

Test Booklet
Series

A

Written Test Paper, 2021

Test Booklet No.

Paper No.

10

**FOREMAN
(MECHANICAL)**

Name of Applicant Answer Sheet No.

Application No. : SVSU/2020/Estt/NT/ Signature of Applicant :

Date of Examination: **25 / 12 / 2021**

Signature of the Invigilator(s)

1.

Time of Examination :

2.

Duration : 60 Minutes]

[Maximum Marks : 50

IMPORTANT INSTRUCTIONS

- (i) The question paper is in the form of Test-Booklet containing **50 (Fifty)** questions. All questions are compulsory. Each question carries four answers marked (A), (B), (C) and (D), out of which only one is correct.
- (ii) On receipt of the Test-Booklet (Question Paper), the candidate should immediately check it and ensure that it contains all the pages, i.e., **50** questions. Discrepancy, if any, should be reported by the candidate to the invigilator immediately after receiving the Test-Booklet.
- (iii) A separate Answer-Sheet is provided with the Test-Booklet/Question Paper. On this sheet there are **50** rows containing four circles each. One row pertains to one question.
- (iv) The candidate should write his/her Application number at the places provided on the cover page of the Test-Booklet/Question Paper and on the Answer-Sheet and NOWHERE ELSE.
- (v) No second Test-Booklet/Question Paper and Answer-Sheet will be given to a candidate. The candidates are advised to be careful in handling it and writing the answer on the Answer-Sheet.
- (vi) For every correct answer of the question **One (1) mark will be awarded**. For every unattempted question, Zero (0) mark shall be awarded. **There is no Negative Marking**.
- (vii) Marking shall be done only on the basis of answers responded on the Answer-Sheet.
- (viii) To mark the answer on the Answer-Sheet, candidate should **darken** the appropriate circle in the row of each question with Blue or Black pen.
- (ix) For each question only **one** circle should be **darkened** as a mark of the answer adopted by the candidate. If more than one circle for the question are found darkened or with one black circle any other circle carries any mark, the question will be treated as cancelled.
- (x) The candidates should not remove any paper from the Test-Booklet/Question Paper. Attempting to remove any paper shall be liable to be punished for use of unfair means.
- (xi) Rough work may be done on the blank space provided in the Test-Booklet/Question Paper only.
- (xii) *Mobile phones (even in Switch-off mode) and such other communication/programmable devices are not allowed inside the examination hall.*
- (xiii) No candidate shall be permitted to leave the examination hall before the expiry of the time.

DO NOT OPEN THIS QUESTION BOOKLET UNTIL ASKED TO DO SO.

[P.T.O.

10 / 1

1. Which of the following is the basic law for mechanics?
 - (A) Newton's law of viscosity
 - (B) Parallelogram law
 - (C) Newton's laws of motion
 - (D) Hooke's law
2. Which of the following doesn't affect frictional force?
 - (A) Surface roughness
 - (B) Reaction of surface
 - (C) Area of contact
 - (D) Force tending cause motion
3. Which part of the truss section is made to employ the method of joints in the free body diagram?
 - (A) Combination of joint and the whole structure
 - (B) The whole structure
 - (C) Truss
 - (D) Joints
4. A steel rod 10 mm in diameter and 1 m long is heated from 20 to 100 degree celsius, $E = 200$ GPa and coefficient of thermal expansion is 12×10^{-6} per degree celcius. Calculate the thermal stress developed?
 - (A) 192 MPa (tensile)
 - (B) 212 MPa (tensile)
 - (C) 192 MPa (compressive)
 - (D) 212 MPa (compressive)
5. A material of Young's modulus and Poisson's ratio of unity is subjected to two principal stresses σ_1 and σ_2 at a point in two dimensional stress system. The strain energy per unit volume of the material is _____
 - (A) $(\sigma_1^2 + \sigma_2^2 - 2\sigma_1\sigma_2) / 2E$
 - (B) $(\sigma_1^2 + \sigma_2^2 + 2\sigma_1\sigma_2) / 2E$
 - (C) $(\sigma_1^2 - \sigma_2^2 - 2\sigma_1\sigma_2) / 2E$
 - (D) $(\sigma_1^2 - \sigma_2^2 - 2\sigma_1\sigma_2) / 2E$
6. Number of points of contraflexure for a double over hanging beam.
 - (A) 3
 - (B) 2
 - (C) 4
 - (D) Infinite
7. The two elements of a pair are said to form a higher pair, when they
 - (A) have a surface contact when in motion
 - (B) have a line or point contact when in motion
 - (C) are kept in contact by the action of external forces, when in motion
 - (D) permit relative motion
8. The gears are termed as medium velocity gears, if their peripheral velocity is
 - (A) 1-3 m/s
 - (B) 3-15 m/s
 - (C) 15-30 m/s
 - (D) 30-50 m/s
9. Bevel gears used for connecting intersecting shafts at 90° and having speed ratio 1 : 1 is known as
 - (A) bevel gears
 - (B) beveled gears
 - (C) miter gears
 - (D) None of the mentioned
10. If the outer and inner radius of the contact surfaces are 100 mm and 75 mm respectively and the semi cone angle is 22.5° , find the value of the face width required.
 - (A) 65.33 mm
 - (B) 89.43 mm
 - (C) 23.87 mm
 - (D) 78.94 mm

