Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (R,S) (FT/WP/PT) Examinations April 2026 (2019 Scheme)

Course Code: MET308

Course name: COMPREHENSIVE COURSE WORK

Max. Marks: 50 Duration: 1Hour

Instruction ***(1) Each question carries one mark. No negative marks for wrong answers***
(2) Total number of questions: 50
(3) All questions are to be answered. Each question will be followed by 4 possible answers of which only ONE is correct.
(4) If more than one option is chosen, it will not be considered for valuation.

1. **Total number of instantaneous centres of rotation for a mechanism having n links is**

   a) n(n-1)/2 b) n(n+1)/2 c) n/2 d) n-1

2. **Which of the following set of acceleration is involved in the motion of the piston inside the cylinder of a uniformly rotating cylinder mechanism?**

   a) Coriolis and radial acceleration b) Radial and tangential acceleration c) Coriolis and gyroscopic acceleration d) Gyroscopic and tangential acceleration

3. **In cams, the point on the pitch curve which indicates the maximum pressure angle is called**

   a) Trace point b) Pitch point c) Dwell point d) Pin point

4. **During the dwell period of the cam, the follower**

   a) Remains at rest b) Moves in a straight line c) Moves with uniform speed d) Does simple harmonic

5. **As per Kennedy's theorem, if three bodies have plane motion, their instantaneous centre lies on**

   a) a triangle b) a point c) two lines d) a straight line

6. **The instantaneous center of rotation is a point of zero**

   a) Angular velocity b) Linear velocity c) Displacement d) Acceleration

7. **Klein's diagram is used to find**

   a) Angular velocity of various parts b) Acceleration of various parts c) Displacements of the various d) Velocity and acceleration of various parts

parts

8. **Mechanism having zero degree of freedom is known as**

a) Machine b) Structure c) Kinematic chain d) Link

9. **Coriolis component of acceleration exists whenever a point moves along a path that has**

a) Tangential acceleration b) Centripetal acceleration c) Linear motion d) Rotational motion

10. **In actual machines mechanical advantage is**

a) unity b) less than unity. c) less than velocity ratio d) greater than velocity ratio

11 **Newton's Law of viscosity states that**

a) Shear stress is directly proportional to velocity b) Shear stress is directly proportional to velocity gradient c) Shear stress is directly proportional to shear strain d) Shear stress is directly proportional to viscosity

12 **The specific gravity of mercury is**

a) 1360 b) 13600 c) 1.36 d) 13.6

13 **The density of water is 1000 kg/m³ at**

a) 0 °C b) 4 °C c) 15 °C d) 20 °C

14 **Kinematic viscosity is equal to**

a) Density/dynamic viscosity b) Dynamic viscosity/density c) Dynamic viscosity X density d) None of these

15 **The intensity of pressure at any in a liquid at rest is same in all directions. The above statement is known as**

a) Kirchoff's law b) Pascal's law c) Newton's law d) Darcy-Weisbach law

16 **When a body floating in a liquid is given a small angular displacement, it starts oscillating about a point known as**

a) Centre of pressure b) Centre of gravity c) Centre of buoyancy d) Metacentre

17 **A flow field satisfying $\nabla \cdot V=0$ (continuity equation) represents**

a) a steady compressible flow b) an incompressible flow c) an unsteady incompressible flow d) an unsteady compressible flow

18 **A streamline and an equipotential line in a flow field**

a) are parallel to each other b) are perpendicular c) intersect at an acute d) are identical

			to each other		angle		

19 **In Hagen–Poiseuille flow of a viscous fluid, which of the following forces are balanced?**

a) Inertia and viscous force b) Pressure and viscous force c) Gravity and viscous force d) Inertia and gravity force

