BIRLA INSTITUTE OF TECHNOLOGY
MESRA – 835215, RANCHI, INDIA

UG

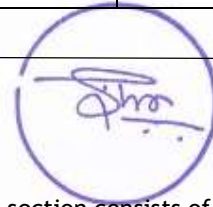Name: ……………………………………………. Roll No.: ………………………………………..

Branch: …………………………………………. Signature of Invigilator: ……………………

Semester: IVth   Date: 28/04/2022 (MORNING)

Subject with Code: **FT212 FLUID MECHANICS AND MECHANICAL OPERATIONS**

Marks Obtained	Section A (30)	Section B (20)	Total Marks (50)

INSTRUCTION TO CANDIDATE

1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.

2. The booklet will be distributed to the candidates before 05 minutes of the examination. **Candidates should write their roll no. in each page of the booklet.**

3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.

4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.

5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.

6. Write on both side of the leaf and use pens with same ink.

7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.

8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.

9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.

10. Always maintain the highest level of integrity. Remember you are a BITian.

11. Candidates need to **submit the question paper cum answer sheets before leaving the examination hall**.

CLASS : IMSC	SEMESTER: IV
BRANCH : FOOD TECHNOLOGY	SESSION: SP/2022

SUBJECT: FT212 – FLUID MECHANICS AND MECHANICAL OPERATIONS	

TIME : 2 HOURS	FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains (PART A) 30 multiple choice questions each of 01 marks and candidates may attempt all questions.
2. The question paper also contains (PART B) 5 short answer questions each of 05 marks and candidates may attempt any 4 questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.

PART A (MCQs)

Q1.	If a small concrete cube is submerged deep in still water in such a way that the pressure exerted on all faces of the cube is P, then the maximum shear stress developed inside the cube is
	    a) 0
	    b) P/2
	    c) P
	    d) 2P
		[1]

Q2.	Differential manometer measures the
	    a) Absolute pressure
	    b) Gauge pressure
	    c) Pressure difference
	    d) Pressure gradient
		[1]

Q3.	The ratio of weight of fluid to the volume of the fluid is called as _____
	    a) partial weight
	    b) partial volume
	    c) specific weight
	    d) specific volume
		[1]

Q4.	Which one of the following is a major loss?
	    a) frictional loss
	    b) shock loss
	    c) entry loss
	    d) exit loss
		[1]

Q5.	Where does the maximum stress occur in case of laminar flow of incompressible fluid in a circular pipe of diameter 'd'?
	    a) At the centre
	    b) At the wall
	    c) At d/4 from the wall
	    d) At d/8 from the wall
		[1]

Q6.	The capillary viscometer is based on _____ flow theory.
	    a) Fully developed Laminar flow
	    b) Turbulent flow
	    c) Neither Laminar nor turbulent
	    d) None of the above
		[1]

Q7.	Which of the factors primarily decide whether the flow in a circular pipe is laminar or turbulent?
	    a) The Prandtl Number
	    b) The Pressure gradient along the length of the pipe
	    c) The dynamic viscosity coefficient
	    d) The Reynolds Number
		[1]

Q8.	The coefficient of discharge for orifice meter is much _____ than that of a venturi meter.
	    a) Smaller
	    b) Greater
	    c) Equal
	    d) Neither smaller nor greater
		[1]

Q9.	It is device used for measuring the velocity of flow at any point in a pipe or a channel.
	    a) Venturi meter
	    b) Orifice meter
	    c) Pitot tube
	    d) All of the above
		[1]

