

TATA STEEL JET EXAMINATION MECHANICAL SAMPLE PAPER (Sample 50 questions)

A. DOMAIN

- The bending moment along the length of a Cantilever beam with uniformly distributed load
(A) varies non-linearly (B) varies exponentially
(C) does not vary (D) varies linearly
- The function of which of the following fitting in a boiler is to prevent the pressure exceeding the fixed maximum limit
(A) Feed check valve (B) blow off COCK (C) fusible plug (D) safety valve
- The maximum deflection of a simply supported beam of length h , with a concentrated load W is proportional to $\{I = \text{moment of inertia}\}$
(A) $\frac{Wh^3}{EI}$ (B) $\frac{WI}{Eh^3}$ (C) $\frac{Eh^3}{WI}$ (D) $\frac{EI}{Wh^3}$
- The air removal from the surface condenser leads to
(A) fall in absolute pressure maintained in condenser
(B) rise in absolute pressure maintained in condenser
(C) no change in absolute pressure in the condenser
(D) rise in the temperature of condenser steam
- Mean effective pressure of a steam engine
(A) is improved if condenser is fitted to it...
(B) remains same with or without condenser
(C) is decreased with condenser fitted
(D) may increase or decrease as condenser does not have any influence
- In steam engine
(A) connecting rod is connected to cross-head by gudgeon pin
(B) connecting rod is connected to piston by gudgeon pin
(C) connecting rod is connected to crank shaft by gudgeon pin
(D) piston rod is connected to cross-head by gudgeon pin
- Which of the following abrasives is generally used for manufacturing grinding wheels ?
(A) Emery (B) Sandstone (C) Corundum (D) None of these
- A heat engine is supplied with 800 KJ/sec of heat at 600°K and heat rejection takes place at 300°K. Which of the following results reports a reversible cycle ?
(A) 200 KJ/sec are rejected (B) 400 KJ/sec are rejected
(C) 100 KJ/sec are rejected (D) 500 KJ/sec are rejected
- Change of entropy for isothermal process carried on a gas whose specific volume changes from V_1 to V_2 and pressure changes from P_1 to p_2 is given by

- (A) $\Delta s = -R \log_e \frac{V_2}{V_1}$ (B) $\Delta s = R \log_e \frac{p_2}{P_1}$
 (C) $\Delta s = -R \log_e \frac{P_2}{P_1}$ (D) $\Delta s = -R \log_e \frac{V_2}{V_1} + R \log_e \frac{P_2}{P_1}$

10. The equation $Tds = du + pdv$ can be applied to process which are

- (A) only reversible (B) only irreversible
 (C) reversible or irreversible (D) None of these

11. The specific internal energy, enthalpy and entropy of an ideal gas are each function of

- (A) temperature alone (B) pressure alone (C) volume alone (D) None of these

12. Power metallurgy helps to

- (A) combine materials that cannot be alloyed in the usual sense
 (B) produce products of extreme purity
 (C) produce metals of very high melting temperature
 (D) All of these

13. Carnot cycle comprises of ?

- (A) two isothermal processes and two isentropic processes
 (B) two constant volume processes and two isentropic processes
 (C) one constant volume, one constant pressure and two isentropic processes
 (D) two constant pressure and two isentropic processes

14. A Carnot cycle operates between 1000°K and 500°K . The Carnot efficiency will be 50% if working substance is

- (A) Only Air (B) Only Nitrogen
 (C) Only ammonia (D) Any substance

15. Many powder metal parts can be

- (A) machined (B) Placed (C) heat treated (D) any substance

16. During a cyclic process, the heat transfers are +120 KJ, -16 KJ, 48 KJ, and +12 KJ. The net work for the cycle is

- (A) 60,000 N.M (B) 68,000 N.M (C) 120,000 N.M (D) 44,000 N.M.

17. Internal energy of an ideal gas is a function of

- (A) temperature and volume (B) pressure and Volume
 (C) pressure and temperature (D) temperature alone

18. A closed system goes from state 1 to state 2 in a process for which $\theta = 0$ and $W = 100$ KJ. Then the system is returned to state 1 in a second process for which $w = -80$ KJ.

The heat transfer of the second process will be

- (A) 20 KJ (B) Zero (C) -20 KJ (D) None of these

19. It is impossible to construct an engine which while operating in a cycle produces no other effect to extract heat from a single reservoir and do equivalent amount of work

- (A) Clausius statement (B) Kelvin – Planck Statement

(C) Carnot theorem (D) none of these

20. Automation is a term used to denote the continuous automation production of a product by using mechanical equipment. Automation can be adopted for the Operations such as

(A) Inspecting (B) Assembling (C) Packing (D) All of these

21. First law of thermodynamics establishes that (when expressed in same units) during a cycle

- (A) heat transfer is equal to work transfer
- (B) work transfer is only a fraction of heat transfer
- (C) heat transfer is only a fraction of work transfer
- (D) there is no relationship between work transfer and heat transfer

22. De Laval nozzle used in a steam turbine has a convergent passage followed by a diverging passage, is used for full expansion of the working fluid. The velocities at the throat and in the divergent are

- (A) sonic and sonic respectively
- (B) sonic and sub-sonic respectively
- (C) sonic and supersonic respectively
- (D) subsonic and supersonic respectively

23. Throttling of Steam is a/an

- (A) reversible, adiabatic process with no change of entropy
- (B) irreversible, adiabatic process with no change of enthalpy
- (C) irreversible, adiabatic process with increase in enthalpy
- (D) irreversible, adiabatic process with decrease in enthalpy

