Mechanical Engineering — Sample Paper-2

Q1. In stress-strain diagram region between elastic point and ultimate point is known as

(a) Plastic region
(b) Strain hardening
(c) Uniform plastic region
(d) Non Uniform plastic region

Q2. If V is volume and A is area of cross section then Freezing ratio for casting is defined as

(a) $[V/A]_{riser}/[V/A]_{casting}$
(b) $[V/A]_{casting}/[V/A]_{riser}$
(c) $[A/V]_{riser}/[A/V]_{casting}$
(d) $V_{riser}/V_{casting}$

Q3. Choose appropriate range of poisons ratio for all type of materials (elastic and inelastic)

(a) $0.25<\mu<0.33$
(b) $0<\mu<0.5$
(c) $-1<\mu<0.5$
(d) $0<\mu<1$

Q4. A Carnot engine working between 400°C and 40°C produces 130KJ of work determine the heat added to the engine.

(a) 243 (b) 234 (c) 342 (d) 432

Q5. 1kg of water at 0°C is brought into contact with heat reservoir at 90°C find entropy change in KJ/Kg K of water when the water has reached 90°C.

(a) 3.193 (b) 1.193 (c) 9.39 (d) -11.93

Q6. A steel wire of diameter {d} and bend over a drum of radius {R} then bending moment in the wire will be:

(a) $\pi Ed^4/32(2R+d)$
(b) $\pi ERd^4/32(2R+d)$
(c) $\pi Ed^4/32(R+2d)$
(d) $\pi ERd^4/32(R+2d)$

Q7.If the material follows stress strain relationship as $\sigma = Ee^n$ instead of hooks law then deflection due self weight of hanging beam, where [(w=weight of bar),(l=length of bar),(A =cross sectional area.)].

(a) $(W/AE)^n[n/n+1]L$
(b) $(W/AE)^{1/n}[n/n+1]L$
(c) $(W/AE)^{1/n}[n+1/n]L$
(d) $(W/AE)^n[n+1/n]L$

Q8. If the C_f is the coefficient of fluctuation of speed of flywheel the the ration of W_{max}/W_{min} will be

(a) $(1-2\ C_f)/(1+2\ C_f)$ (b) $(2-\ C_f)/(2+\ C_f)$
(c) $(1+2\ C_f)/(1-2\ C_f)$ (d) $(2+\ C_f)/(2-\ C_f)$

Q9. A batch of 10 cutting tools could produce 500 components while working at 50rpm with tool feed of 0.25mm/revolution and depth of cut of 1mm. A similar batch of 10 tools of same specification could produce 122 components while working at 80 rpm with a feed of 0.25mm/revolution and 1mm depth of cut. How many components can be produced while cutting tool at 60 RPM.

(a) 29 (b) 31 (c) 3 (d) 42

Q10. In a machining experiment to life was found to vary with cutting speed in following manner

Cutting speed in M/min	Tool life in minute
60	81
90	36

Then the exponent N and constant K of the tailor's tool life equation are

(a) 0.5, 540 (b) 1, 4860 (c)-1, 0.74 (d)-0.5, 1.155

Q11. In a rolling process, sheet of 25 mm thickness is rolled to 20 mm thickness roll is of diameter 600 mm and it rotates at 100 rpm. The roll strip contact length will be

(a) 5mm (b) 39mm (c) 78mm (d) 120mm

Q12. In arc welding voltage equal to 25 volt current equal to 300rpm arc heat transfer efficiency equal to 8mm/sec then net heat input in J/mm is

(a) 64 (b) 797 (c) 1103 (d) 79700

Q13. A heat pump working on reverse Carnot cycle takes energy from a reservoir maintained at temperature T_3 and delivers it to another reservoir where temperature is T_4. The heat pump consumes power for its operation from a reversible engine operating within the higher and lower temperature of T_1 and T_4 ($T_4=T_2$). Find the ratio of heat absorbed by the engine from Temperature T_1 to the heat delivered by the pump at temperature T_2.

(a) $T_1/T_4[T_4-T_3/T_1-T_2]$ (b) $T_1/T_3[T_4-T_3/T_2-T_1]$
(c) $T_2/T_4[T_1-T_3/T_1+T_2]$ (d) $T_3/T_4[T_3-T_2/T_1-T_2]$

Q14. 30kJ/s of heat is supplied at constant fix temperature of 290°C to a heat engine the heat rejection takes place at 8.5°C the following results were obtained:

1. 215 KJ/sec are rejected. 2. 150 KJ/sec are rejected.

