; 97-1; 98-3; 99-4; 100-1; 101-2; 102-4; 103-2; 104-3; 105-3; 106-2; 107-4; 108-2; 109-3; 110-2; 111-3; 112-3; 113-1; 114-2; 115-4; 116-2; 117-4; 118-3; 119-4; 120-3; 121-2; 122-4; 123-2; 124-1; 125-3; 126-3; 127-4; 128-3; 129-2; 130-3; 131-4; 132-3; 133-3; 134-2; 135-3; 136-3; 137-3; 138-2; 139-3; 140-2; 141-1; 142-1; 143-3; 144-1; 145-3; 146-4; 147-3; 148-4; 149-3; 150-3.