Sample Test Paper

ME : Mechanical Engineering

Duration : 50 Min. Maximum Marks : 40

Q.1 – 10 carry one mark each

1. Two stainless steel foils of 0.1 mm thickness are to be Joined. Which of the following process would be best suited.

(A) gas welding (B) electrostag welding
(C) TLG (D) plasma arc welding

2. Which one of the following chart gives simultaneously, information about the progress of work and machine loading?

(A) Process chart (B) Machine load chart
(C) Man machine chart (D) Gantt chart

3. For the metal forming process the stresses encountered are:

(A) less than the yield strength of the material
(B) less than the fracture strength of the material and greater than yield strength
(C) greater than ultimate strength of the material
(D) less than the elastic limit

4. Micro motion study is

(A) enlarged view of motion study
(B) analysis of one state of motion study
(C) motion study of small components up to micro = seconds.
(D) Sub division of an operation into therbligs and their analysis.

5. The 3–2–1 or six point location method checks

(A) 9 degrees of freedom (B) 6 degrees of freedom
(C) 5 degrees of freedom (D) 7 degrees of freedom

6. For a system having m = 4kg, k = 1600 N/m and C = 40 N/m and external force as $F = 16 \sin(\omega t)$, the natural frequency is :

(A) 4 rad/s (B) 20 rad/s
(C) 16 rad/s (D) 24 rad/s

7. Which of the following constituents of steel is softest?

(A) Ferrite (B) Bainite
(C) Austenite (D) Pearlite

8. The processor used for CAD application in CIM is:

(A) 32 bit central processing unit (B) 16 bit central processing unit
(C) 8 bit central processing unit (D) None of the above

9. If s is an open, two sided surface bounded by a closed non intersecting curve C and A is a vector function then

(A) $\oint_c A \times dr = \iint_s (\nabla \times A).\, n\, ds$ (B) $\oint_c A \times dr = \iint_s (\nabla . A) \times n\, ds$

(C) $\oint_c A \,.\, dr = \iint_s (\nabla \,.\, A) \times n\, ds$ (D) $\oint_c A \,.\, dr = \iint_s (\nabla \times A).\, n\, ds$

10. The value of $\Delta^2\left(\frac{5x+12}{x2+5x+6}\right)$ is

(A) $\frac{2(5x+16)}{(x+2)(x+3)(x+4)(x+5)}$ (B) $\frac{5x+8}{(x+2)(x+3)}$

(C) $\frac{8}{(x+2)(x+3)(x+4)}$ (D) $\frac{2x+5}{(x+2)(x+3)(x+4)}$

Q.11 – 25 carry two marks each

11. A body of mass M rests on a horizontal floor with which it has a coefficient of friction μ(static) . It is desired to make the body move by applying the minimum possible force F given by

(A) $\mu Mg\sqrt{1+\mu^2}$ (B) $\frac{\mu Mg}{\sqrt{1+\mu^2}}$

(C) μMg (D) $\frac{Mg}{\mu}$

12. Two shafts of the same material are subjected to the same torque. If the first shaft is of solid circular section and the second shaft is of hollow section whose internal diameter is 2/3 of the outside diameter, the ratio of weights of hollow shaft to solid shaft would be:

(A) Less than ½ (B) Between 0.5 and 0.99

(C) 1 (D) 1 to 1.5

13. A 25mm H8– f7 fit is to be checked. The limit of size for H8 hole are : 25.030mm, low limit equal to basic size. The limit of size for the f 7 shaft are :
High limit = 24.970mm and 24,950mm. Taking gauge maker's tolerance to be 10% of the work tolerance, design plug gauge to check the fit

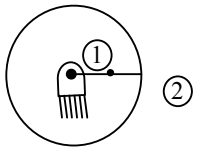
(A) GO plug gauge = $25.00^{+0.003}_{-0.000}$ mm, 'NO GO' plug gauge = $25.033^{+0.000}_{-0.003}$

(B) GO = $25.00^{+0.002}_{-0.000}$, NO GO' = $25.033^{+0.000}_{-0.002}$

(C) GO = $25.033^{+0.002}_{-0.000}$, 'NO GO' = $25.00^{+0.000}_{-0.002}$

(D) GO = $25.033^{+0.003}_{-0.000}$, 'NO GO' = $25.00^{+0.000}_{-0.003}$

14. Two points (1) and (2) are located along the radius of a wheel, having speeds 2 m/s and 8 m/s. the distance between the points is R_{BA} = 100 mm. The diameter of the wheel is ;



(A) 267 mm (B) 200 mm

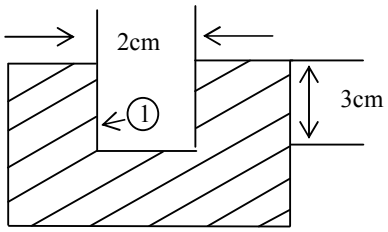
(C) 434 mm (D) 287 mm

15. Velocity of water at the inlet and outlet of draft tube are 6 m/s & 1.2 m/s respectively. If friction losses are 0.1 m calculate the efficiency of draft tube.

