BunkPoint MOCK TEST

NCRTC Supervisor (Mechanical) 2026 Mock Test 1

Total Questions: **60** | Sections: **12**

Section overview Tap a section to jump to it

Section	Questions	Count
Engineering Mechanics	1–5	5
Strength of Materials	6–10	5
Theory of Machines	11–15	5
Machine Design	16–20	5
Thermodynamics	21–25	5
Fluid Mechanics	26–30	5
Hydraulic Machines	31–35	5
Refrigeration and Air Conditioning	36–40	5
Manufacturing Technology	41–45	5
Workshop Technology	46–50	5
Industrial Engineering	51–55	5
Material Science	56–60	5

Engineering Mechanics

Q.1–5 | 5 questions

Q.1 A beam is supported by a hinged (pin) support at one end and a roller support at the other end. The numbers of independent reaction components at the hinge and the roller, respectively, are

(A) One and one **(B)** Two and one **(C)** Two and two **(D)** Three and one

Q.2 A load of 100 N hangs from the junction of two light cables. One cable is horizontal and the other is inclined at 30° to the horizontal. The tension in the inclined cable is

(A) 100 N **(B)** 200 N **(C)** 173.2 N **(D)** 115.5 N

Q.3 A triangular plate has a base of 120 mm and a height of 90 mm. The distance of its centroid from the apex, measured along the height, is

(A) 60 mm **(B)** 30 mm **(C)** 45 mm **(D)** 40 mm

Q.4 A car starts from rest and accelerates uniformly at 2 $\mathrm{m/s^2}$ for 10 s. It then moves at the speed reached for a further 5 s. The total distance covered is

(A) 100 m **(B)** 200 m **(C)** 300 m **(D)** 150 m

Q.5 A block weighing 200 N rests on a rough plane inclined at 30°. The coefficient of friction is 0.2. The force, applied parallel to the plane, needed to just push the block up the plane is nearly

(A) 100.0 N **(B)** 134.6 N **(C)** 65.4 N **(D)** 34.6 N

Strength of Materials

Q.6–10 | 5 questions

Q.6 A solid circular shaft of diameter 40 mm has a permissible shear stress of 40 $\mathrm{N/mm^2}$. The maximum torque it can transmit is nearly

(A) 502.7 N m **(B)** 251.3 N m **(C)** 1005.3 N m **(D)** 125.7 N m

Q.7 A steel bar ($E = 200$ GPa) and a copper bar ($E = 100$ GPa) of equal length and equal cross-sectional area are rigidly joined at both ends and loaded axially. The ratio of stress in steel to stress in copper is

(A) 1 : 2 **(B)** 1 : 1 **(C)** 4 : 1 **(D)** 2 : 1

Q.8 In a tensile test, which of the following materials does not show a definite yield point, so that the 0.2% proof stress is used instead?

(A) Mild steel **(B)** Low carbon steel

(C) Aluminium alloy **(D)** Wrought iron

Q.9 The slenderness ratio of a column is defined as the ratio of

(A) effective length to least radius of gyration

(B) least radius of gyration to the effective length

(C) effective length to least moment of inertia

(D) actual length to the cross-sectional area

Q.10 A thin cylindrical shell of internal diameter d and wall thickness t is subjected to internal pressure p. The longitudinal stress in the wall is

(A) $\frac{pd}{4t}$ **(B)** $\frac{pd}{2t}$ **(C)** $\frac{pd}{8t}$ **(D)** $\frac{pd}{t}$

Theory of Machines

Q.11–15 | 5 questions

Q.11 The module of a gear is the ratio of

(A) number of teeth to the pitch circle diameter

(B) pitch circle diameter to number of teeth

(C) pitch circle diameter to circular pitch

(D) addendum to the pitch circle diameter

Q.12 A planar mechanism has 6 links connected by 7 revolute pairs and no higher pairs. Using Grubler's criterion, its degrees of freedom are

(A) 0 **(B)** 2 **(C)** 1 **(D)** 3

Q.13 In an epicyclic gear train, the sun gear has 20 teeth and the internal annulus gear has 80 teeth, with planets meshing with both. The sun gear is fixed and the arm rotates at 100 rpm. The speed of the annulus gear is

(A) 75 rpm **(B)** 400 rpm **(C)** 25 rpm **(D)** 125 rpm

Q.14 Which of the following governors is of the gravity-controlled type and carries a central load on the sleeve?