20 **In laminar flow through a circular tube, the Darcy-Weisbach friction factor, depends only on the Reynold's number, Re, and the two are related by**

a) f= 16/Re b) f=64/Re c) $f=0.314/Re^2$ d) f=1/Re

21 **The property of a material which enables it to resist fracture due to high impact loads is known as**

a) Brittleness b) Ductility c) Toughness d) Hardness

22 **The crystal structure of alpha iron is**

a) BCC b) FCC c) HCP d) SC

23 **Which of the following phases exhibits highest solid solubility of carbon in Iron**

a) Delta iron b) Gamma iron (Austenite) c) Alpha iron d) Cementite

24 **The number of phases present in equilibrium at eutectic point**

a) 0 b) 1 c) 2 d) 3

25 **The Burgers vector lies parallel to the dislocation line along the axis of a line of atoms in the same plane in:**

a) Screw dislocation b) Edge dislocation c) Cracks d) Vacancies

26 **The average number of atoms per unit cell in a simple cubic crystal structure is**

a) 1 b) 2 c) 4 d) 6

27 **Hardenability of steel is assessed by**

a) Charpy impact test b) Rockwell hardness test c) Jominy end-quench test d) Open hole test

28 **The relative amounts of phases present in a two-phase region can be determined using**

a) Phase rule b) Lever rule c) Either (a) or (b) d) None of these

29 **Gibbs' phase rule is expressed as (where F = degrees of freedom, C = number of components, P = number of phases):**

a) F=C+P b) F=C+P−2 c) F=C−P−2 d) F=C−P+2

30 **The type of atomic bonding present in diamond is**

a) Ionic b) Covalent c) Metallic d) None of these

31 **The main purpose of chaplets used in foundry practice is to**

a) provide efficient venting
b) ensure directional solidification
c) support the core
d) align the mould boxes

32 **Chills are used in casting to:**

a) provide support to the core
b) improve directional solidification
c) cool the mould rapidly after casting
d) connect the pouring basin and runner

33 **Which of the following is *not* a casting defect?**

a) Hot tears
b) Stop-off
c) Run out
d) Blow holes

34 **In resistance welding, the**

a) voltage is low and current is high
b) voltage is high and current is low
c) both voltage and current are low
d) both voltage and current are high

35 **The metal powder used in thermit welding of steel is**

a) Tungsten
b) Copper
c) Lead
d) Aluminium

36 **In MIG welding, helium or argon is used to:**

a) provide cooling effect
b) act as flux
c) act as shielding medium
d) facilitate welding process

37 **The molten metal is poured from the pouring basin to the gate with the help of a**

a) Riser
b) Sprue
c) Runner
d) Core

38 **Hot rolling of mild steel is carried out at**

a) Below recrystallization temp
b) Between 100 to 150º C
c) Above recrystallization temperature
d) 100 °C

39 **Structural sections such as rails, angles, and I-beams are made by**

a) Hot rolling
b) Casting
c) Forging
d) Hot extrusion

40 **Spanners are manufactured by**

a) Die casting
b) Forging
c) Sheet rolling
d) Blanking

41 **Which of the following devices operates under steady-state conditions with an isenthalpic process?**

a) Turbine
b) Compressor
c) Nozzle
d) Throttling device

42 **In which ideal thermodynamic process (for an ideal gas) is the heat supplied completely converted into work?**

a) Isothermal process b) Adiabatic process c) Carnot cycle d) It is not possible

43 **Identify the path function among the following:**

a) Internal energy b) Enthalpy c) Heat d) Entropy

44 **Which among the following is an extensive property?**

a) Pressure b) Temperature c) Density d) Volume

45 **The law which provides the basis of temperature measurement is**

a) Third law of thermodynamics b) Zeroth law of thermodynamics c) First law of thermodynamics d) Second law of thermodynamics

46 **The thermodynamic property introduced by the second law of thermodynamics is**

a) Internal energy b) Enthalpy c) Entropy d) Temperature

47 **Availability (exergy) refers to**

a) total energy of a system b) energy that can be completely converted into work c) maximum useful work obtainable from a system d) heat content of a system

48 Air is compressed in a cylinder such that the volume changes from 0.2 to 0.02 m^3. The initial pressure is 200 kPa. If the pressure is held constant during the process, the work done is

a) –36 kJ b) +36 kJ c) –360 kJ d) +360 kJ

49 Work output from a system is at the expense of internal energy is a non-flow process carried out

a) At constant pressure b) At constant volume c) Adiabatically d) Polytropically

50 **In a P–V diagram, a polytropic process with polytropic index n→∞ (infinity) corresponds to:**

a) Isothermal process b) Adiabatic process c) Isochoric (constant volume) process d) Such a process does not exist

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