2013-ME-14-26

EE24BTECH11001 - ADITYA TRIPATHY

14. In simple exponential smoothing forecasting, to give higher weightage to recent demand information, the smoothing coefficient must be close to (2013 – ME)

    a) -1 b) zero c) 0.5 d) 6

15. A steel bar 200mm in diameter is turned at a feed of 0.25mm/rev with a depth of cut of 4mm. The rotational speed of the workpiece is 160rpm. The material removal rate in mm^3/s is (2013 – ME)

    a) 160 b) 167.6 c) 1600 d) 1.0

16. A cube shaped casting solidifies in 5 min. The solidification time in min for a cube of the same material, which is 8 times heavier than the original casting, will be (2013 – ME)

    a) 10 b) 20 c) 24 d) 40

17. For a ductile material, toughness is a measure of (2013 – ME)

    a) resistance to scratching b) ability to absorb energy up to fracture

    c) ability to absorb energy till elastic limit d) resistance to indentation

item[18.] In order to have maximum power from Pelton turbine, the bucket speed must be (2013 – ME)

    a) equal to jet speed b) equal to half the jet speed

    c) equal to twice the jet speed d) independent of the jet speed

19. Consider one-dimensional steady state heat conduction along x-axis $0 \leq x \leq L$, through a plane wall with the boundary surfaces $x = 0 \text{and} x = L$ maintained at temperatures of $0^{\circ}C$ and $100^{\circ}C$. Heat is generated uniformly throughout the wall. Choos the **CORRECT** statement. (2013 – ME)

    a) The direction of heat transfer will be from the surface at $100^{\circ}C$ to the surface at $0^{\circ}C$.
    b) The maximum temperature inside the wall must be greater than $100^{\circ}C$.
    c) The temperature distribution is linear within the wall.
    d) The temperature distribution is symmetric about the mid-plane of the wall.

20. A cylinder contains $5m^3$ of an ideal gas at a pressure of 1 bar. This gas is compressed in a reversible isothermal process till its pressure increases to 5 bar. The work in kJ required for this process is (2013 – ME)

    a) 804.7 b) 953.2 c) 981.7 d) 1012.2

21. A long thin walled cylindrical shell, closed at both the ends, i ssubjected to an internal pressures. The ratio of the hoop stress (circumferential stress) to the longitudinal stress developed in the shell is (2013 – ME)

a) 0.5 b) 1.0 c) 2.0 d) 4.0

22. If two nodes are observed at a frequency of $1800rpm$ during whirling of a simply supported long slender rotating shaft, the first critical speed of the shaft in rpm is $(2013-ME)$

a) 200 b) 450 c) 600 d) 900

23. A planar closed kinematic chain is formed with rigid links $PQ = 2.0m, QR = 3.0m, RS = 2.5m$ and $SP = 2.7m$ with all revolute joints. The link to be fixed to obtain a double rocker (rocker - rocker) mechanism is $(2013-ME)$

a) PQ b) QR c) RS d) SP

24. Let X be a normal random bvariable with mean 1 and variance 4. The probability $\Pr(X<0)$ is $(2013-ME)$

a) 0.5 b) greater than zero and less than

c) greater than 0.5 and less than 1.0 d) 1.0

25. Choose The **CORRECT** set of functions, which are linearly dependent. $(2013-ME)$

a) $\sin x, \sin^2 x \text{and} \cos^2 x$ b) $\cos x, \sin x \text{and} \tan x$

c) $\cos 2x, \sin^2 x \text{and} \cos^2 x$ d) $\cos 2x, \sin x \text{and} \cos x$

Q.26 to Q.55 carry two marks each.

26. The following surface integral is to be evaluated over a sphere for the given steady velocity vector field $F = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$ defined with respect to a Cartesian corrdinate system having $\mathbf{i}, \mathbf{j} \text{and} \mathbf{k}$ as unit base vectors.

$$\iint_S \frac{1}{4} (\mathbf{F} \cdot \mathbf{n})\, dA \tag{1}$$

where S is the sphere, $x^2 + y^2 + z^2 = 1$ and $\mathbf{n}$ is the outward unit normal vector to the sphere. The value of the surface integral is $(2013-ME)$

a) π b) 2π c) $\frac{3\pi}{4}$ d) 4π