(a) 1 is reversible and 2 is Irreversible (b) 2 is reversible and 1 is Irreversible
(c) 1 is impossible and 2 is Irreversible (d) 1 is impossible and 2 is reversible

Q15. A reversible engine converts a 1/6th of the heat input into work when the temperature of the sink is reduced by 70°C and its efficiency is double find a temperature of the source and a sink

(a) 1785℃, 1442℃ (b) 1442°C, 1785°C

(c) 1715°C, 2085°C (d) 2058°C, 1785°C

Q16. The stroke and cylinder Diameter of compression ignition engine are 250mm and 150 mm respectively if the clearance volume is 0.0004 m3 and fuel injection takes place at constant pressure for 5% of the stroke determine the efficiency of the engine.

(a) 53.9 (b) 93.5 (c) 59.3 (d) 33.59

Q17. A Six cylinder 4 stroke SI engine having a piston displacement of 700cm^3 / cylinder developed 78kw @ 3200rpm and consumes 27kg of petrol/hr. The calorific value of the petrol is 44Mj/Kg. Estimate the volumetric efficiency of the engine, if the air fuel ratio is 12 and intake air is at 0.9 bar and 32℃.

(a) 18.7% (b) 87.1% (c) 78.1% (d) 17.8%

Q18. A fluid is contained in a cylinder by a spring loaded frictionless piston so that the pressure in the fluid is linear function of the volume (P=a+bV).The internal energy of the fluid is given by the following equation (U=42+3.6PV). Where U is in kJ, P is in KPa and V is in m3. If the fluid changes from a initial state of 190KPa, 0.035m3 to a final state of 420KPa, 0.07m3, with no work other than that done on the piston find the direction and magnitude of heat transfer in kJ.

(a) 10.67, 92.57 (b) -10.67, 92.57 (c) 10.67,-92.57 (d) -10.67,-92.57

Q19. Find the strain energy store in steel bar 50cm long and 3cm x 1cm in cross section when it is subjected simultaneously to an axial of 50KN and compressive stress of 100N/mm^2 on its narrow edge. Take E=2 x 10^5 N/mm^2 and μ=0.28.

(a) 22.5 J (b) 17.667J (c) 27.475J (d) 12.5J

Q20. A 100mm×40mm I-beam is subjected to a shear force of 15KN. Find the percentage of shear force carried by the web. Moment of inertia of the section is 1.1mm^4, web thickness is 3mm and flange thickness is 4mm.

(a) 75% (b) 92% (c) 82% (d) 78%

Q21. The Integral

$$\frac{1}{2\pi}\int_{o}^{2\pi} \sin(t-\tau)\cos\tau \; d\tau \; equals$$

(a) sint cost (b) 0 (c)$\frac{1}{2}$cost (d) $\frac{1}{2}$sint

Q22. Let A $=\begin{matrix}2 & -0.1\\ 0 & 3\end{matrix}$ and $A^{-1}=\begin{matrix}\frac{1}{2} & a\\ 0 & b\end{matrix}$ then a+b is equal to

(a) 7/20 (b) 3/20 (c) 19/60 (d) 11/20

Q23.The area in first quadrant under curve

$$y=\frac{1}{x^2+6x+10} \text{ is}$$

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ -$\tan^{-1}3$ (c) $\frac{\pi}{2}$ - $\tan^{-1}3$ (d) $\frac{\pi}{2}$ - $\tan^{-1}3$

Q24.The Newton Raphson method

$$X_{n+1}=\frac{X_n}{2}+\frac{3}{2x_n}$$

Can be used to solve the equal

(a) $x^2=3$ (b) $x^3=3$ (c) $x^2=3$ (d) $x^{-3}=3$

Q25. The solution of $x\frac{dy}{dx}+y=x^4$ with the condition

Y(1) $=\frac{6}{5}$ is

(a) $y=\frac{x^4}{5}+\frac{1}{x}$ (b) $y=\frac{4x^4}{5}+\frac{4}{5x}$ (c) $y=\frac{x^4}{5}+1$ (d) $y=\frac{x^5}{5}+1$

Q26. Mamta had no _____about going the chairman's clerk and throwing her resignation letter to him.

(a) Apathy (b) Penchant (c) Compunction (d) Juxtaposition

Q27. Make the correct word from the meaning given in the question:-
To speak in an indirect manner to evade a point, to mislead

(a) Prevaricate (b) Concede (c) Relegate (d) Remonstrate

Q28. Three pipes of varying diameters can fill the vessels of 1,2, and 3 L in 4, 18, and 48 min respectively. What is the ratio of the diameters?

(a) 6:4:3 (b) 2:3:4 (c) 1:4:5 (d)2:5:8

Q29. $125^x+45^x=2.(27)^x$ has…….

(a) No solution (b) One solution (c) Two solution (d) More than two solution

Q30. If X follows binomial distribution with parameter n=8 and p=1/2 then p ($|x-4| \leq 2$) equals to

(a) $\frac{118}{128}$ (b) $\frac{119}{128}$ (c) $\frac{117}{128}$ (d) None of these