JET-2022 Mechanical Sample Construct

- ## Domain

1. Discharge through a pipe is the product of
   a) Area & velocity
   c) pressure and velocity
   b) Area and pressure
   d) Velocity and displacement

2. _____is defined as a scalar function of space and time such that its negative derivative with respect to any direction gives the fluid velocity in that direction.
   a) Velocity potential function
   c) Equipotential function
   b) Stream function
   d) None of the above

3. As per the moment of momentum equation the resultant Torque(T) = (Given ρ=Density of liquid, Q=flow rate, v_1=velocity at section 1, $v_2$velocity at section 2, r_1=radius of curvature at section 1, r_2=radius of curvature at section 2.
   a) $\rho q(v_1 r_1 - v_2 r_2)$
   c) $\rho q(v_1 r_2 - v_2 r_1)$
   b) $\rho q(v_2 r_2 - v_1 r_1)$
   d) $\rho q(v_2 r_1 - v_1 r_2)$

4. The friction head loss due to the flow of a viscous fluid through a circular pipe of length L and diameter D with velocity v and pipe friction factor f is
   a) $4fLv2/\pi d2g$
   c) $4fLv2/2dg$
   b) $4fL/2v2g$
   d) $4fLv2/2\pi d2g$

5. Fourier law of heat conduction is based on the assumption that
   a) Heat flow through a solid is one dimensional
   c) Both (A) and (B)
   b) Heat flow is in a steady-state
   d) None of the options

6. The literature of heat transfer generally recognizes distinct modes of heat transfer. How many modes are there?
   a) One
   c) Three
   b) Two
   d) Four

7. An 8 cm diameter orange, approximately spherical, undergoes a ripening process and generates 18000 k J/m3 hr of energy. If the external surface of the orange is at 6.5 degrees Celsius, find out the temperature at the center of the orange. Take thermal conductivity = 0.8 k J/ m hr degree for the orange material
   a) 13.5 degree Celsius
   c) 11.5 degree Celsius
   b) 12.5 degree Celsius
   d) 10.5 degree Celsius

8. A solid sphere of an 8 cm radius has a uniform heat generation of 4000000 W/m3. The outside surface is exposed to a fluid at 150 degrees Celsius with a convective heat transfer coefficient of 750 W/m2 K. If the thermal conductivity of the solid material is 30 W/m K, determine the maximum temperature
   a) 444.45 degree Celsius
   c) 424.45 degree Celsius
   b) 434.45 degree Celsius
   d) 414.45 degree Celsius

9. What type of chart will be used to plot the number of defectives in the output of any process?
   a) x bar chart
   c) c chart
   b) R chart
   d) p chart

10. Process standard deviation is necessarily equal to the sample standard deviation of the same process
    a) TRUE
    c) Can't say
    b) FALSE
    d) None of the above

11. Which of the following organization is preferred in the automobile industry?
    a) Functional organization
    c) Staff organization
    b) Line organization
    d) Line and staff organizations

12. Advantages of Line structure are
    a) Simple
    c) Better discipline
    b) Clear division of authority and responsibility
    d) All of the above

13. A key attached to one member of a pair and which permits relative axial movement is known as
    a) Feather Key
    c) Sunk Key
    b) Woodruff key
    d) Gib Head Key

14. The type of stresses developed in the key is/are

   a) shear stress alone
   b) crushing stress alone
   c) both shear and crushing stresses
   d) shearing, crushing, and bending stresses

   The torque, T developed by a disc clutch is given by.
   Where

15. R = Mean radius of the friction face.
   W = axial thrust with which the friction surfaces are held together.
   μ = Coefficient of friction

   a) $T = 0.25\,\mu\,.\,W\,.\,R$
   b) $T = 0.5\,\mu\,.\,W\,.\,R$
   c) $T = 0.75\,\mu\,.\,W\,.\,R$
   d) $T = \mu\,.\,W\,.\,R$

16. In the case of a multiple disc clutch, if n_1 is the number of discs on the driving shaft and n_2 are the number of the discs on the driven shaft, then the number of pairs of contact surfaces will be

   a) $n_1 + n_2$
   b) $n_1 + n_2 - 1$
   c) $n_1 + n_2 + 1$
   d) none of these

17. Loam sand is a mixture of

   a) 30% sand and 70% clay
   b) 70% sand and 30% clay
   c) 50% sand and 50% clay
   d) 90% sand and 10% clay

18. Riddle is used for

   a) Smoothing and cleaning out depressions in the mould
   b) cleaning the molding sand
   c) moistening the sand around the edge before removing the pattern
   d) reinforcement of sand in the top part of the molding box

19. The cores after removing from the core boxes are baked at a temperature of about

   a) 160^0C
   b) 360^0C
   c) 260^0C
   d) 460^0C

20. Riser shape should be such that

   a) pure solidification time must be longer than casting solidification time
   b) casting solidification time must be longer than riser solidification time
   c) riser solidification time must be longer than casting solidification time
   d) ingates solidification time must be longer than casting solidification time

21. Allotropes differ in which of the following properties:

   a) Atomic Number
   b) Atomic mass
   c) Crystal Structure
   d) Electronegativity

22. The coordination number of a crystalline solid is:

   a) Number of particles in the unit cell
   b) Number of nearest neighbours of a particle
   c) Number of nearest neighbors of a particle
   d) Number of tetrahedral voids in a unit cell

23. HCP and BCC are called close-packed structures. Close packed structures have:

   a) Highest packing efficiency
   b) Highest void fraction
   c) Highest Density
   d) All of the mentioned