(A) Watt governor **(B)** Porter governor

(C) Hartnell governor **(D)** Wilson-Hartnell governor

Q.15 In a Grashof four-bar chain, fixing the shortest link produces which mechanism?

(A) Crank-rocker mechanism **(B)** Double-rocker mechanism

(C) Oscillating slider mechanism **(D)** Double-crank mechanism

Machine Design

Q.16–20 | 5 questions

Q.16 A power screw is self-locking when

(A) the helix angle exceeds the friction angle

(B) the efficiency of the screw exceeds 50 percent

(C) the lead of the thread exceeds its pitch

(D) the friction angle exceeds the helix angle

Q.17 Which key transmits torque purely by friction and does not need a keyway in the shaft?

(A) Hollow saddle key **(B)** Woodruff key

(C) Feather key **(D)** Kennedy key

Q.18 A single-riveted lap joint has pitch 50 mm, plate thickness 10 mm and rivet diameter 20 mm with one rivet per pitch. Permissible stresses are tension 100 N/mm^2, shear 60 N/mm^2 and crushing 150 N/mm^2. The efficiency of the joint is nearly

(A) 60.0% **(B)** 75.4% **(C)** 40.0% **(D)** 37.7%

Q.19 The included thread angle of a standard Acme thread is

(A) 30° **(B)** 55° **(C)** 60° **(D)** 29°

Q.20 The theoretical stress concentration factor K_t is defined as the ratio of

(A) maximum stress at the discontinuity to the nominal stress

(B) nominal stress to the maximum stress at the discontinuity

(C) endurance limit to the maximum stress at the discontinuity

(D) yield stress to the nominal stress at the section

Thermodynamics

Q.21–25 | 5 questions

Q.21 A refrigerator working between two fixed temperature limits has a COP of 3.5. If the same machine is run as a heat pump between the same limits, its COP will be

(A) 2.5 **(B)** 3.5 **(C)** 4.5 **(D)** 5.5

Q.22 An ideal Brayton cycle operates with a pressure ratio of 8 using air ($\gamma = 1.4$). Its thermal efficiency is nearly

(A) 44.8% **(B)** 55.2% **(C)** 87.5% **(D)** 77.3%

Q.23 Which of the following is a path function?

(A) Internal energy **(B)** Enthalpy

(C) Entropy **(D)** Heat transfer

Q.24 An ideal Otto cycle has a compression ratio of 8 and $\gamma = 1.4$. The air-standard efficiency is nearly

(A) 43.5% **(B)** 87.5% **(C)** 56.5% **(D)** 94.6%

Q.25 Which one of the following is the Clausius statement of the second law of thermodynamics?

(A) No cyclic engine can convert all heat received from a single reservoir into work

(B) Heat cannot flow from a colder body to a hotter body unless external work is done

(C) Heat can flow from a hotter body to a colder body only with the help of external work

(D) The entropy of an isolated system can never increase during any spontaneous process

Fluid Mechanics

Q.26–30 | 5 questions

Q.26 If the differential head across a venturimeter is increased to four times its original value, with the coefficient of discharge unchanged, the discharge becomes

(A) four times **(B)** eight times **(C)** two times **(D)** sixteen times

Q.27 A vertical rectangular gate 2 m wide and 3 m high has its top edge at the free water surface. The hydrostatic force on one side of the gate is nearly

(A) 176.6 kN **(B)** 88.3 kN **(C)** 58.9 kN **(D)** 29.4 kN

Q.28 Fully developed laminar flow occurs in a circular pipe at a Reynolds number of 1500. The Darcy friction factor is nearly

(A) 0.0107 **(B)** 0.0427 **(C)** 0.0508 **(D)** 0.0640

Q.29 The head over a rectangular notch is doubled. The discharge through the notch increases by a factor of nearly

(A) 2.00 **(B)** 4.00 **(C)** 1.41 **(D)** 2.83

Q.30 A Pitot tube in a water stream records a difference of 0.2 m of water between stagnation and static heads. The velocity of the stream is nearly

(A) 3.92 m/s **(B)** 1.40 m/s **(C)** 1.98 m/s **(D)** 0.99 m/s

Hydraulic Machines

Q.31–35 | 5 questions

Q.31 Which measure helps to prevent cavitation in a centrifugal pump?

