# WBMSC
# SAE

## Previous Year Paper
## (Mechanical)
## 09 Nov, 2025

**WEST BENGAL MUNICIPAL SERVICE COMMISSION**
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**WBMSC/web/30 /Direct** **Dated the Kolkata 14th November, 2025**

# NOTIFICATION

**DISPLAY OF PROVISIONAL ANSWER KEYS TO THE QUESTIONS FOR WRITTEN EXAMINATION FOR RECRUITMENT TO THE POST OF SUB-ASSISTANT ENGINEER (MECHANICAL) (ADVT. NO. 08 OF 2025) UNDER KMC HELD ON 09/11/2025 (SUNDAY). [QUESTION BOOKLET CODE: SMKM (Annexed herewith)]**

The provisional Answer Keys to the Questions for written examination for recruitment to the post of Sub-Assistant Engineer (Mechanical) under Kolkata Municipal Corporation (Advt. No. 08 of 2025) are hereby published for information to the candidates.

The candidates are requested to visit the website and upload their claims and objections, if any, on the Answer Key-options uploaded as follows, in their opinions. The candidates are required to submit the correct answers, if at variance with the provisional Answer Keys as follows in their opinions, indicating Test / Question Booklet code, Question Booklet number, Roll No. etc., specific for each particular candidate, along with scanned copies of the front page of Question Booklet and the concerned page(s) of the Question Booklet between 17th November, 2025 and 23rd November, 2025 by accessing the link provided at www.mscwb.org. No claims for correction of Answer Key will be entertained beyond the specified period as mentioned above.

The claims and objections will not be entertained through any other medium.

**Answer Keys to Booklet Code - SMKM**

| Q. No. | Answer Option | Q. No. | Answer Option | Q. No. | Answer Option | Q. No. | Answer Option |
|---|---|---|---|---|---|---|---|
| 1 | A | 26 | A | 51 | B | 76 | B |
| 2 | C | 27 | B | 52 | D | 77 | D |
| 3 | A | 28 | B | 53 | B | 78 | C |
| 4 | B | 29 | A | 54 | D | 79 | B |
| 5 | B | 30 | D | 55 | A | 80 | C |
| 6 | C | 31 | B | 56 | C | 81 | B |
| 7 | C | 32 | C | 57 | A | 82 | B |
| 8 | C | 33 | A | 58 | D | 83 | A |
| 9 | D | 34 | C | 59 | B | 84 | D |
| 10 | C | 35 | B | 60 | B | 85 | D |
| 11 | B | 36 | C | 61 | D | 86 | B |
| 12 | A | 37 | A | 62 | C | 87 | A |
| 13 | D | 38 | B | 63 | A | 88 | D |
| 14 | D | 39 | A | 64 | C | 89 | A |
| 15 | C | 40 | A | 65 | D | 90 | A |
| 16 | D | 41 | C | 66 | A | 91 | B |
| 17 | A | 42 | A | 67 | C | 92 | D |
| 18 | B | 43 | A | 68 | B | 93 | A |
| 19 | D | 44 | D | 69 | B | 94 | C |
| 20 | C | 45 | A | 70 | B | 95 | A |
| 21 | C | 46 | B | 71 | C | 96 | B |
| 22 | B | 47 | C | 72 | C | 97 | C |
| 23 | D | 48 | A | 73 | D | 98 | B |
| 24 | B | 49 | C | 74 | A | 99 | B |
| 25 | D | 50 | B | 75 | B | 100 | B |

Annexure: As mentioned.

WEST BENGAL MUNICIPAL SERVICE COMMISSION

Deputy Secretary, WBMSC
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**1.** At critical point temperature and pressure, latent heat of vaporization of water will be

(A) zero
(B) 80 kcal/kg
(C) 540 kcal/kg
(D) 2260 kJ/kg

**2.** Electrostatic Precipitator removes fine particles from a flowing gas using

(A) static filtration process.
(B) the force of an impulse water jet.
(C) the force of an induced electrostatic charge.
(D) clariflocculation process.

**3.** In Engineering Drawing the term 'Representative fraction' is defined as

(A) length of the object on a drawing : actual length of the object.
(B) actual length of the object : length of the object on drawing.
(C) isometric length of the object : length of the object on drawing.
(D) length of the object on a drawing : isometric length of the object.