11. Which is not a possible type of failure in a riveted joint?
- (A) Crushing failure of the plate
 - (B) Shear failure of rivet
 - (C) Tensile failure of the plate between rivets
 - (D) Shear failure of plate
12. What is the number of teeth of worm gear in the following designation "2/20/10/8/150"?
- (A) 10
 - (B) 20
 - (C) 150
 - (D) 2
13. How can be leverage be calculated?
- (A) Load arm / Effort arm
 - (B) Effort / Load
 - (C) Load / Effort
 - (D) Effort arm / Load arm
14. Which of the following is a dominance of power screw?
- (A) Large load carrying capacity
 - (B) High efficiency
 - (C) Wear of screw is reduced
 - (D) Mechanical advantage is lowered
15. How can the term "Lead" be defined ?
- (A) Distance between two adjacent threads measured parallel to axis
 - (B) Largest diameter of a screw thread
 - (C) Smallest diameter of a screw thread
 - (D) Distance travelled by the nut when the nut is given motion measured parallel to axis
16. What will be the Wahl factor, if coil and wire diameters are 60 and 12 mm, respectively?
- (A) 0.998
 - (B) 1.064
 - (C) 0.752
 - (D) 1.310
17. Damping Capacity of a material is its ability to
- (A) Absorb shock
 - (B) Absorb impact
 - (C) withstand creep
 - (D) absorb vibrations
18. In under-damped systems the amplitudes of vibrations with respect to time
- (A) Increases linearly
 - (B) Increases exponentially
 - (C) Decreases linearly
 - (D) Decreases exponentially
19. Whirling speed of a shaft coincides with the natural frequency of the
- (A) Longitudinal vibration
 - (B) Transverse vibration
 - (C) Both (A) and (B)
 - (D) None of the above
20. A vibrating beam has following degrees of freedom
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 0
21. Which of the following is correct regarding one dimensional heat transfer?
- (A) Steady – $f(x, y, t)$, Unsteady – $f(x)$
 - (B) Steady – $f(y, z)$, Unsteady – $f(y)$
 - (C) Steady – $f(x, t)$, Unsteady – $f(x)$
 - (D) Steady – $f(x)$, Unsteady – $f(x, t)$

22. For conduction heat transfer, the heat energy propagation will be minimal for _____
- (A) Copper
(B) Air
(C) Water
(D) Lead
23. Consider the following statements pertaining to heat transfer through fins
- (i) They must be arranged at right angles to the direction of flow of working fluid
- (ii) The temperature along the fin is variable and accordingly heat transfer rate varies along the fin elements
- (iii) Fins are equally effective irrespective whether they are on the hot side or cold side of the fluid
- (iv) Fins are made of materials that have thermal conductivity higher than that of wall
- Identify the correct statements
- (A) (i) and (ii)
(B) (iii) and (iv)
(C) (i) and (iv)
(D) (ii) and (iii)
24. Which of the following is the unit of coefficient of radiant heat transfer?
- (A) W/m^2
(B) W/mK
(C) W/m^2K
(D) W/K
25. A steam condenser is transferring 250 kW of thermal energy at a condensing temperature of 65 degree Celsius. The cooling water enters the condenser at 20 degree Celsius with a flow rate of 7500 kg/hr. If overall heat transfer coefficient for the condenser surface is $1250 W/m^2 K$, what surface area is required to handle this load?
- (A) $7.08 m^2$
(B) $5.08 m^2$
(C) $4.08 m^2$
(D) $1.08 m^2$
26. Which among the following is formula for friction factor of circular pipes?
- (A) $Re/64$
(B) $16/Re$
(C) $64/Re$
(D) $Re/16$
27. If the magnitude of dimension of a rectangular wooden block is length > breadth > height, then for it to float on the water, it should be immersed in what manner?
- (A) It should be immersed vertically such that length is partially immersed
(B) It should be immersed horizontally such that breadth is partially immersed
(C) It should be immersed such that height is partially immersed
(D) None of the mentioned
28. The pressure at any given point of a non-moving fluid is called the _____
- (A) Gauge Pressure
(B) Atmospheric Pressure
(C) Differential Pressure
(D) Hydrostatic Pressure

