

- 3.8 CNC machines are more accurate than conventional machines because they have a high resolution encoder and digital read-outs for positioning.
- 3.9 CNC machines are more economical to use even for simple turning jobs.
- 3.10 The continuity equation in the form always represents an incompressible flow regardless of whether the flow is steady or unsteady.
- 3.11 Bernoulli's equation can be applied between any two points on a streamline for a rotational flow field.
- 3.12 In a venturi meter, the angle of the diverging section is more than that of converging section.
- 3.13 As the transition from laminar to turbulent flow is induced a cross flow past a circular cylinder, the value of the drag coefficient drops.
- 3.14 The necessary and sufficient condition which brings about separation of boundary layer is .
- 3.15 When the fluid velocity is doubled, the thermal time constant of a thermometer used for measuring the fluid temperature reduces by a factor of 2.
- 3.16 For air near atmospheric conditions flowing over a flat plate, the laminar thermal boundary layer is thicker than the hydrodynamic boundary layer.
- 3.17 Isentropic compression of saturated vapour of all fluids leads to superheated vapour.
- 3.18 Any thermodynamic cycle operating between two temperature limits is reversible if the product of efficiency when operating as a heat engine and the coefficient of performance when operating as a refrigeration is equal to 1.
- 3.19 Two balls of mass m and $2m$ are projected with identical velocities from the same point making angles 30° and 60° with the vertical axis, respectively. The heights attained by the balls will be identical.
- 3.20 A concentrated load P acts at the middle of a simply supported beam of span l and flexural rigidity EI . Another simply supported beam of identical material, geometry and span is being acted upon by an equivalent distributed load $\left(w = \frac{P}{l}\right)$ spread over the entire span. The central deflections in both the beams are identical.

4.1 Match correct pairs between list I and List II for the questions

List I	List II
(a) Hooke's law	1. Planetary motion
(b) St. Venant's law Energy	2. Conservation
(c) Kepler's laws	3. Elasticity
(d) Tresca's criterion	4. Plasticity
(e) Coulomb's laws	5. Fracture
(f) Griffith's law	6. Inertia

4.2 List I gives a number of processes and List II gives a number of products

List I	List II
(a) Investment casting	1. Turbine rotors
(b) Die casting	2. Turbine blades
(c) Centrifugal casting	3. Connecting rods
(d) Drop forging pipe	4. Galvanised iron
(e) Extrusion	5. Cast iron pipes
(f) Shell moulding	6. Carburettor body

4.3 For a perfect gas :

List I	List II
(a) Isobaric thermal expansion coefficient	1. 0
(b) Isothermal compressibility	2. ∞
(c) Isentropic compressibility	3. $1/v$
(d) Joule - Thomson coefficient	4. $1/T$
	5. $1/p$
	6. $1/\gamma p$

List I	List II
(a) Collision of bodies	1. Kinetics
(b) Minimum potential energy	2. Reciprocating unbalance
(c) Degree of freedom	3. Dynamics
(d) Prony brake	4. Coefficient of restitution
(e) Hammer blow	5. Stability
(f) Ellipse trammels	6. Gravity idler

List I	List II
(a) Strain rosette	1. Critical speed
(b) Beams	2. Mohr's circle
(c) Section modulus	3. Coil springs
(d) Wahl's stress factor	4. Flexural rigidity
(e) Fatigue	5. Endurance limit
(f) Somer field number	6. Core section

ANSWERS

1.

- 1.1 (d) 1.2. (none) 1.3. (c) 1.4. (b) 1.5. (a,c) 1.6. (d) 1.7. (d) 1.8. (c) 1.9. (c) 1.10. (b)
 1.11. (c) 1.12. (b) 1.13. (a) 1.14. (d) 1.15. (c) 1.16. (b) 1.17. (a) 1.18. (d) 1.19. (c) 1.20. (d)
 1.21. (a) 1.22. (b) 1.23. (d) 1.24. (b) 1.25. (c)

2.

- 2.1 $\text{s/s}^2 - \text{m}^2$ 2.2. $\frac{1}{2} \sqrt{\frac{\pi}{3}}$ 2.3. minimum, maximum 2.4. 1 : 1
 2.5. 2.5 2.6. metacentre 2.7. closed contour in a fluid flow 2.8. two
 2.9. $\frac{64}{\text{Re}}$ 2.10. Froude Number 2.11. $\frac{N\sqrt{Q}}{H^{3/4}}$ 2.12. higher, lower
 2.13. -11858 J/K, 12787 J/K 2.14. 1, 1/9 2.15. 15.5 N
 2.16. $\frac{2}{3} \sqrt{2gh}$ 2.17. 1.5 2.18. less than 50% 2.19. π
 2.20. ω_r, ω_p

3.

- 3.1 False 3.2. True 3.3. False 3.4. False 3.5. False
 3.6. True 3.7. True 3.8. True 3.9. False 3.10. False
 3.11. True 3.12. False 3.13. True 3.14. False 3.15. False
 3.16. False 3.17. False 3.18. False 3.19. False 3.20. False

4.

- 4.1 (a) 3, (c) 1, (d) 5 (e) 2
 4.2. (a) 2, (b) 6, (c) 5 (d) 3
 4.3. (a) 4, (b) 5, (c) 6 (d) 1
 4.4. (a) 4, (b) 5, (e) 2 (f) 3
 4.5. (a) 2, (c) 4, (d) 3 (e) 5