

JS UNIVERSITY

ASSIGNMENT FOR B.TECH IN MECHANICAL - 3rd SEM.

The Assignment will consist of two parts, A and B. Part A will have 5 short answer questions(40-60words) of 4 marks each. Part B will have 4 long answer questions of 5 marks each.

All questions are compulsory.

These Assignments should be completed and submitted in written form by the student to his/her respective Faculty/ Examiners. Assignment Submission Dates are:Dec-2023

List Of Suggested Questions

The list of suggested questions is for students to practice. Although optional, we recommend that student's solve these questions, as they will help them in preparing for exams as well as in clearing the important concepts of the subject.

List of Practical and suggested practical's

The list of practical's should be done by the students in their Lab Sessions. These are the basic Practical's, which each student should be able to do himself independently. While the list of Suggested practical's are optional, but it is recommended that students should perform those practical so as to have a thorough knowledge of the subject.

Education Delivery Schedule (EDS)

As per University Semester scheme, the minimum contact hours of each paper has been Divided into two hours theory and practical class. The faculty will maintain this attendance paper wise for his/her batch.

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SUBJECT CODE	SUBJECT NAME
BTME-1	Engineering Mathematics-III
BTME-2	Fluid Mechanics
BTME-3	Mechanics of Solids
BTME-4	Material Science
BTME-5	Thermodynamics
BTME-6	Industrial Psychology

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ID NUMBER

NAME

COURSE

STREAM

SEM 3rd

SUBJECT CODE.....

SUBJECT NAME

Assignments will be completed by the Student in his/her own handwriting.

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BTAS – 31 ENGG. MATHEMATICS – III PART – A

1. What is the analytic function and properties of analytic function ?
2. Differentiation $\log(\sin\sqrt{x^3})$.
3. Solve $\int \tan x \, dx$.
4. Solve $\int e^x \sin x \, dx$.
5. Solve $\int \sin 2x \sin 3x \sin 4x \, dx$.

PART – B

1. Consider the time series data given below.

x_i	8	3	2	10	11	3	6	5	6	8
y_i	4	12	1	12	9	4	9	6	1	14

Use the least square method to determine the line of best fit for the data then plot the line .

2. What do you mean by finite difference and what is the backward difference ?

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FLUID MECHANICS

PART-A

1. What is fluid define ideal fluid and properties of fluids ?
2. What is the difference between a steady and unsteady flow and uniform and non-uniform flow in an open channel flow?
3. What are the applications of Bernoulli's equation in real life?
4. Find the force exerted by a jet of water of diameter 50 mm on a stationary flat plate when the jet strikes the plate normally with a velocity of 18 m/s.
5. What is the mean velocity of laminar flow through a pipe?

PART-B

1. Give the various characteristics of the critical state of flow through a channel section.
2. For a constant specific energy of 2.1 N.m/N, calculate the maximum discharge that may occur in a rectangular channel 6.0 m wide.

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MECHANICS OF SOLIDS

PART-A

1. Derive the relation between Shear Force, Bending Moment and rate of loading at a section of a beam.
2. The shear force diagram for a cantilever beam of length 3 m is varying linearly from a value of 12 N at the fixed end to a value of zero at the free end. Determine the loading on the cantilever beam.
3. The tension flange of a cast iron I section beam is 240 mm wide and 50 mm deep, the compression flange is 100 mm wide and 20 mm deep where as the web is 300 mm deep and 30 mm thick. Find the load per unit run which can be carried over a 4 m span of a simply supported beam if the maximum permissible stresses are 90 MPa in compression and 24 MPa in tension.
4. A hollow shaft having an internal diameter 50% of its external diameter transmits 600 kW of power at 200 rpm. Determine the external diameter of the shaft if the shear stress is not to exceed 65 MPa and the twist in the length of 3 m shaft should not exceed 1.5 degrees. Take modulus of rigidity = 100 GPa.
5. A cylindrical vessel is 1.5 m diameter and 4 m long is closed at ends by rigid plates. It is subjected to an internal pressure of 3 MPa. If the maximum principal stress is not to exceed 150 MPa, find the thickness of the shell. Also find the changes in diameter, length and volume of the shell. Take Young's modulus = 200 GPa and Poisson's ratio = 0.25.

PART-B

1. A bolt is subjected to an axial pull of 9 kN and a transverse shear of 4.5 kN. Determine the diameter of the bolt if the elastic limit in tension is 225 MPa using maximum principal stress theory and the maximum shear stress theory. Assume a factor of safety of 3.
2. Explain the terms: Polar Sectional Modulus, Torsional rigidity and Torsional stiffness.

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MATERIAL SCIENCE

PART-A

1. What are the concepts of the modern atomic theory?
2. What are defects and dislocations in solids?
3. Which method is used to test the strength of an object?
4. What is the study of the microstructure of metals and alloys?
5. What are the different types of heat treatment on metals?

PART-B

1. What are the classification and application of dielectric materials?
2. What is a fatigue fracture in detail and different steps involved?

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THERMODYNAMICS

PART-A

1. Give the Clausius statement of the second law.
2. What is a PMM2 ? Why is it Impossible ? Explain.
3. Write short notes on any four of the following :
 - a. Point function
 - b. Quasi-static process
 - c. Specific heat at constant pressure (C_p)
 - d. Irreversibility
 - e. Availability
 - f. Heat engine
4. What is Entropy? What is the principle of Increase of Entropy ? Explain.
5. Explain first law of thermodynamics with joule's experiments.

PART-B

1. What is ideal gas? Derive the expression for gas constant and what is the numeric value of gas Constant ?
2. State whether the following statements are true or false :
 - a. Energy can flow in and out of a closed system, but mass cannot.
 - b. Mixture of ice and water is a heterogeneous system.
 - c. Amount of work done is a point function
 - d. The cyclic integral of a thermodynamics property is always zero.
 - e. It is not possible to construct a PMM1.

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INDUSTRIAL PSYCHOLOGY

PART-A

1. What is industrial psychology? Give examples of two roles that an industrial psychologist is likely to play in an organization.
2. Explain the following terms.
 - a. Central attitudes
 - b. Peripheral attitudes
 - c. Job satisfaction
 - d. Job involvement
 - e. Organization commitment
3. The characteristics involved can either be psychologically good or bad for the employees.
4. Explain the physical and psychological problems associated with unemployment or “bad” employment.
5. Discuss the various fields of industrial psychology.

PART-B

1. Discuss the various occupational oriented personality theories.
2. Highlight six of the things employees most wish to experience in their jobs and the work place in general.