MCQs Test (Mechanical)

Duration 60 minutes Encircle

the correct answers .

1. When a shaft having a circular cross section is subjected to a torque, the cross section:

   a. *Remains plane* b. rotates c. increased d. decreased

2. For linear elastic homogeneous material the shear stress along any radial line of the shaft also varies_____, from zero at its axis to a maximum at its outer boundary. This maximum shear stress must not exceed the__.

   a. inversely, normal stress. *c. Linearly, proportional limit.*
   b. Does not vary, minimum normal stress. d. Directly, max normal stress.

3. External forces can be applied to a body as distributed or concentrated surface loadings , or as body forces that act throughout the of the body.

   a. Area b. Surface *c. Volume* d. Surface boundary

4. The equations of equilibrium $\Sigma F = 0$ and $\Sigma M = 0$ must be satisfied in order to prevent a body from translating with accelerated motion and from:

   a. *Rotating* b. Linear motion c. both a & b d. none of these

5. Deformations not only cause line segments to elongate or contract, but they also cause them to change:

   a. Shape b. Position *c. Direction* d. none of these e. a & c

6. Most engineering materials undergo very small deformations, and so the normal strain (ϵ): a. $\epsilon << 1$ b. $\epsilon >> 1$ c. $\epsilon = 0$ d. $\epsilon = 1$

7. A Specimen of steel has a principal stress of 35 ksi and principal strain of 0.0012 in/in, then the elasticity must be:

   a. 2.9×10^4 ksi b. 13.7×10^3 ksi c. 9.34×10^3 ksi d. Zero

8. For design or analysis, it is only necessary to determine the stress acting

on the smallest cross-sectional area.

a. Shear *b. Maximum* c. Minimum d. Normal e. Experimental

9. Normally the stress concentration in a specimen that is subjected to a static loading will not have to be considered in design.

a. *Ductile* b. Brittle c. Deformed d. none

10. The element representing the maximum in-plane shear strain and its associated average normal strains is from the orientation of an element representing the principal strains.

a. 180^0 b. 90^0 c. 0^0 *d. 45^0*

11. If a refrigeration system has work input of 8000 J/kg and refrigeration effect produced is 160 kJ/kg , then the C.O.P will be:

a. 0.5 *b. 2* c. 200 d. 0.05

12. A machine working on Carnot cycle with a heat pump have temperature 305 K and coefficient of performance is 6.78. what will be the initial temperature:

a. 273 K b. 315 K *c. 260 K* d. insufficient data

13. A cold storage is to be maintained at $-5\ ^0$C while the surroundings temperature is $35\ ^0$C . If the actual coefficient of performance is 2.233 what will be the heat leakage from the surroundings to the cold storage:

a. 44 kW b. 29 kW c. 83.9 MW d. 170 kW *e. none of these*

14. The refrigeration capacity of plant with 113.7 kJ heat removal per minute is:

a. *0.541 TR* b. 113.7 TR c. 0.541 kJ/min d. insufficient data

15. One tonne of refrigeration is equal to:

a. 21 kJ/min *b. 210 kJ/min* c. 420 kJ/min d. 620 kJ/min

16. The coefficient of performance is always :

a. Equals to 1 *b. greater than 1* c. smaller than 1 d. zero e. both c & d

17. The refrigerating capacity (Q) of the system is 12 TR and the heat rejected or refrigerating effect per kg is 130 kJ/kg. Then the mass flow rate of the refrigerant:

a. 19.4 kg/min b. 19.4 kg/s c. 0.1944 g/min d. 0.1944 g/s

18. In a system of two stage compression with liquid intercooler, the work done in high pressure compressor is 2651 kJ/min and work done by low pressure compressor is 2540 kJ/min. The power needed for the system is:

a. 86.5 kJ/min b. 5191 kJ/min c. 86.5 kW *d. both b & c*

19. The compression device used in steam jet refrigeration system is a:

a. Vapour compressor *b. steam ejector* c. diffuser d. liquid pump

Numerical MCQs

7. *$Y = \sigma p / \epsilon p$ (where; **Y** = young modulus of elasticity , σp = principal stress , ϵp = principal strain)*

11. C.O.P = q / w (where; w = work input , q = refrigeration effect , C.O.P = coefficient of performance)

12. (C.O.P)heat pump = T2 / (T2 –T1) (Where; T2 = operating or final temperature , T1 = initial Temperature)

13. insufficient data so the answer will be e. none of these

14. conversion (1TR = 210 kJ/min) so 0.541 TR = 113.7 kJ/min) where; TR= tonnage of refrigeration or refrigerating capacity.

17. $m_R = Q / R_E$ (where; m_R = Mass flow rate of refrigerant , R_E = Refrigeration effect , Q = refrigerating capacity =12 TR = 2520 kJ/min)

18. Power needed = (W_L + W_H) / 60 (where; W_L = work done in low pressure compressor , W_H = work done in high pressure compressor)