**4.** In a psychrometric process, the sensible heat added is 30 kJ/s and the latent heat added is 20 kJ/s. Then sensible factor for the process will be

(A) 0·3
(B) 0·6
(C) 0·67
(D) 1·5

**5.** Which of the following are the desired comfort conditions in an air-conditioning system?

(A) 20°C DBT and 90% RH
(B) 25°C DBT and 50% RH
(C) 15°C DBT and 75% RH
(D) 15°C DBT and 30% RH

**6.** When DBT=WBT=DPT, then the air is said to be

(A) unsaturated and has a relative humidity of 75%.
(B) unsaturated and has a relative humidity of 50%.
(C) saturated and has a relative humidity of 100%.
(D) saturated and has a relative humidity of 0%.

**7.** Flat pivot bearing is also known as

(A) Conical bearing.
(B) Collar bearing.
(C) Foot step bearing.
(D) Truncated bearing.

**8.** Rope brake dynamometer is a/an _____ type dynamometer.

(A) transmission
(B) distribution
(C) absorption
(D) eddy current

**9.** Which mechanism produces intermittent rotary motion from continuous rotary motion?

(A) Whitworth mechanism
(B) Scotch mechanism
(C) Elliptical trammel
(D) Geneva mechanism

**10.** Which one of the following is an example of lower pair?

(A) Cam and follower
(B) Bearings
(C) Nut and screw
(D) Belt and rope drive

**11.** At the maximum and minimum radius of balls, a Porter governor has equilibrium speeds of 165 rpm and 135 rpm. This corresponds to a governor sensitivity of about

(A) 0·12
(B) 0·20
(C) 0·33
(D) 0·45

**12.** A square threaded screw having friction angle 60° will have maximum efficiency when the screw helix angle is

(A) 15°
(B) 30°
(C) 45°
(D) 60°

**13.** What is the condition for dynamic balancing of rotating masses?

(A) Force polygon is closed.
(B) Couple polygon is closed.
(C) Neither force nor couple polygon is closed.
(D) Both force and couple polygons are closed.

**14.** In a governor, if the equilibrium speed is constant for all radii of rotation of balls, the governor is said to be

(A) stable
(B) unstable
(C) inertial
(D) isochronous

**15.** Which of the following sets of gear train is used in the down feed mechanism of pillar drilling machine?

(A) Worm and worm wheel
(B) Bevel gear pairs
(C) Rack and pinion
(D) Herringbone gears

**16.** In a shaping machine, the length of stroke is 250 mm, number of double strokes per minute is 30 and quick return ratio is 0·6, then cutting speed is

(A) 5 m/min
(B) 7·5 m/min
(C) 10 m/min
(D) 12 m/min

**17.** An end mill having 4 teeth is rotating at 250 rpm. If the feed per tooth is given as 0·1 mm, what is the table feed in mm/min?

(A) 120
(B) 100
(C) 60
(D) 10

**18.** Which of the following material is not made by injection moulding?

(A) Nuts
(B) Tubes
(C) Car handles
(D) Electrical fittings

**19.** Which is the softest material among the following?

(A) Calcite
(B) Feldspar
(C) Quartz
(D) Gypsum

**20.** The S-N curve for steel becomes asymptotic nearly at

(A) $10^3$ cycles
(B) $10^4$ cycles
(C) $10^6$ cycles
(D) $10^9$ cycles

**21.** The crystal structure of austenite is

(A) hexagonal close packed
(B) body-centered cubic
(C) face-centered cubic
(D) body-centered tetragonal

**22.** The size and throat of weld in case of transverse fillet welded joint conform to the ratio of

(A) 1·2 : 1
(B) 1·414 : 1
(C) 2 : 1
(D) 0·707 : 1

**23.** In gib and cotter joint, the gib and cotter joint are subjected to

(A) single shear
(B) double shear
(C) single shear and crushing
(D) double shear and crushing