Q10.	The ratio of power output of the pump to the power input to the pump is known as _____ a) Mechanical Efficiency b) Overall Efficiency c) Manometric efficiency d) None of the above	[1]
Q11.	Impellers that generate currents parallel with the axis of the impeller shaft are called: a) Radial flow impellers b) Axial flow impellers c) Tangential flow impellers d) None of the above	[1]
Q12.	Which type of impeller may be used for liquids of low viscosity. a) Propeller b) Turbine c) Paddle d) None of the above	[1]
Q13.	The component of the total force in the direction of motion is called _____ a) Lift b) Drag c) Neither lift nor drag d) All of the above	[1]
Q14.	The ratio of driving force ie., the pressure difference across the filters to the resistance to flow is called as _____ a) Rate of filtration b) Rate of transmission c) Rate of Expression d) None of the above	[1]
Q15.	If the axis of the body is parallel to the direction of fluid flow, then the lift force is _____. a) Parallel b) Perpendicular c) 0 d) 1	[1]
Q16.	The drag force acts in _____ to the flow velocity. a) Perpendicular direction b) Parallel direction c) Opposite direction d) Different directions	[1]
Q17.	Which among the following is the correct formula for lift force? a) $FL = CL * A * 0.5 * \rho * V*3$ b) $FL = CL * A * 0.5 * \rho * V*2$ c) $FL = Cd * A * 0.5 * \rho * V/2$ d) $FL = 0.5 * \rho * V$	[1]
Q18.	At high velocities, fluid drag plus buoyancy overcome the gravitational force and the bed expands is called as_____ a) Fluidized bed b) Fixed bed c) High velocity d) None of the above	[1]
Q19.	Statement 1: Foreign objects entering food is called physical contamination of food. Statement 2: Controlling moisture is the only precaution to be taken to prevent food contamination. a) True, False b) True, True c) False, False d) False, True	[1]
Q20.	In all types of size reduction _____ forces are used to reduce the size of foods. a) Compression force b) Impact force c) Shearing force d) All of the mentioned	[1]
Q21.	What is the flow rate of materials in a bucket conveyor dependent on? a) Shape of the buckets b) Spacing of the buckets c) Speed of the conveyor d) All of the mentioned	[1]
Q22.	The presence of _____ in processed foods is the main cause of prosecution of food companies.	[1]

		a) Foreign bodies b) Nitrogen c) Oxygen d) Carbon di-oxide	

Q23.		Harder foods absorb _____ energy and consequently require a greater energy input to create fractures.
		    a) More
		    b) Less
		    c) Medium
		    d) None of the above
			[1]

Q24.		Which of the following is NOT a method used for size reduction?
		    a) Cutting
		    b) Impact
		    c) Burning
		    d) Shear
			[1]

Q25.		More viscous liquids are mixed using multiple paddle (gate) agitators to develop _____.
		    a) high shearing forces
		    b) low shearing forces
		    c) high tumbling forces
		    d) low tumbling forces
			[1]

Q26.		_____ is a ratio of the standard deviation of various products during mixing to that at zero mixing.
		    a) Zero Index
		    b) One Index
		    c) Standard Index
		    d) None of the mentioned
			[1]

Q27.		If the food is heated above 100ºC the process is known as _____
		    a) Injection cooking
		    b) extrusion cooking
		    c) Cold cooking
		    d) None of the above
			[1]

Q28.		In single-screw extruders, the _____ constitutes the major part of the energy input.
		    a) External heat
		    b) Both External and Internal heat
		    c) Internally generated heat
		    d) None of the above
			[1]

Q29.		_____ is a unit operation in which a uniform mixture is obtained from two or more components, by dispersing one within the other(s).
		    a) Mixing
		    b) Peeling
		    c) Grading
		    d) Cooling
			[1]

Q30.		Which of the following products is manufactured using the cold extrusion process?
		    a) Corn flakes
		    b) Soy protein
		    c) Apple cider
		    d) None of the mentioned
			[1]

PART B

NOTE: This section contains (PART B) 5 short answer questions each of 05 marks and candidates may attempt any 04 questions.

Q1.		Derive Bernoulli's Equation from Euler's Equation?	[5]
Q2.		Write short notes on centrifugal pump with a neat sketch?	[5]
Q3.		Experiments were conducted in a wind tunnel with a wind speed of 50 km/hour on a flat plate of size 2 m long and 1 m wide. The density of air is 1.15 kg/m^3. The co-efficient of lift and drag are 0.75 and 0.15 respectively. Determine 1. The lift force 2. The drag force 3. the resultant force 4. Power exerted by air on the plate	[5]
Q4.		Discuss the methods of peeling?	[5]

Q5.		Write short notes on
		    a) Extrusion cooking
		    b) Cold Extrusion
			[2x2.5=5]