24. A square surface 3m x 3m lies in a vertical plane. When the upper edge of the surface is at the water surface level the Centre of pressure is located at a height of

(A) 20 m (B) 3.5 m (C) 1.8 m (D) 4.2 m

25. The critical temperature and pressure of water are

- (A) 221 bar ; 100°C (B) 374 bar ; 221°C
- (C) 1 bar ; 374°C (D) 221 bar ; 374 °C

B. GENERAL APTITUDE

26. If 42 persons consume 144 kg of rice in 45 days; then in how many days will 30 persons consume 48 kg of rice?

(A) 6 days. (B) 7 days. (C) 8 days (D) 12 days:

27. The area of a circle is 24.64 m^2 . The circumference of the circle is:

(A) 14.64 m (B) 16.36m (C) 17.60.m (D) 18.40 m

28. A certain number of tennis balls were purchased for Rs: 450: Five more balls could have been purchased in the same amount if each ball was cheaper by Rs. 45. The number of balls purchased were:

(A) 10 (B) 15 (C) 20 (D) 25

29. Which National Highway connects Delhi and Mumbai? -

(A) NH6 (B) NH 8 (C) NH10 (D) NH 12,

30. A two-digit number is 7 times the sum of its digits. The number formed by reversing its digits is 18 less than the original number. What is the number?

(A) 42 (B) 52 (C) 62 (D) 72

C. ENGLISH

31. It was _____ hot that day and the cable suffered the brunt of the heat, AW

(A) treacherously (B) acceptably. (C) unfailingly (D) unbelievably -

32. _____ my knowledge, Mr. Akash has a 'prejudice _____ foreigners.

(A) in..... for (B) as..... towards. (C) for at (D) to..... against

Direction for questions 33-34:

In the following questions, you will find sentences part of which is bold.

Compare the bold part of each sentence with the expressions (A), (B) and (C) given below: Choose the expression which is an improvement upon the bold part. If none of the three expressions improve the sentence, then your answer is (D).

Questions:

33. It is high time she. **changes** her job.

(A) must change (C) had changed
(B) changed (D) No improvement

34. I am surprised that **he dares speak** in such a tone to his father.

(C) he dares to speak (C) he dare to speak
(D) he dare speak (D) No improvement

35. Choose the word which is **nearest in** meaning to the 'bold typed word. He could rise to this stature because of **his invincible** 'courage.

(A) inviolable (B) unmanageable
(C) unbeatable (D) immeasurable

D. CURRENT INDUSTRY TRENDS

36. What is the full-form of AI in field of technology?

- A. Artificial Information
- B. Artificial Intelligence
- C. Additional Intelligence
- D. Augmented Intelligence

37. TPM concept was first initiated by

- A. Suzuki
- B. Nippon Densco
- C. TOYOTA
- D. Ford Automobiles

38. Full form of TOC is

- A. Theory of Constraints
- B. Tata Overseas Company
- C. Theory of Change
- D. Theory of Commitment

39. The purpose of CPR in Industry Safety is to:

- (A) Maintain oxygenated blood circulation
- (B) Stabilize body temperature to avoid hypothermia
- (C) Build upper body strength
- (D) Dislodge blood clots within the victim's lungs

40. A confined space is deemed ready for employee entry when:

- (A) A company safety inspector has certified it
- (B) The unit operations foreman declares it ready
- (C) An engineer has completed the necessary calculations
- (D) Your supervisor assigns you to the job

E. INDUSTRIAL ORIENTED LEARNING

41. Tapered seating bearing with adapter sleeve can be removed from shaft by

- (A) using a puller
- (B) Hydraulic oil injection
- (C) using hydraulic nut
- (D) All of above

42. For mounting a large bearing on to shaft, after heating, it should be lifted with

- (A) taking round a nylon rope or nylon belt
- (B) by inserting a wire between races
- (C) Either (a) or (b)
- (D) None of these

43. During mounting and dismounting of bearing, we should check

- (A) Shaft run-out
- (B) Bearing clearance
- (C) Interference/clearance between bearing outer surface and bearing housing
- (D) all of these

44. Early fatigue failure of a bearing may be due to
(A) Excessive loads (B) Tight fits (C) improper preloading (D) All of these
45. This bearing is best suited for oscillating load
(A) Deep groove ball bearing (B) Taper roller bearing (C) Spherical roller bearing (D) Needle roller bearing
46. Needle roller bearing can
(A) Requires less radial space (B) Cannot take axial thrust
(C) Can be used as floating end bearing (D) All of these
47. Needle roller bearing finds application in
(A) Gudgeon pin bearing of IC engines (B) Cross bearings of universal spindles
(C) Front axle of scooters (D) All of these
48. In face to face arrangement of two taper roller bearings
(A) If shaft becomes hotter in operation, preload given during mounting increases.
(B) Same co-efficient of thermal expansion for bearing & associated component causes radial & axial thermal expansions to cancel each other, so preload does not change.
(C) Distance between pressure point of two bearings more
(D) (a) and (c)
49. Deep groove ball bearings can be found in
(A) Small and medium size motors (B) electric fans
(C) Light loads machine tools (D) All of these
50. This bearing is used as back to back or face to face arrangements
(A) Deep groove ball bearing (B) Taper roller bearing
(C) Angular contact bearing (D) Both (b) and (c)