Ph.D. Entrance Examination
November - 2022
Part - C
(Mechanical Engineering)
Time : 50 Minutes
Maximum Marks : 50

Note :

(i)   This question booklet comprises 50 questions.

(ii)   All questions are compulsory.

(iii) The question booklet along with answer sheet is to be handed over by the candidate to the invigilator at the end of the examination.

(iv)   There is no negative marking.

(v)   Each question carries one mark.

Multiple Choice Questions -

1. The property of sand due to which it evolves a great amount of steam and other gases is called

    (a) Collapsibility   (b) Permeability   (c) Cohesiveness   (d) Adhesiveness

2. During hot working of metals

    (a) Porosity of the metal is largely eliminated

    (b) Grain structure of the metal is refined

    (c) Mechanical properties are improved due to refinement of grains

    (d) All of the above

3. V-block is used to

    (a) Check the trueness of flat surfaces   (b) Locate centres of round rods

    (c) Check the surface roughness   (d) None of these

4. The process extensively used for making bolts and nuts is

    (a) Hot piercing   (b) Extrusion   (c) Cold peening   (d) Cold heading

5. The current in electric resistance welding can be regulated by

    (a) Varying the input supply

    (b) Changing the primary turns of the transformer

    (c) Changing the secondary turns of the transformer

    (d) Any one of the above

6. The operation in which oil is permeated into the pores of a powder metallurgy product is known as

    (a) Mixing   (b) Sintering   (c) Impregnation   (d) Infiltration

7. The compressible flow is assumed to be _____

    (a) Adiabatic only   (b) Isentropic only

    (c) Isentropic and adiabatic   (d) Polytropic

8. Principle of fluid mechanics works on the utilization of_____

    (a) Velocity   (b) Accelerating mass (c) Volume   (d) Work

9. Pressure variation for compressible fluid is maximum for which of the following kind of process?

    (a) Adiabatic   (b) Quasi Static

    (c) Isothermal   (d) None of the mentioned

10. Which of the following principle is used for calculating the centre of pressure?

    (a) Principle of balancing of momentum   (b) Principle of momentum

    (c) Principle of conservation of energy   (d) None of the mentioned

11. Which among the following is a knuckle joint?

    (a) Tension link in bridge structure   (b) Foundation bolt

    (c) Both a. and b.   (d) None of the above

12. What are assumptions made during stress analysis of curved beams?

    (a) The material is nonisotropic   (b) The material is non homogeneous

    (c) The material obeys hooke's law   (d) All of the above

13. Which factors are responsible for the failure of a component due to buckling?

    (a) Yielding   (b) Plastic deformation

    (c) Elastic instability   (d) All of the above

14. Which type of springs have only active coils?

    (a) Helical compression springs   (b) Helical tension springs

    (c) Both a. and b.   (d) None of the above

15. Absolute pressure is measured as

    (a) Gauge pressure – Atmospheric pressure

    (b) Gauge pressure + Atmospheric pressure

    (c) Gauge pressure / Atmospheric pressure

    (d) None of the above

16. The process in which no heat transfer takes place through boundaries is called as

    (a) Isothermal process   (b) Adiabatic process

    (c) Isochoric process   (d) None of the above

17. The amount of heat required to raise a unit mass of substance through a unit rise in temperature is called as

    (a) Heat capacity of a substance   (b) Specific heat of a substance

    (c) Latent heat of a substance   (d) None of the above

18. A quasi-static process has main characteristics as it is:

    (a) A stationary process   (b) An infinitely slow process

    (c) A random process   (d) A spontaneous process

19. A cyclic heat engine operates between a source temperature of 927^0C and a sink temperature of 27^0C. What will be the maximum efficiency of the heat engine?

    (a) 100 %   (b) 80 %   (c) 75 %   (d) 70 %

20. People use electric energy to heat and light homes. What does it indicate?

    (a) People are destroying energy

    (b) People are creating energy

    (c) People are converting energy from more exergy value to less exergy value

    (d) People are converting energy from less exergy value to more exergy value

21. The dryness (x) fraction of superheated steam is taken as

    (a) x = 0   (b) x = 0.9   (c) x = 0.999   (d) x = 1

22. The thermocouple circuit which is used to measure temperature works on _____.

    (a) Seebeck effect   (b) Peltier effect   (c) Thomson effect   (d) None of the above

23. To achieve a definite zero point on the Kelvin scale, we have to violate

    (a) First law of thermodynamics

    (b) Second law of thermodynamics

    (c) Both first law and second law of thermodynamics

    (d) No law has to be violated

24. The temperature at which a system undergoes a reversible isothermal process without transfer of heat is called as _____