(A) Increasing the suction lift by raising the pump above the water level

(B) Reducing the suction lift by placing the pump closer to the water level

(C) Increasing the water temperature to lower its viscosity

(D) Running the pump at a higher speed to raise the suction velocity

Q.32 A reciprocating pump has a theoretical discharge of 0.050 m^3/s and an actual discharge of 0.047 m^3/s. The percentage slip is

(A) 6.0% **(B)** 6.4% **(C)** 94.0% **(D)** 3.0%

Q.33 In a hydraulic turbine, the power supplied by water at the inlet is 1000 kW, the power developed by the runner is 900 kW and the shaft power is 855 kW. The hydraulic efficiency is

(A) 85.5% **(B)** 95.0% **(C)** 81.0% **(D)** 90.0%

Q.34 In a fluid coupling, ignoring friction losses, the output torque compared with the input torque is

(A) greater than the input torque due to stator reaction

(B) less than the input torque by the slip ratio

(C) equal to the input torque

(D) twice the input torque at stall condition

Q.35 Two identical centrifugal pumps are connected in series. For any given discharge, the combined performance is that

(A) the discharges add up while the head of each pump stays the same

(B) both the heads and the discharges of the two pumps add up together

(C) neither the head nor the discharge changes, while efficiency improves slightly

(D) the heads add up while the same discharge passes through each pump

Refrigeration and Air Conditioning

Q.36–40 | 5 questions

Q.36 Moist air is heated in a heating coil without any addition of moisture. Which property of the air decreases?

(A) Specific humidity **(B)** Dew point temperature

(C) Relative humidity **(D)** Dry-bulb temperature

Q.37 A reversed Carnot refrigerator works between −13°C and 27°C. Its COP is

(A) 6.5 **(B)** 7.5 **(C)** 0.87 **(D)** 0.15

Q.38 In a vapour absorption refrigeration system using ammonia and water, the function of the generator is

(A) to absorb the ammonia vapour from the evaporator in weak solution

(B) to condense the ammonia vapour using the cooling water supply

(C) to heat the strong solution and drive off the ammonia vapour

(D) to reduce the pressure of the liquid ammonia before the evaporator

Q.39 In a dry expansion evaporator, the refrigerant leaving the evaporator is generally

(A) saturated liquid **(B)** a wet mixture of liquid and vapour

(C) superheated vapour **(D)** subcooled liquid

Q.40 Which of the following refrigerant expansion devices has no moving parts?

(A) Thermostatic expansion valve **(B)** Automatic expansion valve

(C) Float valve **(D)** Capillary tube

Manufacturing Technology

Q.41–45 | 5 questions

Q.41 In powder metallurgy, the sintering operation consists of

(A) melting the metal powder and pouring it into a die cavity

(B) pressing the blended powder in a die at room temperature

(C) mixing the metal powders with a lubricant before compaction

(D) heating the compact below the melting point to bond the particles

Q.42 According to Taylor's tool life equation $VT^n = C$ with $n = 0.25$, if the cutting speed is doubled, the original tool life T becomes

(A) $T/16$ **(B)** $T/8$ **(C)** $T/4$ **(D)** $T/32$

Q.43 Upset forging is the operation of

(A) reducing the cross-section of a bar while increasing its length

(B) bending a bar to a required angle over an anvil at red heat

(C) punching holes in a hot billet with a punch and backing die

(D) increasing the cross-section of a bar by reducing its length

Q.44 In a blanking operation, the required die clearance is provided by

(A) reducing the die opening below the blank size

(B) enlarging the punch beyond the die opening

(C) reducing the punch size below the die opening

(D) enlarging the die opening beyond the blank size

Q.45 Which of the following materials cannot be machined directly by electrical discharge machining (EDM)?

