KATHMANDU UNIVERSITY
End Semester Examination
February, 2025

Marks Scored:

Level : B.E.
Year : II

Course : MEEG 202
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 17 FEB 2025

SECTION "A"
[20 Q. × 1 = 20 marks]

Choose and encircle the most appropriate option from each set of choices

1. If $E_s = 3E_a$ the stress in steel of a composite bar made of aluminum and steel strips each having a cross-sectional area 300 mm^2 and subjected to an axial load 12kN is
   a. 10MPA b. 20 MPA c. 30 Mpa d. 40 Mpa

2. The elongation produced in a rod by its own weight of length (l) and diameter (d) rigidly fixed at the upper end and hanging is equal to
   a. $\frac{wl}{2E}$ b. $\frac{wl^2}{2E}$ c. $\frac{wl^3}{2E}$ d. $\frac{wl^4}{2E}$

3. The elongation of a circular tapped rod is given by
   a. $\frac{2pl}{\pi E d_1 d_2}$ b. $\frac{4pl}{\pi E d_1 d_2}$ c. $\frac{4pl}{E d_1 d_2}$ d. $\frac{4pl}{\pi d_1 d_2}$

4. The shear stress on the principal plane is
   a. Zero b. $\frac{\sigma_x+\sigma_y}{2}$ c. $\frac{\sigma_x-\sigma_y}{2}$ d. $\frac{\sigma_x+\sigma_y}{2} + \tau_{xy}$

5. In a Mohr's circle, the radius gives the value of
   a. Minimum shear stress b. Maximum shear stress
   c. Minimum normal stress d. Maximum normal stress

6. In the case of pure tension, the angle between the planes of principal stress and principal strain is
   a. zero b. 45^0 c. 90^0 d. 180^0

7. Two threaded bolts A and B of same material and length are subjected to identical tensile load. If the elastic strain energy stored in bolt A is 4 times that of bolt B and the mean diameter of bolt A is 8 mm, what is the mean diameter of bolt B (in mm)?
   a. 8 b. 10 c. 12 d. 16

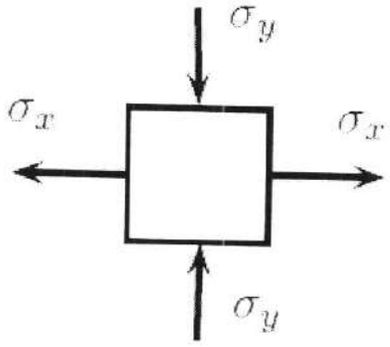
8. For a ductile material, toughness is a measure of
   a. resistance to scratching b. resistance to indentation
   c. ability to absorb energy till elastic limit d. ability to absorb energy up to fracture

9. The second moment of a circular area about the diameter is given by (D is the diameter).
   a. $\pi D^4/4$ b. $\pi D^4/16$ c. $\pi D^4/32$ d. $\pi D^4/64$

10. A concentrated load of P acts on a simply supported beam of span L at a distance L/2 from the left support. The bending moment at the point of application of the load is given by
    a. PL/2 b. PL/4 c. 2PL/3 d. 2PL/4

11. A simply supported beam is subjected to a uniformly distributed load of 16 kN over its entire span (L). What is the maximum bending moment in the beam?
a.2L b. $2L^2$ c. 4L d. $4L^2$

12. The figure shows the state of stress at a certain point in a stressed body. The magnitudes of normal stresses in the x and y directions are 50 MPa and 20 MPa, respectively.



The radius of Mohr's stress circle representing this state of stress is
a.25MPa b. 30MPa c. 35MPa d. 40 MPa

13. Between two beams made of the same material and cross-sectional area, the beam with _____ will resist bending more effectively.
a. longer length b. greater width c. greater height d. symmetric cross-section

14. A stainless-steel shaft is designed to 15 kW at the angular velocity of 94.24 rad/s. What is the maximum torque delivered by the shaft?
a. 150Nm b. 160Nm c.170Nm d. 180 Nm

15. In moment area method, $\theta_{B/A}$ represents
a. the angle of tangent at A measured with respect to x- axis
b. the angle of tangent at B measured with respect to x- axis
c. the angle of tangent at A measured with respect to. the tangent at B
d. the angle of tangent at B measured with respect to the tangent at A

16. A beam of square section of side 4 mm is subjected to a shear force of 300 N. What is the closest value of the maximum shear stress induced in it?
a. 26MPa b. 27MPa c. 29Mpa d. 30Mpa

17. If two shafts (T_1 and T_2) are connected in parallel and a total torque T is applied to the composite shaft, the total torque will be:
a. $T = T_1 + T_2$ b. $T = T_1 - T_2$ c. $T = T_1 \times T_2$ d. $T = T_1/T_2$

18. The strain energy stored in a body of volume V subjected to uniform stress σ is
a. $\frac{\sigma \times E}{V}$ b. $\frac{\sigma \times E^2}{V}$ c. $\frac{\sigma^2}{2E} \times V$ d. $\frac{\sigma^2}{E} \times V$

19. The strength of the beam mainly depends on
a. its weight b. section modulus
c. bending moment d. center of gravity of the section

20. Maximum principal stress theory was postulated by
a. Rankine b. St. Venant c. Mohr d. Tresca