    (a) Critical temperature   (b) Kelvin temperature

    (c) Absolute zero temperature   (d) Reversible temperature

25. Assume that a reversible heat engine is operating between a source at T_1 and a sink at T_2. If T_2 decreases, the efficiency of the heat engine _____

    (a) Decreases   (b) Increases

    (c) Remains constant   (d) None of the above

26. What is the entropy chosen at the triple point of water?

    (a) Zero   (b) Less than zero   (c) More than zero   (d) None of the above

27. What is the entropy change when the system is at stable equilibrium state?

    (a) The entropy change will be positive   (b) The entropy change will be negative

    (c) The entropy change will be zero   (d) None of the above

28. When two vapor cycles are coupled in series and heat rejected by one is absorbed by another, the cycle is called as

    (a) Dual vapour cycle   (b) Binary vapour cycle

    (c) Coupled vapour cycle   (d) None of the above

29. In turbofan engine, fan is used

    (a) To compress the inlet air more efficiently   (b) To increase the total thrust of the engine

    (c) Both a. and b.   (d) None of the above

30. The horizontal line in psychrometric chart joining the change of state of air represents

    (a) Humidification

    (b) Sensible cooling or heating

    (c) Sensible cooling or heating with humidification

    (d) Sensible cooling or heating with dehumidification

31. Gear finishing operation is called

    (a) Shaping   (b) Milling   (c) Hobbing   (d) Burnishing

32. The chamfering is an essential operation after

    (a) Knurling   (b) Rough turning   (c) Boring   (d) Thread cutting

33. The ratio of indicated thermal efficiency to the corresponding air standard cycle efficiency is called..............................

    (a) Net efficiency   (b) Efficiency ratio   (c) Relative efficiency (d) Overall efficiency

34. Supercharging............................the power developed by the engine

    (a) Has no effect on (b) Increases   (c) Decreases   (d) None of the above

35. One tonne of refrigeration is equal to

    (a) 21/kJ/min   (b) 210/kJ/min   (c) 420/kJ/min   (d) 620/kJ/min

36. Which type of compressor is used in domestic refrigerator.......

    (a) Centrifugal   (b) Axial

    (c) Miniature sealed unit   (d) Piston type reciprocating

37. Size of boiler tubes is specified by

    (a) Mean diameter and thickness   (b) Inside diameter and thickness

    (c) Outside diameter and thickness   (d) Outside diameter and inside diameter

38. The ratio of work-done per cycle to the stroke volume of the compressor is known as.......

    (a) Compressor capacity   (b) Compression ratio

    (c) Compressor efficiency   (d) Mean effective pressure

39. Aeroplanes employ following type of compressor.........

    (a) Radial flow   (b) Axial flow

    (c) Centrifugal   (d) Combination of above

40. The type of layout used for manufacturing steam turbines, is

    (a) Product layout   (b) Process layout

    (c) Fixed position layout   (d) Any one of these

41. Gantt chart gives information about

    (a) Scheduling and routing   (b) Sales

    (c) Production schedule   (d) Machine utilisation

42. PERT stands for

    (a) Programme Estimation and Reporting Technique

    (b) Process Estimation and Review Technique

    (c) Programme Evaluation and Review Technique

    (d) Planning Estimation and Resulting Technique

43. Standard time is equal to

    (a) Normal time minus allowances   (b) Normal time plus allowances

    (c) Representative time multiplied by rating factor (d) Normal time taken by an operation

44. Break even analysis consists of

    (a) Fixed expenses   (b) Variable cost   (c) Sales revenue   (d) All of these

45. Slack represents the difference between the

    (a) Earliest completion time and latest allowable time

(b) Latest allowable time and earliest completion time

(c) Earliest completion time and normal expected time

(d) Latest allowable time and normal allowable time

46. In radial cams, the follower moves

(a) In a direction parallel to the cam axis

(b) In a direction perpendicular to the cam axis

(c) In any direction irrespective of cam axis

(d) Along the cam axis

47. Resilience of a material is important, when it is subjected to

(a) Combined loading   (b) Fatigue   (c) Thermal stresses   (d) Shock loading

48. A stud

(a) Has a head on one end and a nut fitted to the other

(b) Has head at one end and other end fits into a tapped hole in the other part to be joined

(c) Has both the ends threaded

(d) Has pointed threads

49. An alien bolt is

(a) Self locking bolt   (b) Same as stud

(c) Provided with hexagonal depression in head (d) Used in high speed components

50. The function of a first compression ring (top ring) is that it

(a) Increases the combustion temperature

(b) Creates swirl

(c) Maintains a seal and prevents the fuel leakage

(d) Maintains a seal and prevents escape of burned gases and loss of pressure in the combustion chamber

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