

SAMPLE QUESTION PAPER

Examination: Third Year Semester VI

Course Code: **MEC602**

Course Name: **Machine Design I**

Q1.	Which design consideration deals with the appearance of the product?
Option A:	Ergonomics
Option B:	Aesthetics
Option C:	System design
Option D:	Creative design
Q2.	The process of creating mechanisms and shapes of mechanical elements for a machine to get the desired output for a given input is called as _____.
Option A:	analysis
Option B:	innovation
Option C:	synthesis
Option D:	designing
Q3.	In design process, which process is followed after selecting the material?
Option A:	Selecting factor of safety
Option B:	Synthesis
Option C:	Analysis of forces
Option D:	Determining mode of failure
Q4.	If compressive yield stress and tensile yield stress are equivalent, then region of safety from maximum principal stress theory is of which shape?
Option A:	Rectangle
Option B:	Square
Option C:	Circle
Option D:	Ellipse
Q5.	The centroidal and neutral axes of an initially curved beam are _____.

Option A:	Intersecting
Option B:	Coincident
Option C:	Parallel
Option D:	Perpendicular
Q6.	The maximum stress in an initially curved beam is in the _____.
Option A:	Innermost fiber
Option B:	Outermost fiber
Option C:	Innermost as well as in outermost fibers
Option D:	Mean Fiber
Q7.	With regards to a curved beam, which one of the following statements is <i>false</i> ?
Option A:	The neutral axis in unloaded condition is curved instead of straight.
Option B:	The neutral and centroidal axes of the straight beam are coincident.
Option C:	In curved beams, the stress distribution is linear.
Option D:	The material is homogeneous and obeys Hooke's law.
Q8.	Which type of stress is negative in nature in the case of a thick cylinder?
Option A:	Tangential stress
Option B:	Radial stress
Option C:	Longitudinal stress
Option D:	Principal stress
Q9.	A curved link of a mechanism is made from a round steel bar. The material of the link is plain carbon steel 30C8 ($S_{yt} = 400 \text{ N/mm}^2$) and the factor of safety is 3.5. Determine the permissible tensile stress for the link.
Option A:	114.29 N/mm^2
Option B:	13.33 N/mm^2
Option C:	50 N/mm^2
Option D:	400 N/mm^2
Q10.	Which of the following <i>is not</i> a part of cotter joint?

Option A:	Socket
Option B:	Spigot
Option C:	Cotter
Option D:	Collar
Q11.	The rails in the field are generally welded using _____.
Option A:	Thermit welding
Option B:	Gas welding
Option C:	Electric arc welding
Option D:	Forge welding
Q12.	Calculate the diameter of pin from shear consideration with maximum shear stress allowed is 40 N/mm ² and an axial tensile force of 50 kN is acting on the rod.
Option A:	39 mm
Option B:	44 mm
Option C:	49 mm
Option D:	52 mm
Q13.	The transverse shear stress at the root of the threads in the nut can be given by which one of the following relations_____? (All the notations have their usual meaning.)
Option A:	$4W/\pi dz^2$
Option B:	$W/\pi dtz$
Option C:	$4W/\pi td^2$
Option D:	$4W/\pi d^2$
Q14.	The endurance or fatigue limit is defined as the maximum value of the stress which a polished standard specimen can withstand without failure, for an infinite number of cycles, when subjected to_____.
Option A:	static load
Option B:	dynamic load
Option C:	static as well as dynamic load
Option D:	completely reversed load

Q15.	The phenomenon of decreased resistance of the materials to fluctuating stresses is the main characteristic of _____ failure.
Option A:	Fracture
Option B:	Fatigue
Option C:	Yielding
Option D:	Creep
Q16.	The fatigue life of a part can be improved by _____.
Option A:	electroplating
Option B:	shot peening
Option C:	Polishing
Option D:	coating
Q17.	A flat rectangular plate 30 mm wide and 't' mm wide is subjected to a tensile force of 5 kN. The plate has a circular hole of diameter 15mm with the centre coinciding with the diagonal intersection point of the rectangle. If stress concentration factor is 2.16, find the thickness of the plate (Take maximum allowable tensile stress as 80 N/mm ²).
Option A:	8 mm
Option B:	9 mm
Option C:	10 mm
Option D:	12 mm
Q18.	Which of the following loading is considered for the design of axle?
Option A:	Bending moment only
Option B:	Twisting moment only
Option C:	Combined bending moment & torsion
Option D:	Combined action of bending moment, Twisting moment & Axial thrust
Q19.	Power Transmitted by the shaft (in watt) is given by _____. (The symbols have their usual meaning)
Option A:	$P = \frac{2\pi NT}{60}$

Option B:	$P = \frac{2\pi N}{60}$
Option C:	$P = \frac{2T}{60}$
Option D:	$P = \frac{NT}{60}$
Q20.	A feather key is generally _____.
Option A:	Loose in shaft & Tight in hub
Option B:	Loose in hub & Tight in shaft
Option C:	Loose in both shaft & hub
Option D:	Tight in both shaft & hub
Q21.	If the compression of a helical spring is observed to be 10 mm when applied with a compressive force of 150 N, then the stiffness of the spring is:
Option A:	15 N/m
Option B:	150 N/m
Option C:	1500 N/m
Option D:	15000 N/m
Q22.	Which of the following stresses are induced in Leaf springs?
Option A:	Both bending and shear stresses.
Option B:	Only shear stresses
Option C:	Only compressive stresses
Option D:	Only bending stresses
Q23.	The spring index, C of a helical spring is found to be 6. The Wahl's Stress Factor for the spring is_____. (The spring index is the ratio of the mean coil diameter to the wire diameter)
Option A:	4
Option B:	2
Option C:	1.2525
Option D:	1

Q24.	Which one of the following statements with regards to the patented and cold-drawn steel wires is <i>false</i> ?
Option A:	Grade-1 patented and cold-drawn steel is used in springs subjected to static or low-load cycles.
Option B:	Grade-2 patented and cold-drawn steel is used in springs subjected to moderate-load cycles.
Option C:	Grade-3 patented and cold-drawn steel is used in highly stressed static springs or springs subjected to moderate dynamic loads.
Option D:	Grade-4 patented and cold-drawn steel is used in springs subjected to static or low-load cycles.
Q25.	Which one of the following dimensions <i>is not</i> the main spring dimension to be calculated during the spring design procedure?
Option A:	Wire diameter
Option B:	Mean coil diameter
Option C:	Number of active coils
Option D:	Gap between adjacent coils