UNIT-1

STATIC STRESSES

1. **Modern automobile car is produced by**

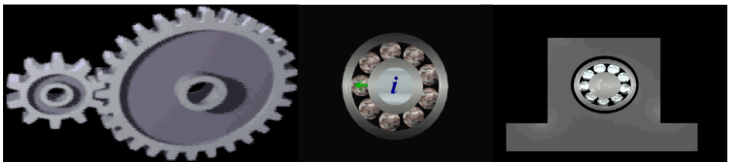
   a) sequential design

   b) design by craft evolution

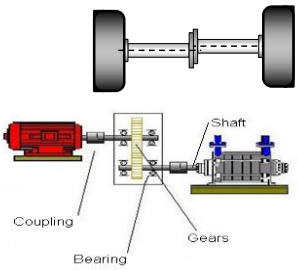
   c) design synthesis

   d) simultaneous design

2. **Identify the Machine Element and Transmission Element**



Basics of Design process and Material Selection



Answer:

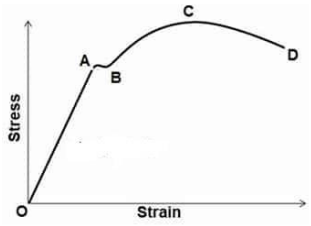
3. **Identify the Type of Design from the Given Sketch**

Cars

4. **What are the general considerations to be considered in designing of a machine component.**

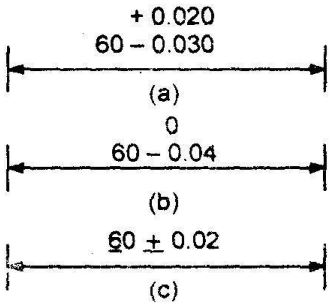
5. **Steels used for automobile bodies and hoods are**

6. **Hooke's law holds good up to**



7. What are the ergonomic considerations in Design?

8. Identify the type of Tolerance for the given Dimension



9. How do you classify materials for engineering use

10. What alloying element improves the Hardenability of steels

11. Which of the following materials has maximum strength

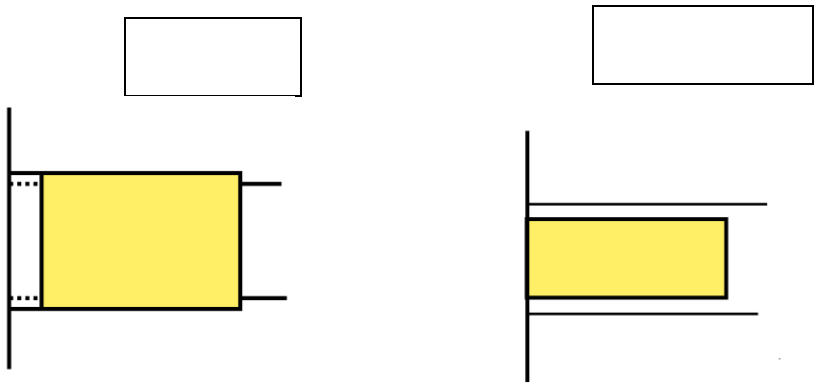
a) grey cast iron
b) plain carbon steel
c) alloy steel
d) aluminium alloy

12. How does the carbon content affect the hardness and toughness properties of CI and steel? / How carbon content influences the properties of steel?

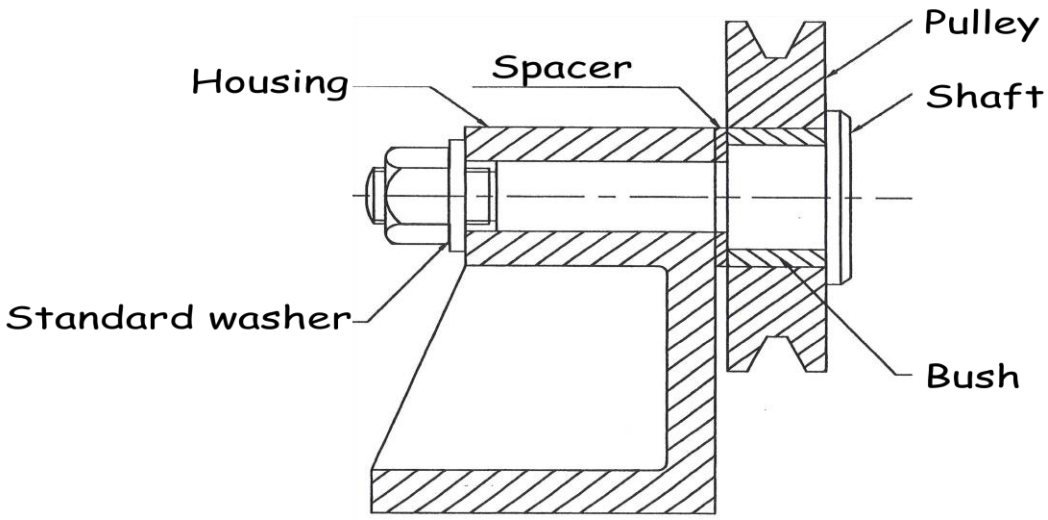
13. Write the Series factor for the given series