**24.** The number of degrees of freedom of an epicyclic gear train is

(A) one
(B) two
(C) three
(D) four

**25.** The device used to measure torque or power produced by any machine is known as

(A) Tachometer
(B) Rotameter
(C) Hygrometer
(D) Dynamometer

**26.** A homogeneous mixture of two or more solid components that has a lower melting point than its individual components—

(A) eutectic mixture
(B) peritectic mixture
(C) hypo-eutectoid mixture
(D) hyper-eutectoid mixture

**27.** A gear having infinite radius is known as

(A) Worm gear
(B) Rack
(C) Hypoid gear
(D) Bevel gear

**28.** A wheelbarrow is an example of _____ class lever.

(A) first
(B) second
(C) third
(D) fourth

**29.** The life of a ball bearing at a load of 10 kN is 8000 hours. If the load is increased to 20 kN keeping all other conditions same, calculate the modified bearing life in hours.

(A) 1000
(B) 2000
(C) 4000
(D) 8000

**30.** The value of initial tension (neglecting centrifugal tension) in the belts is equal to

(A) tension in the tight side of the belt.
(B) tension in the slack side of the belt.
(C) sum of tension in the tight side and slack side of the belt.
(D) average of tension in the tight side and slack side of the belt.

**31.** A bearing designated by the number 205, means that the bearing is of

(A) extra light series with bore 5 mm.

(B) light series with bore 25 mm.

(C) medium series with bore 25 mm.

(D) heavy series with bore 50 mm.

**32.** The ratio of the elastic modulus of a particular material to the elastic modulus of the 'base' or reference material is known as

(A) Elastic ratio

(B) Poisson's ratio

(C) Modular ratio

(D) Slenderness ratio

**33.** A 40 cm long and 10 cm diameter brass cylinder was subjected to a tensile load of 50000 N. The resulting increase in length and decrease in diameter were noted to be 0·8 mm and 0·05 mm respectively. Find the Poisson's ratio of brass.

(A) 0·25

(B) 0·33

(C) 0·40

(D) 0·50

**34.** The ratio of moment of inertia of a rectangle and that of a triangle, having same base and height, with respect to their bases would be

(A) 2 : 1

(B) 3 : 1

(C) 4 : 1

(D) 6 : 1

**35.** A tapering bar (diameters of end sections being $d_1$ and $d_2$) and a bar of uniform cross-section (diameter $d$) have the same length and are subjected to the same axial pull. Both the bars will have the same extension if $d$ is equal to

(A) $(d_1 + d_2)/2$

(B) $\sqrt{(d_1 d_2)}$

(C) $\sqrt{(d_1 d_2)}/2$

(D) $\sqrt{(d_1 + d_2)}/2$

**36.** At a principal plane

(A) no stress exists.

(B) only uniaxial stress acts.

(C) the normal stress is maximum or minimum and the shear stress is zero.

(D) the tensile stress is zero and the shear stress is maximum.

**37.** When a thin cylinder of diameter '$d$' and thickness '$t$' is pressurized with an internal pressure of '$p$' ($\mu$ is the Poisson's ratio and $E$ is the modulus of elasticity), then circumferential strain will be

(A) $\frac{pd}{4tE}(2-\mu)$

(B) $\frac{pd}{4tE}(1-2\mu)$

(C) $\frac{pd}{4tE}(5-4\mu)$

(D) $\frac{pd}{4tE}(4-5\mu)$

**38.** A cantilever beam carrying a load W at its free end has a maximum deflection $\delta$. If the load is doubled, the deflection compared to earlier one will change by a factor of:

(A) ½

(B) 2

(C) 4

(D) 8

**39.** A closed coil helical spring of stiffness 30N/mm is arranged in series with another such spring of stiffness 60 N/mm. The stiffness of the composite unit is

(A) 20 N/mm
(B) 30 N/mm
(C) 45 N/mm
(D) 90 N/mm

**40.** A four bar chain has

(A) all turning pairs.
(B) all sliding pairs.
(C) one turning pair and others are sliding pairs.
(D) one sliding pair and others are turning pairs.

**41.** Instantaneous centre of wheel rolling on a straight surface is

(A) the centre of the wheel.
(B) any point on the wheel circumference.
(C) the point of contact between the wheel and the straight surface.
(D) at infinity.

