

**MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR**  
**SEMESTER END THEORY EXAMINATION, B.Tech. Dairy Technology 2018-19**

Semester	: VI (V Dean)	Academic Year	: 2018-2019
Course No.	: DE- 613	Course Title	: Material Strength & Dairy Machine Design
Credits	: 2+1=3	Total Marks	: 50
Day & Date	: Monday, 24.06.2019	Time	: 11.00 to 13.00 Hrs.

- Note :** 1) All questions from **Section 'A'** are compulsory.  
2) Solve **Any Three** questions from **Section 'B'**.  
3) Draw neat and well labelled diagram wherever necessary.

**SECTION - 'A'**

- Q.1 A) Choose the most appropriate answer from the options given below. (05)
- i) The ratio of Young's modulus to the Bulk modulus is about .....
    - a) Less than half
    - b) Depends on Poisson's ratio
    - c) More than one third
    - d) Less than one third
  - ii) A ..... is a element used to connect two shafts together at their ends for the purpose of transmitting power
    - a) Coupling
    - b) Gear
    - c) Rope
    - d) Chain
  - iii) Which of the following property is desirable in parts subjected to shock and impact loads?
    - a) Strength
    - b) Stiffness
    - c) Brittleness
    - d) Toughness
  - iv) A leaf spring in automobiles is used to .....
    - a) apply forces
    - b) measure forces
    - c) absorb shocks
    - d) store strain energy
  - v) Antifriction bearings are .....
    - a) Thick lubricated bearings
    - b) Plastic Bearings
    - c) Thin lubricated bearings
    - d) Ball and Roller bearings
- B) Define the following (05)
- i) Ductility
  - ii) Law of Dynamic friction
  - iii) Poisson's Ratio
  - iv) Factor of Safety
  - v) Shaft
- Q.2 A) Give the values of moment of inertia for the following sections about X axis (05) passing through their center of gravity.
- i) Rectangle with breadth 'b' and depth 'd'.
  - ii) Circle with diameter 'd'.
  - iii) Hollow circle with external diameter 'D' and internal diameter 'd'.
  - iv) Hollow rectangle with external breadth 'B' and depth 'D' and internal breadth 'b' and depth 'd'.
  - v) Triangle with base 'b' and height 'h'.



- B) State whether the following the statements are True or False. If false, rewrite the statement after making necessary corrections. (05)
- A beam extending beyond the supports is called a cantilever beam.
  - Proportional limit is defined as the stress at which the stress-strain curve begins to deviate from the straight line.
  - When equal and opposite forces applied to a body tend to elongate it, the stress produced is called tensile stress.
  - The property of the material by which it can be rolled into thin plates is called malleability.
  - The dimension of strain is  $LT^{-2}$ .

### SECTION – 'B'

- Q. 3 A) Explain different modes of power transmission? (05)  
 B) A mild steel rod supports a tensile load of 50 kN. If the stress in the rod is limited to 100 MPa, find the size of the rod when the cross-section is circular. (05)
- Q. 4 A) What is moment of inertia? State the theorems of parallel and perpendicular axes. (05)  
 B) What is force? Explain the parallelogram law of resultant force. (05)
- Q. 5 A) Give the classification of engineering materials. (03)  
 B) How do you select factor of safety? (03)  
 C) Explain different types of springs with neat diagrams. (04)
- Q. 6. A) Explain equilibrium of forces and state Lami's Theorem. (03)  
 B) A solid steel shaft is to transmit a torque of 10000 kg-m. If the shearing stress is not to exceed  $450 \text{ kg/cm}^2$ . Find the minimum diameter of the shaft. (03)  
 C) Explain the general procedure for design of machine element. (04)
- Q. 7 What is Hooke's law? Explain the stress-strain diagram for metals. State the relation between Young's modulus, shear modulus and Bulk modulus for an engineering material. (10)

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