SERIES	**Series Factor**
R5	
R10	
R20	
R40	
R80	

14. Name the fit for the given sketch



15. Decide what fits are required between the shaft and bush and the bush and pulley. Give reason for your choices.



16. According to Indian standard, 50 H8-g7 means

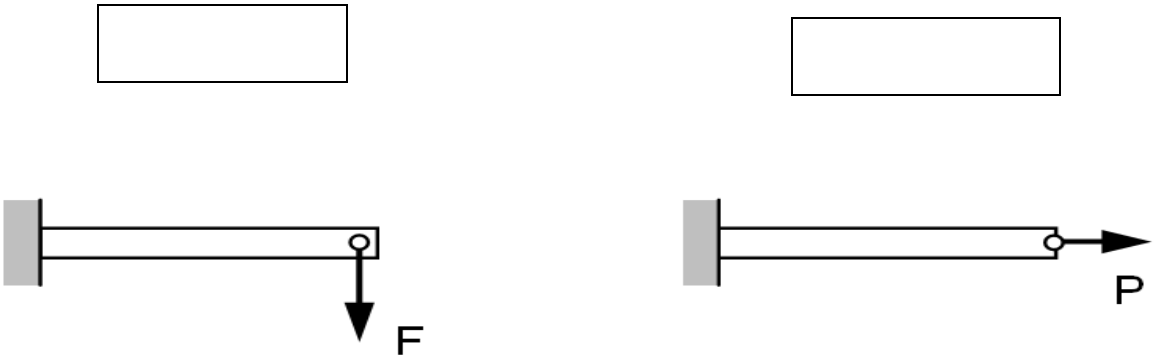
a) upper limit is (50+8) mm and lower limit (50-7) mm

b) designation of tolerance with basic size 50 mm

c) designation of fit of two parts with basic size 50 mm

d) designation of tolerance with nominal size of 50 mm

17.Name the Stress for the given Sketch



18.Name the Stress for the given Situaution

19.The strain energy stored in a body, when suddenly loaded, is _____the strain energy stored when same load is applied gradually.

20.The stress in the bar when load is applied suddenly is ..... as compared to the stress induced due to gradually applied load

21. **A hallow shaft of 1m length is designed to transmit a power of 30 kW at 700 rpm. The maximum permissible angle of twist in the shaft is 1degree . The inner diameter of the shaft is 0.7.**

22. **Two identical circular rods of same diameter and same length are subjected to same magnitude of axial tensile force. One of the rods is made out of mild steel having the modulus of elasticity of 206GPa. The other rod is made out of cast iron having the modulus of elasticity of 100 GPa. Assume both the materials to be homogeneous and isotropic and the axial force causes the same amount of uniform stress in both the rods. The stresses developed are within the proportional limit of the respective materials. Which of the following observations is correct?,**

23. **Machine element is subjected to the following bi-axial state of stress; σx = 80 MPa; σy = 20MPa; τxy=40MPa. If the shear strength of the material is 100 MPa, the factor of safety asper Tresca"s maximum shear stress theory is**

24. **The uniaxial yield stress of a material is 300 MPa. According to von Mises criterion, the shear yield stress (in MPa) of the material is**

25. A solid circular shaft needs to be designed to transmit a torque of 50Nm. If the allowable shearof the material is 140MPa, assuming a factor of safety of 2, the minimum allowable design diameter in mm is

26. Sketch the bending stress distribution in a curved beam

27. The neutral axis of a beam,

a) the layers are subjected to maximum bending stress
b) the layers are subjected to compression
c) the layers do not undergo any strain
d) the layers are subjected to compression

28. **The material commonly used for crane hooks is**

a) cast iron

b) wrought iron

c) mild steel

d) aluminium

29. Identify the Maximum Stress Area in Crane Hook

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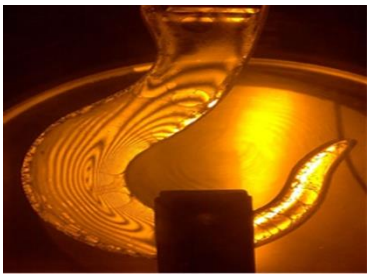
INSIDE FIBER	OUTSIDE FIBER



30. The maximum bending stress in a curved beam, having symmetrical cross-section, always occurs at

a) inner fiber
b) outer fiber
c) centroidal axis
d) neutral axis

31. The factor of safety for cast iron component, subjected to static force, is Usually_____

32. Match the Following

a)	Maximum principle stress theory	(Haigh Theory)
b)	Maximum shear stress theory	(St. Venant's theory)
c)	Maximum strain theory	(Von Mises Hencky Theory)
d)	Maximum strain energy theory	(Rankine theory):
e)	Distortion Energy theory	(Guest's or Coulomb's theory

33. For maximum principal stress theory, the shape of the region of safety on σ1 ,σ2 co-ordinate system is

a)Square
b) Hexagon
c) Ellipse
d)Pentagon

34. **Rankine's theory of failure is applicable to**

√ THE RIGHT ANSWER

Ductile materials	
Elastic materials	
brittle materials	
Plastic materials	

35. Coulomb, Tresca and Guest's theory of failure is applicable to

√ THE RIGHT ANSWER

Ductile materials	
Elastic materials	
brittle materials	
Plastic materials	

36. According to distortion energy theory of failure, the relationship between yield strength in shear (Ssy) and tensile yield strength (Syt) is

a) Ssy=0.5S yt
b) Ssy=0.57S yt
c) Ssy=0.75S yt
d) Ssy=0.4S yt

37. When a shaft of diameter d and length l is subjected to torsional moment Mt, then the angle of twist θ in degrees is given by,_____