**42.** A flywheel of moment of inertia 9·8kgm$^2$ fluctuates by 30 rpm for fluctuation of energy of 1936 Joules. The mean speed of the wheel is (in rpm)

(A) 600
(B) 900
(C) 968
(D) 2940

**43.** In which of the following bearings, the bearing pressure is acting perpendicular to the axis of the shaft?

(A) Journal bearing
(B) Foot step bearing
(C) Thrust bearing
(D) Ball bearing

**44.** Maximum surface hardness is attained by

(A) carburizing
(B) cyaniding
(C) flame hardening
(D) nitriding

**45.** The algebraic difference between the actual size and the corresponding basic size is known as

(A) deviation
(B) tolerance
(C) allowance
(D) clearance

**46.** The welding defect in which we observe a long and continuous visual separation line between the base metal and the heat affected zone is

(A) incomplete fusion
(B) lamellar tearing
(C) hot cracking
(D) undercut

**47.** In submerged arc welding, the arc is struck between

(A) consumable coated electrode and work piece.
(B) non-consumable electrode and work piece.
(C) consumable bare electrode and work piece.
(D) tungsten electrodes and work piece.

**48.** The vapour compression refrigeration cycle operates on reversed

(A) Rankine cycle
(B) Joule's cycle
(C) Atkinson cycle
(D) Ericson cycle

**49.** For successful extrusion, the metal should be

(A) ductile
(B) malleable
(C) plastic
(D) tough

**50.** Which of the following welding techniques uses a non-consumable electrode?

(A) MIG welding
(B) TIG welding
(C) Submerged arc welding
(D) Thermal welding

**51.** Systematic errors in a bourdon tube pressure gauge may be caused by

(A) friction in the pins and gears of the amplifying mechanism.
(B) incorrect zero setting of pointer.
(C) variation of atmospheric pressure.
(D) incorrect readings of the scale due to parallax.

**52.** When the dry bulb and wet bulb temperature of air is same, then relative humidity of air will be

(A) 0%
(B) 50%
(C) 66·70%
(D) 100%

**53.** Heat is conducted through a 10 cm thick wall at the rate of 30 $W/m^2$ when the temperature difference across the wall is 10°C. What is the thermal inductivity of the wall material?

(A) 0·03 W/mK
(B) 0·3 W/mK
(C) 3·0 W/mK
(D) 30·0 W/mK

**54.** In oblique cutting of metals, the cutting edge of the tool is

(A) parallel to the direction of tool travel.
(B) perpendicular to the direction of tool travel.
(C) perpendicular to the work piece.
(D) inclined at an angle less than 90° to the direction of tool travel.

**55.** Constant pressure lines in superheated region of the Mollier diagram will have

(A) a positive slope.
(B) a negative slope.
(C) zero slope.
(D) both positive and negative slope.

**56.** Hobbing process cannot be used to cut

(A) helical gears
(B) spur gears
(C) bevel gears
(D) worm gears

**57.** Cold worked components are generally subjected to the following process to relieve stresses:

(A) Annealing
(B) Austempering
(C) Age hardening
(D) Tempering

**58.** An increase in fin effectiveness is caused by high value of

(i) convective coefficient
(ii) thermal conductivity
(iii) sectional area
(iv) circumference

Identify the correct statement from the following:

(A) (i) and (iii)
(B) (ii) and (iii)
(C) (iii) and (iv)
(D) (ii) and (iv)

**59.** When a shaft of diameter $d$ is subjected to pure torsional load T, the maximum shear stress $f_s$ induced in the shaft is prescribed by the relation:

(A) $f_s = \frac{8T}{\pi d^3}$

(B) $f_s = \frac{16T}{\pi d^3}$

(C) $f_s = \frac{32T}{\pi d^3}$

(D) $f_s = \frac{64T}{\pi d^3}$

**60.** Directional solidification in castings can be improved by using

(A) chills and chaplets.

(B) chills and padding.

(C) chaplets and padding.

(D) chills, chaplets and padding.

**61.** A cutting tool has been designated as 8-10-6-6-8-15-1 mm. The side cutting edge angle of the tool is

(A) 6-degree

(B) 8-degree

(C) 10-degree

(D) 15-degree

**62.** Four identical pieces of copper painted with different colour of paints were heated to the same temperature and then left in the environment to cool. Which of the following paints will give fast cooling?

