

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER- VI EXAMINATION – SUMMER 2026

Subject Code:3160312

Date:26-05-2026

Subject Name: Computational fluid dynamics in Biomedical Systems

Time:10:30 AM TO 01:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define the following terms: 1) Shear stress 2) Newtonian fluid **03**
(b) Describe in details the classification of fluids. **04**
(c) Write a note on properties, flow phenomena and applications of bio viscoelastic fluids. **07**
- Q.2** (a) What is Navier-Stokes equations? Discuss its applications. **03**
(b) Describe the generalized governing equations of fluid motion. **04**
(c) Explain Bernoulli's equation and its physiological relevance. **07**
- OR**
- (c) Explain the Lagrangian description of fluid motion. **07**
- Q.3** (a) Explain postprocessing discretization principle. **03**
(b) What is Reynolds number? Define Reynolds transport theorem. **04**
(c) Draw and explain blood vessel mechanics. **07**
- OR**
- Q.3** (a) What is synovial fluid? **03**
(b) Describe the preprocessing discretization principle. **04**
(c) Write a note on structured mesh systems and its properties. **07**
- Q.4** (a) In terms of fluid dynamics, what is FEM, FDM and FVM? **03**
(b) Explain the principle of finite volume method. **04**
(c) Describe the application of finite difference method. **07**
- OR**
- Q.4** (a) Describe the applications of finite volume method. **03**
(b) Discuss the principle of finite difference method. **04**
(c) Explain in detail the principle and application of finite element method. **07**
- Q.5** (a) Describe the use of CFD analysis in the human respiratory system. **03**
(b) Explain the Eulerian description of fluid motion. **04**
(c) Write a note on CFD analysis of the human circulation. **07**
- OR**
- Q.5** (a) Discuss the generalized applications of CFD. **03**
(b) Describe the Bio-Microfluidic device application of CFD. **04**
(c) Explain the applications of CFD in Biomedical. **07**