24. Which of the following Bravais lattices exist as face cantered unit cells?

   a) Orthorhombic
   b) Monoclinic
   c) Tetragonal
   d) None of the mentioned

25. A convergent-divergent adiabatic steam nozzle is supplied with steam at 10 bar and 250°c. the discharge pressure is 1.2 bar. Assuming that the nozzle efficiency is 100% and the initial velocity of steam is 50 m/s. find the dryness fraction at discharge. For 10 bar, 250°c, h_1=2943 KJ/kg s_1=6.926 KJ/kgk and For 1.2 bar, hf_2 =439.3 KJ/kg ; hfg_2=2244.1 KJ/kg;sf_2=1.3 61 KJ/kg K ; sfg_2=5.937 KJ/kgK

   a) 0.9373
   b) 0.88
   c) 0.95
   d) 0.983

26. Considering the variation of static pressure and absolute velocity in an impulse steam turbine across one row of moving blades

a) both pressure and velocity decreases

b) pressure decreases but velocity increases

c) pressure remains constant while velocity increases

d) pressure remains constant while velocity decreases

27. Vacuum obtainable in a condenser is dependent upon

a) Capacity of ejector

b) Quantity of steam to be handled

c) Any of the A and B

d) The temperature of cooling water

28. In jet type condenser

a) cooling water passes through tubes and steam surrounds them

b) steam passes through tubes and cooling water surrounds them

c) steam and cooling water mix

d) steam and cooling water do not mix

29. A cantilever beam of span, 'L' is subjected to a downward load of 800 kN uniformly distributed over its entire length and a concentrated upward load P at its free end. For vertical displacement to be zero at the free end, the value of P is:

a) 300 kN

b) 500 kN

c) 800 kN

d) 1000 kN

30. A circular column of length 1.8 m has Euler's crippling load of 2 kN. If the diameter of the column is reduced by 15 %, the reduction in crippling load will be

a) 0.1

b) 0.3

c) 0.4

d) more than 40%

31. A tripod carrying a camera is an example of a force system representing

a) Collinear concurrent forces

b) Coplanar concurrent forces

c) Non-coplanar concurrent forces

d) Non- coplanar non-concurrent forces

32. A force P of 50 N and another force Q of unknown magnitude act at 90o to each other. They are balanced by a force of 130 N. The magnitude of Q is

a) 120 N

b) 130 N

c) 70 N

d) None of these

33. In a reciprocating steam engine, which of the following forms a kinematic link?

a) Cylinder and piston

b) Crankshaft and flywheel

c) Piston rod and connecting rod

d) Flywheel and engine frame

34. The motion between a pair when limited to a definite direction, irrespective of the direction of force applied is known as

a) Completely constrained motion

b) Incompletely constrained motion

c) Successfully constrained motion

d) None of these

35. Which of the following is an example of a higher pair?

a) Toothed gearing

b) belt and rope drive

c) Ball and roller bearing

d) All of these

36. An automobile steering gear is an example of

a) Siding pair

b) Rolling pair

c) Lower pair

d) Higher Pair

37. A definite area or space where some thermodynamic process takes place is known as

a) thermodynamic system

b) thermodynamic cycle

c) thermodynamic process

d) thermodynamic surrounding

38. An open system is one in which

a) Heat and work cross the boundary but mass does not

b) Mass crosses the boundary bit heat and work do not

c) Heat, work, and mass cross the boundary

d) None of the heat, work, and mass cross the boundary

39. A gas is expanded in a cylinder such that its temperature remains constant. The resulting variation of pressure vs volume is
    a) A parabola
    b) A hyperbola
    c) A straight line
    d) None of these

40. Which of the following phenomenon occurs when gas in a piston-cylinder assembly expands reversibly at constant pressure
    a) Heat is added to the gas
    b) Heat is removed from the gas
    c) Gas does work from its own stored energy
    d) Gas undergoes adiabatic expansion

41. The amount of heat required to raise the temperature of 1Kg of water by 1-degree Celcius at constant pressure is called
    a) specific heat at constant volume
    b) specific heat at constant pressure
    c) kilo calorie
    d) None of these

42. Change in internal energy in a reversible process occurring in a closed system is equal to the heat transfer if the process occurs at constant
    a) Pressure
    b) Volume
    c) Temperature
    d) Enthalpy

- **IoT:**

43. Which of the following is not an aspect of Big Data?
    a) Volume
    b) Vitality
    c) Velocity
    d) Variety

44. What are the three types of nodes defined by Zigbee?
    a) Gateway, hub, end device
    b) Node 1, Node 2, Node 3
    c) Zigbee 1, Zigbee 2, Zigbee 3
    d) Coordinator, router, end device

45. What do smart devices include?
    a) Field devices
    b) Mobile devices
    c) Operating devices
    d) All of the above

46. What does the term PLC stand for?
    a) Programmable Logic Controller
    b) Programmable Logic Control
    c) Partial Logic Controller
    d) Permanent Logic Controller

47. Which of the following does not include different learning methods
    a) Analogy
    b) Introduction
    c) Memorization
    d) Deduction

48. TQM stands for
    a) Time Quality Management
    b) Total Quality Management
    c) Total Quality Making
    d) Total Quality marketing

49. What is the Full Form of TBEM
    a) Tata Business Execution Model
    b) Total Business Execution Method
    c) Tata Business Excellence Model
    d) Total Business Enterprise Model

50. Up to what percentage in the Pareto chart do we attack first?
    a) 60%
    b) 70%
    c) 80%
    d) 50%

Disclaimer: The sample paper is for illustrative purposes alone. The actual jet exam may contain different numbers of total questions or duration.

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