(A) 90.55 % (B) 90 %
(C) 91.55 % (D) 92 %

16. A blind cylindrical hole of 2cm diameter and length 3cm is drilled into a metal slab having emissivity 0.6. If the metal slab is maintained at 350°C, find the heat escaping out of the hole by radiation?

(A) 3.14W (B) 2.44W
(C) 2.95W (D) 3.85W



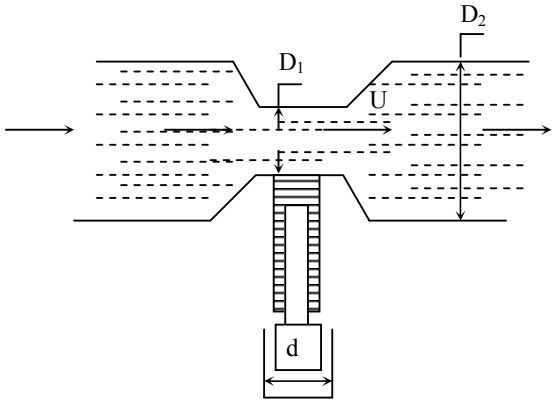
17. Fig below shows a venturimeter. The pressure at the throat is measured by a piston cylinder arrangement which works similar to a damping device i.e. F = cv where F = force on piston, c = damping constant and v = velocity of piston. D_1 is the throat diameter and D_2 is the outlet diameter. If U is the velocity of flowing liquid at throat then the expression for v will be { Take density of liquid as ρ}

(A) $\dfrac{\pi d^2 \rho U^2}{8c}\left[\left(\dfrac{D_1}{D_2}\right)^2 - 1\right]$

(B) $\dfrac{8c}{\pi d^2 \rho U^2}\left[\left(\dfrac{D_1}{D_2}\right)^4 - 1\right]$

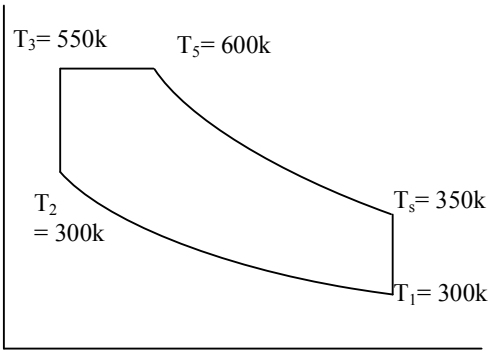
(C) $\dfrac{\pi d^2 \rho U^2}{8c}\left[\left(\dfrac{D_1}{D_2}\right)^4 - 1\right]$

(D) $\dfrac{8c}{\pi d^2 \rho U^2}\left[\left(\dfrac{D_2}{D_1}\right)^2 - 1\right]$



18. For the given dual cycle below, the efficiency is;

(A) 58% (B) 24%
(C) 46% (D) 74%



19. A lathe is used to machine a steel bar of 100mm diameter at 900 rpm. The cutting force applied by the tool to the work is 600 N. Determine the initial cutting velocity.

(A) 6.2m/s (B) 5.12 m/s
(C) 7 m/s (D) 5.5 m/s

20. An automobile engine operates at a fuel air ratio of 0.055, volumetric efficiency of 88% and indicated thermal, efficiency of 35%. given that the calorific value of the fuel is 42 mJ/kg and density of air at intake is 1 kg/m^3, the indicated mean effective pressure for the engine is

(A) 6.115 bar (B) 5.115 bar
(C) 7.115 bar (D) 8.115 bar

21. A machine part made in steel of $\sigma_u = 500\text{MPa}$ and $\sigma_m = 50\text{MPa}$ can carry a reversible stress with σ_{max}

(A) 275 MPa (B) 300 MPa
(C) 325 MPa (D) 350 MPa

22. For what value of x, the matrix $\begin{bmatrix} 3-x & 2 & 2 \\ 2 & 4-x & 1 \\ -2 & -4 & -1-x \end{bmatrix}$ is singular

(A) 0, 3 (B) 0, –3
(C) –1, 4 (D) 3, 4

23. Let $f(x) = 2x$ if $x < 2$
$= 2$ if $x = 2$
$= x^2$ if $x > 2$

the discontinuity of f (x) is known as

(A) first kind of discontinuity
(B) second kind of discontinuity
(C) Mixed discontinuity
(D) removable discontinuity at x = 2

24. The solution of D.E. $\frac{d^2y}{dx^2} + y = \cos 2x$ is

(A) $A\cos x + B \text{ is in } x + \frac{1}{3}\cos 2x$ (B) $A\cos x + B\sin x + \frac{1}{3}\sin 2x$
(C) $A\cos x + B\sin x - \frac{1}{3}\cos 2x$ (D) $A\cos x + B\sin x - \frac{1}{3}\sin 2x$

25. An anti – aircraft gun take a minimum of four shots at an enemy plane moving away from it. The probability of hitting the plane at the first, second, third and fourth shot are 0.4, 0.3, 0.2 and 0.1 respectively. The probability that the gun hits the plane is

(A) 0.3024 (B) 0.1
(C) 0.6976 (D) 0.9

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