SAMPLE TEST PAPER FOR GRADUATE ADMISSION

DEPARTMENT OF MECHANICAL ENGINEERING
INTERNATIONAL ISLAMIC UNIVERSITY, ISLAMABAD

Name:…………………………..Roll Number……………

Instructions:
This exam is of 100 marks.
Total time allowed: 75 mins

MSME/PHDME Questions will be from:
- Fluid Mechanics
- Strength of Materials
- Thermodynamics
- Heat Engines
- Refrigeration and Air Conditioning
- Theory of Machines
- Machine Design
- Production Engineering

1. The bearings in a car wheel are subjected to _____ load.
   a. Radial
   b. Axial
   c. Both a and b
   d. None of the above

2. When two surfaces slide relative to each other with only a partial lubricant film between them, _____ is said to exist.
   a. Hydrostatic lubrication
   b. Hydrodynamic lubrication
   c. Boundary lubrication
   d. Solid film lubrication

3. Bevel gears can transmit motion for shaft angle of:
   a. 90°
   b. 45°
   c. 30°
   d. any degree

4. Threads used for power transmission are called _____ threads.
   a. Acme
   b. Buttress
   c. Square
   d. Bevel

5. If the spring diameter is 20mm and the wire diameter is 2mm, the spring index is

   _____.
   a. 5
   b. 20
   c. 22
   d. 10

6. _____ pulley is used for flat belts.
   a. Grooved
   b. Sprocket
   c. Sheave
   d. Crowned

7. The treatment in which the brittleness of martensite is reduced is called:
   a. aging
   b. Annealing
   c. Normalizing
   d. Tempering

8. Hot working is performed only at temperatures above the room temperature and below material's recrystallization temperature.
   a. True
   b. False

9. If stress values were measured during a tensile test, which of the following would have the higher value?
   a. engineering stress
   b. true stress

10. Which of the following statements define tolerance?
   a. Clearance between a shaft and a mating hole
   b. Measurement error
   c. Total permissible variation from a specified dimension
   d. Variation in manufacturing.

11. Which one of the following manufacturing processes will likely result in the best surface finish?
   a. Arc welding
   b. Grinding
   c. Machining
   d. Sand casting

12. The purpose of _____ views on drawings is to show internal or invisible detail clearly.
   a. Projection
   b. Orthogonal
   c. Section
   d. None of the above

13. If line is inclined in both reference planes, its projection will show:
   a. True length
   b. True projection
   c. All of the above

       d. None of the above

14. Symbol represents which type of projection?
   a. First angle
   b. Second angle
   c. Third angle
   d. Fourth angle

15. A numerical value enclosed in parenthesis, providing information only and not directly used in fabrication of the part is:
   a. Basic dimension
   b. Reference dimension
   c. Tolerance
   d. None of the above

16. Cams are a form of degenerative four bar linkage in which the coupler link has been replaced by a _____.
   a. Planar joint
   b. Spherical joint
   c. Full joint
   d. Half joint

17. Backlash is the clearance between the mating teeth measured at the _____.
   a. Pitch circle
   b. Base circle
   c. Dedendum circle
   d. Addendum circle

18. A revolute joint permits _____.
   a. One and a half degree freedom
   b. Two degrees of freedom
   c. Three degrees of freedom
   d. One degree of freedom

19. Linear momentum may be regarded as area under which of the following curves?

   a. F-t curve
   b. s-t curve
   c. v-t curve
   d. a-t curve

20. In US Customary system of units, which of the following units is the derived unit?
   a. Slug

      b. Newton

      c. lb

      d. kg

21. Mercury is generally used in manometer in order to measure:

      a. Surface tension

      b. High pressure

      c. Low pressure accurately

      d. Very low pressure

22. The buoyant force on a floating or submerged body is a force, which is:

      a. Due to volume of liquid displaced by the body and acting vertically upwards

      b. Due to gravity and acting downwards

      c. Acting horizontally on the vertical projection of the body

      d. Equal to submerged weight of the body and acting vertically upwards

23. For Newtonian fluid stresses are linearly related to:

      a. Acceleration

      b. Rate of strain

      c. Velocity

      d. Strain

24. Latent energy is associated with:

      a. Microscopic kinetic energy

      b. Atomic bonds

      c. macroscopic kinetic energy

      d. phase change

25. Pressure and temperature cannot be considered independent properties except when we have:

      a. Single phase

      b. Multi-phase

      c. Variable size of system

      d. Quasi-equilibrium process

26. Time dependent permanent deformation is called _____.

      a. Plastic deformation

      b. Elastic deformation

      c. Creep

      d. An-elastic deformation

27. Hydrostatic stress results in the following:
- a. Linear strain
- b. Shear strain
- c. Both linear and shear strains
- d. None of above

28. Toughness of a material is equal to area under _____ part(s) of the stress-strain curve.
- a. Elastic
- b. Plastic
- c. Both
- d. None

29. True stress-strain curve needs to be corrected after:
- a. Elastic limit
- b. Yield limit
- c. Tensile strength
- d. No need to correct

30. High elastic modulus in materials arises from:
- a. High strength of bonds
- b. Weak bonds
- c. combination of bonds
- d. None of above

31. Von Mises and Tresca criteria give different yield stress for:
- a. Uni-axial stress
- b. Balanced bi-axial stress
- c. Pure shear stress
- d. None

32. On a P-v diagram, what does the area under the process curve represent?
- a. Boundary work
- b. Stream pressure
- c. Specific volume of mixture
- d. None of above

33. An insulated room is heated by burning candles. Taking the whole room as one system, what type of interaction it is?
- a. Work interaction
- b. Internal energy interaction
- c. Heat interaction
- d. All of above

34. Conduction heat transfer occurs in:
   a. Solids only
   b. Fluids only
   c. Both solids and fluids
   d. Vacuum only

35. Rate of heat conduction in a material is governed by:
   a. Newton's law of cooling
   b. Fourier's law
   c. Stefan Boltzmann law
   d. NavierStoke's law

36. The non-dimensional number used to check validity of Lumped Capacitance Method used in transient heat conduction problems is:
   a. Biot number
   b. Reynolds number
   c. Nusselt number
   d. Grashoff number

37. A 200 W vacuum cleaner is powered by an electric motor whose efficiency is 70%. (Note that the electric motor delivers 200 W of net mechanical power to the fan of the cleaner). The rate at which this vacuum cleaner supplies energy to the room when running is:
   a. 140 W
   b. 286 W
   c. 200 W
   d. 360 W

38. A heat pump absorbs heat from the cold outdoors at 3°C and supplies heat to a house at 20°C at a rate of 30,000 kJ/h. If the power consumed by the heat pump is 3 kW, the coefficient of performance of the heat pump is:
   a. 0.36
   b. 1.18
   c. 16.2
   d. 2.78

39. If in a certain fluid boiling occurs while the fluid is stationary and any motion of the fluid is due to natural convection currents and the motion of the bubbles is due to the influence of buoyancy, such a boiling mechanism is called:
   a. Convective boiling
   b. Pool boiling
   c. Evaporative boiling
   d. Nucleate boiling

40. Consider a submarine cruising 30 m below the free surface of seawater whose density is 1025 kg/m^3. The increase in the pressure exerted on the submarine when it dives to a depth of 110 m below the free surface is:

    a. 480 kPa
    b. 144kPa
    c. 1400 kPa
    d. 804kPa