(A) Tungsten carbide **(B)** Soda-lime glass

(C) Hardened die steel **(D)** Titanium alloy

Workshop Technology

Q.46–50 | 5 questions

Q.46 A vernier caliper has 50 vernier scale divisions that coincide with 49 divisions of the main scale, and one main scale division is 1 mm. The least count of the instrument is

(A) 0.10 mm **(B)** 0.05 mm **(C)** 0.02 mm **(D)** 0.01 mm

Q.47 What is the main difference between a jig and a fixture?

(A) A jig guides the cutting tool, whereas a fixture only locates and holds the workpiece

(B) A fixture guides the cutting tool, whereas a jig only locates and holds the workpiece

(C) A jig is used on lathes, whereas a fixture is used on milling machines

(D) A jig is bolted to the machine table, whereas a fixture is held in the operator's hand

Q.48 As per the standard convention for CNC machine axes, the Z-axis is defined along

(A) the direction of the longest table travel

(B) the axis of the main spindle of the machine tool

(C) the vertical direction irrespective of machine type

(D) the direction perpendicular to the table T-slots

Q.49 A gear blank is to be cut with 30 teeth on a milling machine using simple indexing with a 40 : 1 worm gear ratio. The correct index crank movement is

(A) one full turn plus 10 holes on a 21-hole circle

(B) two full turns plus 7 holes on a 21-hole circle

(C) one full turn plus 7 holes on a 21-hole circle

(D) one full turn plus 7 holes on a 15-hole circle

Q.50 A micrometer shows a zero error of +0.02 mm when its jaws are closed. When used on a job, the observed reading is 12.46 mm. The correct dimension of the job is

(A) 12.44 mm **(B)** 12.48 mm **(C)** 12.46 mm **(D)** 12.42 mm

Industrial Engineering

Q.51–55 | 5 questions

Q.51 In a project network, an activity has an earliest start time of 5 days, a duration of 4 days and a latest finish time of 14 days. The slack of this activity is

(A) 5 days **(B)** 9 days **(C)** 4 days **(D)** 1 day

Q.52 Demand for a product over the last four months was 120, 130, 110 and 140 units. The forecast for the next month by the three-month simple moving average method is nearly

(A) 125.0 units **(B)** 126.7 units **(C)** 120.0 units **(D)** 130.0 units

Q.53 In ABC analysis of inventory, class A items are best described as

(A) a small number of items accounting for a large share of annual usage value

(B) a large number of items accounting for a large share of annual usage value

(C) a small number of items accounting for a small share of annual usage value

(D) a large number of items accounting for a small share of annual usage value

Q.54 On a Shewhart $\bar{X}$ control chart, the upper and lower control limits are normally placed at

(A) one standard deviation of individual values on either side of the centre line

(B) three standard errors of the sample mean on either side of the centre line

(C) two standard deviations of individual values on either side of the centre line

(D) six standard errors of the sample mean on either side of the centre line

Q.55 The annual demand of an item is 2400 units, the ordering cost is Rs. 200 per order and the holding cost is Rs. 6 per unit per year. The economic order quantity is

(A) 283 units **(B)** 400 units **(C)** 800 units **(D)** 566 units

Material Science

Q.56–60 | 5 questions

Q.56 Which alloying element forms the thin self-healing passive oxide layer that gives stainless steel its corrosion resistance?

(A) Nickel **(B)** Manganese **(C)** Chromium **(D)** Vanadium

Q.57 The Brinell hardness test uses an indenter in the form of

(A) a diamond cone with a 120° apex angle

(B) a square-based diamond pyramid of 136 degrees

(C) a small steel needle under a fixed spring load

(D) a hardened steel or tungsten carbide ball

Q.58 Which of the following is a thermoplastic material?

(A) Polyethylene **(B)** Bakelite

(C) Epoxy resin **(D)** Melamine formaldehyde

Q.59 Brass is an alloy of

(A) copper and tin **(B)** copper and lead

(C) copper and zinc **(D)** copper and nickel

Q.60 A dislocation in a crystal is classified as a

(A) point defect **(B)** surface defect **(C)** volume defect **(D)** line defect

Get the Answers with Explanations

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