29. Which among the following is not a criteria to achieve similitude?
- Geometric similarity
 - Kinematic similarity
 - Dynamic similarity
 - Conditional similarity
30. The Reynolds number for a flow in a channel is 1000. What type of flow is it?
- Laminar
 - Turbulent
 - Transition
 - Steady
31. Which law of thermodynamics says that efficiency of a heat engine cannot be 1?
- First
 - Zeroth
 - Second
 - Third
32. Which of the following exists in a p-V diagram for water?
- Saturated solid line
 - Saturated liquid lines
 - Saturated vapour line
 - All of the mentioned
33. For an adiabatic compressor or pump,
- the enthalpy of fluid remains constant with the amount of work input
 - the enthalpy of fluid decreases by the amount of work input
 - the enthalpy of fluid increases by the amount of work input
 - None of the mentioned
34. The equation $dU = C_v \cdot dT$ holds good for
- any process for an ideal gas, even when the volume changes
 - for other substances it is true only when the volume is constant
 - both of the mentioned
 - none of the mentioned
35. Dry ice is suitable for _____ temperature refrigeration.
- high
 - low
 - all range of
 - none of the mentioned
36. The thermal efficiency of diesel engines is about _____
- 65%
 - 50%
 - 80%
 - 70%
37. In which of following turbine whirl component is zero?
- Reaction turbine
 - Inward radial flow reaction turbine
 - Axial flow turbine
 - Impulse turbine
38. Why casing is used in turbine?
- Forms the outside wall of the main flow duct to remain concentric
 - Forms the inside wall of the main flow duct to remain concentric
 - Forms the outside wall of the main flow duct to not remain concentric
 - None of the mentioned
39. Path in liquid in which layers do not meet each other is _____
- laminar flow
 - tubular flow
 - viscosity
 - straight path
40. What do vertical and uniformly spaced lines indicate on the psychrometric chart?
- DPT
 - WBT
 - DBT
 - Humidity

41. An alloy 30 wt % Ni-70 wt % Cu at 1315°C (2400°F) will lie in which state?
 (A) Solid state
 (B) Liquid state
 (C) Mixture of solid and liquid state
 (D) α state
42. Which method is used for locking planks and bars?
 (A) Mortising
 (B) Building-up
 (C) Soldering
 (D) Brazing
43. Which of the following is a perfect composition of clay (Bentonite) used in moulding sand?
 (A) Al_2O_3
 (B) $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$
 (C) $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$
 (D) $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$
44. In how many groups, cutting tools can be divided?
 (A) 2
 (B) 3
 (C) 4
 (D) None of the mentioned
45. In a single point turning operation with a cemented carbide and steel combination having a Taylor exponent of 0.25, if the cutting speed is halved, then the tool life will become
 (A) Half
 (B) Two times
 (C) Eight times
 (D) Sixteen times
46. Arrange the steps of QA in ascending order?
 (A) Customer needs, material control, design development, process control, marketing
 (B) Material control, process control, customer need, design development, finished product
 (C) Customer needs, design development, material control, process control, finished product
 (D) Material control, servicing, process control, material control, design development
47. The process in which the detailed specifications materials, dimensions, tolerances and surface rough is made is known as
 (A) decision process
 (B) analysis process
 (C) implementation process
 (D) refinement process
48. The time period between placing an order and its receipt in stock is known as
 (A) Lead time
 (B) Carrying time
 (C) Shortage time
 (D) Setup time
49. All the parameters in the linear programming model are assumed to be _____
 (A) Variables
 (B) Constraints
 (C) Functions
 (D) None of the above
50. The operational definition of goals is called _____
 (A) Goals
 (B) Objectives
 (C) Plans
 (D) Action Plans

ROUGH WORK

ANSWER KEY Foreman (Mechanical)

1. B	26. C
2. C	27. B
3. D	28. D
4. C	29. D
5. A	30. A
6. B	31. C
7. B	32. D
8. B	33. C
9. C	34. C
10. A	35. B
11. D	36. D
12. B	37. B
13. D	38. A
14. A	39. A
15. D	40. C
16. D	41. B
17. D	42. A
18. D	43. D
19. B	44. A
20. B	45. D
21. D	46. C
22. B	47. C
23. A	48. A
24. C	49. B
25. A	50. B