ANJUMAN-I-ISLAM'S

AKTC KALSEKAR TECHNICAL CAMPUS

INNOVATIVE TEACHING · EXUBERANT LEARNING

Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2021-22/   Date: 02/08/2022

School: **SoET-REV. C-SCHEME**   Branch: **MECH. ENGG.**   SEM: **III**

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following **Semester/Unit Test-I/Unit Test-II (Reg./ATKT)** question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format SC	Format HC	No. of Copies
1	Engineering Mathematics-III	MEC301			
2	Strength of Materials	MEC302		✓	
3	Production Processes	MEC303		✓	
4	Materials and Metallurgy	MEC304		✓	
5	Thermodynamics	MEC305			

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

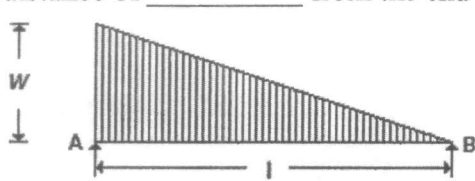**University of Mumbai**
Examination May -2022
Program: Mechanical Engineering
Curriculum Scheme: Rev2019
Examination: SE Semester III
Course Code: MEC302 and Course Name: Strength of Materials

7/6/2022
Evening.

Time: 2.5 hours   Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Which of the following has no unit
Option A:	Strain
Option B:	Surface tension
Option C:	Bulk modulus
Option D:	Elasticity
2.	A body is subjected to a tensile stress of 1200 MPa on one plane and another tensile stress of 600 MPa on a plane at right angles to the former. It is also subjected to a shear stress of 400 MPa on the same planes. The maximum normal stress will be
Option A:	400 MPa
Option B:	500 MPa
Option C:	900 MPa
Option D:	1400 MPa
3.	If the slenderness ratio for a column is 100, then it is said to be a _____ column.
Option A:	Long
Option B:	Medium
Option C:	Short
Option D:	Intermediate
4.	The extreme bending moment caused by total of UDL (W) on a cantilever beam of span (L) is
Option A:	WL/2
Option B:	WL/8
Option C:	WL/4
Option D:	WL/12
5.	The maximum bending moment for the beam shown in the below figure, lies at a distance of _____ from the end B.
Option A:	L/2
Option B:	L/3
Option C:	L/√2

Option D:	L/√3
6.	Which of the following assumptions are made in torsion theory?
Option A:	Shaft is perfectly straight
Option B:	Material of the shaft is heterogeneous
Option C:	Twist cannot be uniform along the length of the shaft
Option D:	Torsion is not constant along the length
7.	Strain energy stored in a uniform bar is given as _____
Option A:	$(\sigma E/ 2A)$
Option B:	$(\sigma L/ 2AE)$
Option C:	$(\sigma^2 AL/ 4E)$
Option D:	$(\sigma^2 AL/ 2E)$
8.	Which of the following is a differential equation for deflection?
Option A:	$dy / dx = (M/EI)$
Option B:	$dy / dx = (MI/E)$
Option C:	$d^2y / dx^2 = (M/EI)$
Option D:	$d^2y / dx^2 = (ME/I)$
9.	A simply supported beam carries uniformly distributed load of 20 kN/m over the length of 5 m. If flexural rigidity is 30000 kN.m², what is the maximum deflection in the beam?
Option A:	5.4 mm
Option B:	1.08 mm
Option C:	6.2 mm
Option D:	8.6 mm
10.	The S.I. unit of torsional rigidity is....................
Option A:	Nm
Option B:	N.m²
Option C:	Nm/ radian
Option D:	Nm²/ radian

Q2	Solve any Two Questions out of Three	10 marks each
A	A copper bar 50mm in diameter is placed within a steel tube 75mm external diameter and 50 mm internal diameter of exactly the same length. The two pieces are rigidly fixed together by two pins 18mm in diameter, one at each end passing through the bar and tube. Calculate the stresses induced in the copper bar, steel tube and pins if the temperature of the combination is raised by 50°C. Take $E_s = 210$ GPa; $E_c = 105$ GPa; Coefficient of thermal expansion of steel = $11.5 \times 10^{-6}/^0$C; Coefficient of thermal expansion of copper = $17 \times 10^{-6}/^0$C.	
B	For the beam loaded as shown in figure, Draw S.F. and S.M. diagrams. Also locate point of contraflexure if any.	