(A) Rough white

(B) Red

(C) Rough black

(D) Shiny white

**63.** A helical coil spring with wire diameter $d$ and coil diameter D is subjected to external load. A constant ratio of $d$ and D has to be maintained such that the extension of spring is independent of $d$ and D. What is this ratio?

(A) $D^3/d^4$

(B) $d^3/D^4$

(C) $D^{4/3}/d^3$

(D) $d^{3/4}/D^4$

**64.** Why the porous structure provided by the silica is necessary in casting process?

(A) For the escape of gases

(B) For the escape of vapours

(C) For the escape of both gases and vapours

(D) None of the mentioned

**65.** A spring of stiffness 1000 N/m is stretched initially by 10 cm from the un-deformed position. The work required to stretch by another 10 cm is

(A) 5 Nm

(B) 7·5 Nm

(C) 10 Nm

(D) 15 Nm

**66.** As the cutter progress, the chip accumulate at the cutting zone, spoils the work surfaces. This is the disadvantage of _____ process.

(A) up milling

(B) down milling

(C) both up milling and down milling

(D) None of the mentioned

**67.** In a strained material one of the principal stresses equals twice the other. If the maximum shear stress is $\tau_{max}$, then what is the value of maximum principal stress?

(A) $\tau_{max}$
(B) $2\tau_{max}$
(C) $4\tau_{max}$
(D) $8\tau_{max}$

**68.** Which of the following are the advantages of Nano-composite materials?

(i) Decreased thermal expansion coefficients
(ii) Higher residual stress
(iii) Reduced gas permeability
(iv) Increased solvent resistance

(A) (i), (ii) and (iii) only
(B) (i), (iii) and (iv) only
(C) (i), (ii) and (iv) only
(D) (ii), (iii) and (iv) only

**69.** Which of the following is not a friction clutch?

(A) Plate clutch
(B) Jaw clutch
(C) Cone clutch
(D) Centrifugal clutch

**70.** In a shaper _____ movement of the drive is converted into _____ movement.

(A) reciprocating, rotary
(B) rotary, reciprocating
(C) rotary, rotary
(D) None of the mentioned

**71.** Which of the following is the most precise device for measuring length?

(A) A vernier callipers with 20 divisions on the sliding scale.
(B) A screw gauge of pitch 1 mm and 100 divisions on the circular scale.
(C) An optical instrument that can measure length to within a wavelength of light.
(D) All of the above are equally precise.

**72.** Force acting on a particle moving in a straight line varies with the velocity of the particle as $F = K/v$, where K is a constant. The work done by this force in time $t$ is

(A) $(K/v^2)\cdot t$
(B) $2Kt$
(C) $Kt$
(D) $2Kt/v^2$

**73.** The midpoint of a rigid link of a mechanism moves as a translation along a straight line, from rest, with a constant acceleration of 5 m/s$^2$. The distance covered by the said midpoint in 5s of motion is

(A) 124·2 m
(B) 112·5 m
(C) 96·2 m
(D) 62·5 m

**74.** On a ladder resting on a smooth ground and leaning against rough vertical wall, the force of friction acts

(A) upward and its upper end.
(B) towards the wall at the upper end.
(C) towards the wall at the lower end.
(D) downward and its upper end.

**75.** If the moment of inertia of a section about its orthogonal axes are $1 \times 10^6$ and $2 \times 10^6$ and its area is 100 units, its polar moment of inertia is

(A) $3{\cdot}1 \times 10^6$
(B) $3 \times 10^6$
(C) $4 \times 10^6$
(D) $5 \times 10^6$

**76.** If for a given material, E = 2G (E is modulus of elasticity, G is the shear modulus), then the bulk modulus K will be

(A) E/2
(B) E/3
(C) E
(D) E/4

**77.** A body is subjected to a direct tensile stress of 300 MPa in one plane accompanied by a simple shear stress of 200 MPa. What would be the maximum normal stress?

