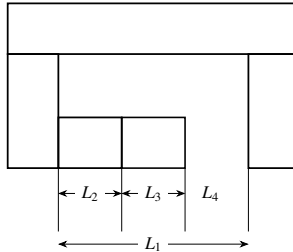


2015 Mechanical Engineering

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AI24BTECH11003 - Badde Vijaya Sreyas

- 1) In the assembly shown below, the part dimensions are: $L_1 = 22.0^{+0.01}mm$, $L_2 = L_3 = 10.0^{+0.005}mm$. Assuming the normal distribution of part dimensions, the dimension L_4 in mm for assembly condition would be:



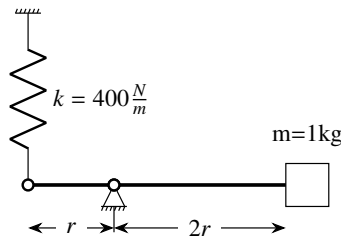
- a) $2.0^{+0.008}$ b) $2.0^{+0.012}$ c) $2.0^{+0.016}$ d) $2.0^{+0.020}$
- 2) A DC welding power source has a linear voltage-current ($V - I$) characteristic with open circuit voltage of 300 V. For maximum arc power, the current (In Amperes) should be set as _____
- 3) A triangular facet in a CAD model has vertices $P_1 (0,0,0)$; $P_2 (1, 1, 0)$ and $P_3 (1, 1, 1)$. The area of the facet is
- a) 0.500 b) 0.707 c) 1.414 d) 1.732
- 4) Following data refers to the activities of a project where node 1 refers to the start and node 5 refers to the end of the project.

Activity	Duration (days)
1-2	2
2-3	1
4-3	3
1-4	3
2-5	3
3-5	2
4-5	4

The critical path (CP) in the network is

- a) 1 - 2 - 3 - 5 b) 1 - 4 - 3 - 5 c) 1 - 2 - 3 - 4 - 5 d) 1 - 4 - 5

- 5) For a canteen, the actual demand for disposable cups was 500 units in January and 600 units in February. The forecast for the month of January was 400 units. The forecast for the month of March considering smoothing coefficient as 0.75 is _____
- 6) An orthogonal turning operation is carried out under the following conditions: rake angle = 5° , spindle rotation speed = 400rpm; axial feed = $0.4 \frac{m}{min}$ and radial depth of cut = 5mm. The chip thickness, t_c , is found to be 3mm. The shear angle (in degrees) in this turning process is _____.
- 7) The solidification time of a casting is proportional to $\left(\frac{V}{A}\right)^2$, where V is the volume of the casting, and A is the total casting surface area losing heat. Two cubes of the same material and size are cast using sand casting process. The top face of one of the cubes is completely insulated. The ratio of the solidification time for the cube with top insulated to that of the other cube is
- a) $\frac{25}{36}$ b) $\frac{36}{25}$ c) 1 d) $\frac{6}{5}$
- 8) In a slab rolling operation, the maximum thickness reduction (Δh_{max}) is given by $\Delta h_{max} = \mu^2 R$, where R is the radius of the roll and μ is the coefficient of friction between the roll and the sheet. If $\mu = 0.1$, the maximum angle subtended by the deformation zone at the center of the roll (bite angle in degrees) is _____
- 9) Considering massless rigid rod and small oscillations, the natural frequency (in $\frac{rad}{s}$) of vibration of the system shown in the figure is



- a) $\sqrt{\frac{400}{1}}$ b) $\sqrt{\frac{400}{2}}$ c) $\sqrt{\frac{400}{3}}$ d) $\sqrt{\frac{400}{4}}$
- 10) For the truss shown in figure, the magnitude of force in member PR and the support reaction at R are respectively