C	A hollow shaft having and internal diameter 40% of its external diameter transmits 562.5 KW power at 100 rpm. Determine the external diameter of the shaft if the shear stress is not to exceed 60 N/mm^2 and twist in the length of 2.5 m should not exceed 1.3 degrees. Assuming maximum torque as 1.25 times the mean torque and modulus of rigidity as 9x10^4 N/mm^2.

Q3.	Solve any Two Questions out of Three	10 marks each
A	Find the deflections of points B and C for the beam shown in figure. Assume El =constant. Point A is a fixed support and point E is a roller support in the figure.	
B	A T-shaped cross section of a beam having flange of 50x200 mm and web of 200x50 mm, is subjected to a vertical shear force of 100 KN. Calculate the shear stress at important points and draw shear stress distribution diagram. Take Moment of Inertia about horizontal neutral axis is 113.4 x 10^6 mm^4.	
C	Find the Euler crushing load for a hollow cylindrical cast iron column 200 mm external diameter and 25 mm thick. If it is 6 m long and hinged at both ends. Take E = 1.2 x 10^6 N/mm^2. Compare the load with crushing load as given by Rankine's formula, take σ_c = 550 N/mm^2 and α = 1/1600.	

Q4	Solve any Two Questions out of Three	10 marks each
A	A cylindrical thin drum 800 mm in diameter and 3 m long has a shell thickness of 10 mm. if the drum is subjected to an internal pressure of 2.5 N/mm^2, determine (i) change in diameter, (ii) change in length and (iii) change in volume. Take E = 2 x 10^5 N/mm^2 and Poisson's ratio = 0.25	
B	A rod 12.5 mm in diameter is stretched 3.2 mm under a steady load of 10 KN. What stress would be produced in the bar by a weight of 700 N, falling through 75 mm before commencing to stretch, the rod being initially unstressed? Take value of E as 2.1 x 10^5 N/mm^2.	
C	At a point within the body subjected to two mutually perpendicular directions, the stresses are 20 N/mm^2 and tensile 10 N/mm^2 tensile. Each of above stress is accomplished by a shear stress of 10 N/mm^2. Determine the principal stresses and principal planes by using Mohr circle method.	

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Mech-Sem-III- C-scheme
Sub: PP
09/6/2022 -Evening

University of Mumbai
Examinations summer 2022

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Which of the following is not a primary shaping process
Option A:	Powder Metallurgy
Option B:	Metal Forming
Option C:	Welding
Option D:	Casting
2.	In which of the following welding process the source of heat is the arc generated between anode and cathode?
Option A:	Resistance welding
Option B:	Gas welding
Option C:	Arc welding
Option D:	Seam welding
3.	Weldability of metals depends on which of the following parameters?
Option A:	Melting point of metals
Option B:	Yield point
Option C:	Breakeven point
Option D:	Ultimate point
4.	Back gear is used in lathe machine to
Option A:	Change the direction of rotation
Option B:	Increase the speed of rotation
Option C:	Decrease the speed of rotation
Option D:	Maintain the continuous speed
5.	Segmental chips are formed during machining
Option A:	Mild steel
Option B:	Cast Iron
Option C:	High speed steel
Option D:	High carbon steel
6.	The purpose of grinding operation is
Option A:	To cut harder material
Option B:	To get good surface finish
Option C:	To maintain dimensional accuracy
Option D:	All of above
7.	Which of the following is not traditional machining?
Option A:	Turning
Option B:	Abrasive jet machining
Option C:	Milling
Option D:	Drilling
8.	Which of the unconventional process can be used effectively for machining of plastic material?

Option A:	Electro chemical machining
Option B:	Laser beam machining
Option C:	Electric discharge machining
Option D:	Ultrasonic machining
9.	Which of the following not uses mechanical energy for metal removal
Option A:	Abrasive Jet Machining
Option B:	Ultrasonic Machining
Option C:	Laser beam Machining
Option D:	Water jet machining
10.	Which of the following is not IoT Technology
Option A:	Cloud computing
Option B:	RFID
Option C:	EBM
Option D:	Big data analysis

Please use either of the 3 option given below while setting up the subjective/descriptive questions

Q2,	Solve any Four out of Six	5 marks each
A	What are desirable properties of moulding sand	
B	Write short note on adhesive bonding	
C	Explain various defects in rolled parts	
D	Compare lapping and honing machines	
E	Explain ultrasonic machining	
F	Describe rotational moulding with neat sketch	