(A) 100 MPa
(B) 200 MPa
(C) 300 MPa
(D) 400 MPa

**78.** When a beam is subjected to a transverse shearing force, the shear stress in the upper fibers will be

(A) maximum
(B) minimum
(C) zero
(D) None of the above

**79.** The unit of strain energy in S.I unit is

(A) watt
(B) joule
(C) joule/sec
(D) joule/m

**80.** The metallic structure of mild steel is

(A) hexagonal close packed
(B) cubic structure
(C) body-centered cubic
(D) face-centered cubic

**81.** In a tensile test of mild steel specimen, the breaking stress as compared to ultimate tensile stress is

(A) more
(B) less
(C) same
(D) more/less depending on composition

**82.** Which of the following is not a constituent of Babbitt's metal?

(A) Tin
(B) Nickel
(C) Copper
(D) Antimony

**83.** A composite wall of a furnace has two layers of equal thickness having thermal conductivities in the ratio of 3 : 2. What is the ratio of the temperature drop across the two layers?

(A) 2 : 3
(B) 3 : 2
(C) 1 : 2
(D) 2 : 1

**84.** A spherical drop of molten metal of radius 3 mm was found to solidify in 10 seconds. A similar drop of radius 6 mm would solidify in

(A) 14·14 seconds
(B) 18·30 seconds
(C) 20 seconds
(D) 40 seconds

**85.** Vacuum environment required in

(A) Ultrasonic welding

(B) Laser beam welding

(C) Plasma arc welding

(D) Electron beam welding

**86.** Two castings of the same metal have the same surface area. One casting is in the form of a sphere and the other is a cube. What is the ratio of the solidification time for the sphere to that of the cube?

(A) $3/4\pi$

(B) $6/\pi$

(C) $5/4\pi$

(D) $3\pi/8$

**87.** In the centrifugal casting method

(A) no core is used.

(B) core may be made of any metal.

(C) core is made of sand.

(D) core is made of ferrous metal.

**88.** In resistance seam welding, electrode is in the form of

(A) cylinder

(B) flat plate

(C) coil of wire

(D) circular disc

**89.** Using the Taylor's tool life equation with exponent $n = 0{\cdot}5$, if the cutting speed is reduced by 50%, the ratio of new tool life to that of original tool life is

(A) 4

(B) 2

(C) 1

(D) 0·5

**90.** In a grinding wheel of A60 G7 B23, B stands for

(A) resinoid bond

(B) rubber bond

(C) shellac bond

(D) silicate bond

**91.** A heat engine is provided with a heat input of 1800 kJ/min and the output from the engine is 9 kW. Thermal efficiency of the engine is

(A) 66·66%

(B) 30%

(C) 70%

(D) 33·33%

**92.** When a system is in equilibrium, any conceivable change in entropy would be

(A) maximum

(B) positive

(C) negative

(D) zero

**93.** The temperature of source and sink of a heat engine are 127°C and 27°C respectively. An inventor claims its efficiency to be 26%, then

(A) it is impossible.
(B) it is possible with high probability.
(C) it is possible with low probability.
(D) None of the above

**94.** When cam moves, the period during which the follower of cam remains at rest is known as

(A) Constant period
(B) Fixed period
(C) Dwell period
(D) Idle period

**95.** Relation between module(m) and circular pitch ($P_c$) of a gear is

(A) $P_c = \pi m$
(B) $P_c = 2\pi m$
(C) $P_c = \pi m/2$
(D) $P_c = 4\pi m$

**96.** In a horizontal belt drive, it is preferable to have

(A) tight side on the top.
(B) slack side on the top.
(C) tight side tension twice slack side tension.
(D) equal tension on both sides.

**97.** The supply of working fluid to the engine to suit the load conditions is controlled by

(A) Flywheel
(B) Throttle valve
(C) Governor
(D) All of the above

**98.** Which of the following is not a part of the transmission system?

(A) Clutch
(B) Wheels
(C) Gear box
(D) Axles

**99.** The 'Jominy test' is used to find

(A) Young's Modulus
(B) Hardenability
(C) Yield Strength
(D) Thermal Conductivity

**100.** Normally in the assembly of pulley, key and shaft, the

(A) pulley is made the weakest.
(B) key is made the weakest.
(C) key is made the strongest.
(D) shaft is designed as the weakest.

**Space for Rough Work**

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