Option 2

Q3	Solve any Two Questions out of Three	10 marks each
A	What is pattern? Explain various types of pattern with neat sketches.	
B	Explain various methods of gear manufacturing	
C	Write stepwise procedure of powder metallurgy with neat sketch	

Option 3

Q4.	Solve the following	
A	Solve any Two	5 marks each
i.	Compare shaper and planer	
ii.	What is riser, also mentions types and functions of riser	
iii.	Differentiate between blanking and punching operation	
B	Solve any One	10 marks each
i.	Write short note on classification of welding	
ii.	What are various types of forging, compare drop forging with press forging	

Sub - IR@AIKTC-KRRC III
Dept: Mechanical

QPcode: 90961

13/06/2022

University of Mumbai
Examinations Summer 2022

R-19

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	In case of an edge dislocation the relation between burger vector and dislocation line is
Option A:	Parallel
Option B:	Inclined at 45 degree
Option C:	Inclined at 45 degree
Option D:	Perpendicular
2.	The increase in strength and hardness due to cold working is called as
Option A:	Creep
Option B:	Work Hardening
Option C:	Fatigue
Option D:	Recrystallization
3.	Which of the following can be categorised as an open moulding composite manufacturing process
Option A:	Hand Layup Process
Option B:	Resin Transfer Moulding
Option C:	Vacuum Bagging
Option D:	Sheet Moulding Compounds
4.	The following is not a phase transformation occurring on Fe-Fe3C equilibrium diagram
Option A:	Eutectoid
Option B:	Eutectic
Option C:	Peritectic
Option D:	Peritectoid
5.	The test to determine hardenability of steel is
Option A:	Jominy End Quench Test
Option B:	Fatigue Test
Option C:	Creep Test
Option D:	Tension Test
6.	Which of the following nondestructive test can't be applied to a non-conducting material
Option A:	Die penetrant test
Option B:	Radiographic test
Option C:	Ultrasonic test
Option D:	Magnetic particle test
7.	The heat treatment carried out to reduce brittleness caused by hardening heat treatment is called as
Option A:	Annealing
Option B:	Normalizing
Option C:	Tempering
Option D:	Hardening

8.	Which of the following surface hardening methods is best suited for symmetrical parts
Option A:	Induction Hardening
Option B:	Carburising
Option C:	Nitriding
Option D:	Cyniding
9.	The stress at which the material will not fail for an infinite number of cycles of fatigue load is called as
Option A:	Endurance limit
Option B:	Fatigue strength
Option C:	Fatigue life
Option D:	Tensile fatigue
10.	The creep rate remains almost constant during
Option A:	Primary Creep
Option B:	Secondary creep
Option C:	Tertiary creep
Option D:	It never remains constant

Q2 (20 Marks)		
A	Solve any Two	5 marks each
i.	Classify defects in materials and explain point defects in detail.	
ii.	Classify nondestructive testing of materials. Explain Magnetic particle test in detail.	
iii.	What are the stages of creep in material? Explain with the help of a neat sketch.	
B	Solve any One	10 marks each
i.	Derive an expression for Griffiths Theory of Brittle fracture.	
ii.	Explain slow cooling of steel of hypo eutectoid composition.	
Q3 (20 Marks)		
A	Solve any Two	5 marks each
i.	What is the difference between slip and twining? Explain the deformation of material by slip in detail.	
ii.	Explain flame hardening process in details.	
iii.	What are polymers? Explain their advantages over metallic materials.	
B	Solve any One	10 marks each
i.	What is strain hardening? Explain the steps of recrystallization annealing clearly showing the changes that are observed in ductility and tensile strength of the material during each step.	
ii.	State various processing methods of composite materials.	
Q4 (20 Marks)		
A	Solve any Two	5 marks each
i.	State the process for synthesis of nano materials in detail.	
ii.	Explain solid carburizing process with the help of a neat sketch.	
iii.	What are alloy steels? Give their brief classification.	
B	Solve any One	10 marks each
i.	Draw Fe-Fe3C equilibrium diagram and locate all the important temperatures, compositions and phases on it.	
ii.	What is Fatigue of material? Explain the procedure for plotting SN curve of a given material using fatigue test. State endurance limit, fatigue strength and fatigue life through SN curve.	