BT 36

Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 1003

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN. 2023
Third Semester
Biotechnology

U15GE305 – FLUID MECHANICS AND MOMENTUM TRANSFER
(Regulation 2015)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define fluid statics.	2	K1	CO1
2.	What is meant by Hydrostatic equilibrium?	2	K2	CO1
3.	Differentiate Newtonian and Non-Newtonian fluids.	2	K2	CO2
4.	State the applications of Bernoulli's equation.	2	K1	CO2
5.	Define drag coefficient.	2	K1	CO2
6.	What is hindered settling?	2	K2	CO3
7.	Recall the effects of cavitation.	2	K1	CO4
8.	Define vena-contracta.	2	K1	CO4
9.	State the law of conservation of momentum.	2	K1	CO3
10.	What do you mean by one dimensional flow?	2	K2	CO4

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Discuss the Buckingham's π-theorem method of dimensional analysis.	7	K2	CO1
		ii.	State the significance of the following dimensionless numbers in fluid flow problems: Reynolds number, Froude's number and Mach's number.	6	K1	CO1
			(OR)			
	b)	i.	A simple U-tube manometer containing mercury is connected to a pipe in which an oil sp. gravity 0.8 is flowing. The pressure in the pipe is vacuum. The other end of the manometer is open to the atmosphere. Calculate the vacuum pressure in the pipe, if the difference of mercury level in the two limbs is 20 cm and height of oil in the left limb from the centre of the pipe is 15 cm below.	8	K3	CO1
		ii.	Explain the working principle of continuous gravity decanter.	5	K1	CO1
12.	a)		Derive the continuity equation in three dimensional rectangular coordinates.	13	K2	CO2
			(OR)			
	b)		State Bernoulli's theorem for steady flow of an incompressible fluid. Derive an expression for Bernoulli's equation and list the assumptions made.	13	K2	CO2
13.	a)		Derive Ergun's equation for flow through bed of solids.	13	K2	CO3
			(OR)			
	b)	i.	Derive an expression for terminal velocity in the Stoke's law range.	6	K2	CO3
		ii.	A metallic sphere of specific gravity 7.0 falls in an oil of density 800 kg/m^3. The diameter of the sphere is 8 mm and it attains a terminal velocity of 40 mm/s. Determine the viscosity of the oil in poise.	7	K3	CO3
14.	a)	i.	Sketch and discuss the operating characteristics of a centrifugal pump.	7	K1	CO4
		ii.	An orifice of diameter 150 mm is fitted at the bottom of a boiler drum of length 8 m and of diameter 3 metres. The drum is horizontal and contains water upto a height of 2.4 m. Determine the time required to empty the boiler. Take C_d =0.6.	6	K3	CO4

(OR)

b)	i.	Illustrate the principle and working features of a venturi meter and rotameter with neat diagrams.	10	K1	CO4
	ii.	Why is priming necessary in centrifugal pumps? Explain.	3	K2	CO4
15. a)		Explain the transport properties and mechanism of momentum transport.	13	K2	CO4

(OR)

b)		With the momentum balance equation, explain one dimensional transport in laminar flow.	13	K3	CO4

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16. a)		Discuss in detail the application of fluid statics with suitable examples.	15	K2	CO2

(OR)

b)	i.	Develop the concept of viscosity for the Newtonian Fluids and explain the rheological models of the non-newtonian fluids.	10	K3	CO1
	ii.	Explain the concept of boundary layers.	5	K2	CO1

Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 9025

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN. 2023

Third Semester

Biotechnology

U15BT302 – GENETICS AND MOLECULAR BIOLOGY

(Regulation 2015)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	State the law of independent assortment. When does it take place?	2	K1	CO1
2.	In what way a genetic map differs from a physical map?	2	K2	CO1
3.	What is eugenics?	2	K1	CO2
4.	How genetics finds application in agriculture?	2	K2	CO2
5.	What is the significance of telomerase?	2	K2	CO3
6.	Define post-transcriptional modification.	2	K1	CO3
7.	Differentiate between Co and Post translational modification of protein.	2	K2	CO3
8.	What is phosphorylation and glycosylation?	2	K1	CO3
9.	How transcription factors help in the process of transcription?	2	K2	CO4
10.	What are ribozymes?	2	K1	CO4

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Describe the types of genetic linkage with examples.	13	K1	CO1
		(OR)			
	b)	Explain the steps involved in construction of genetic linkage map.	13	K1	CO1
12.	a)	What is mutation? Discuss the factors responsible and types of mutation.	13	K1	CO2
		(OR)			
	b)	Write down the causes and symptoms of the following genetic disorders			
		i. Down syndrome	4	K2	CO2
		ii. Klinefelter syndrome	3		
		iii. Turner syndrome and	3		
		iv. Trisomy 18	3		
13.	a)	Give an account on the events taking place during eukaryotic DNA replication.	13	K1	CO3
		(OR)			
	b)	Elaborate on homologous and non-homologous end joining of double stranded break.	13	K3	CO3
14.	a)	Discuss the different phases of translation in prokaryote.	13	K1	CO3
		(OR)			
	b)	Give an overview on molecular mechanism of translational control.	13	K2	CO3
15.	a)	Discuss the role of RNAi and miRNA in gene silencing.	13	K2	CO4
		(OR)			
	b)	Explain the steps involved in genome sequencing.	13	K1	CO4

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	DNA cloning can benefit the society. Discuss.	15	K3	CO4
		(OR)			
	b)	In what way Gregor Mendel was responsible for understanding the basis of inheritance?	15	K3	CO1

Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 9024

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN. 2023

Third Semester

Biotechnology

U19BT304 – INDUSTRIAL BIOTECHNOLOGICAL PRODUCTS

(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are the different types of media used in bacterial culture?	2	K1	CO1
2.	What is the importance of downstream processing in industrial setting?	2	K2	CO2
3.	What is the preferred organism for production of citric acid - process of converting glucose to citric acid?	2	K2	CO2
4.	What are the organisms that produce ethanol from cellulose and lignocellulose?	2	K2	CO3
5.	Which steroid is used for microbial transformation?	2	K2	CO1
6.	What antibiotic class is penicillin and what is its chemical name?	2	K2	CO2
7.	What are SCPs and why they are harmful?	2	K3	CO2
8.	What are biofertilizers and list out the three main sources of biofertilizers?	2	K2	CO2
9.	What are Recombinant vaccines? Give an example?	2	K2	CO3
10.	What is the first human hormone produced by recombinant DNA technology?	2	K1	CO1

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Describe the principle behind Liquid-liquid extraction of biomolecules in downstream processing?	13	K3	CO3
		(OR)			
	b)	Describe the different chromatography methods used for protein purification?	13	K3	CO2
12.	a)	List the different substrates and their role in control of primary metabolism?	13	K4	CO5
		(OR)			
	b)	Draw a flow chart for the production of aromatic amino acids from bacterial sources, with a focus on L-Phenylalanine?	13	K3	CO3
13.	a)	Draw a flow chart for penicillin production by *Penicillium chrysogenum*?	13	K3	CO2
		(OR)			
	b)	What are the different methods of microbiological strain improvement for industrial production purpose?	13	K3	CO2
14.	a)	i. What is biodiesel and how is it produced?	6	K3	CO3
		ii. What are the advantages and disadvantages of biodiesel?	7		
		(OR)			
	b)	Write a detailed note on industrial production of beer?	13	K3	CO4
15.	a)	Write a note on the plant cell culture strategies for the production of natural products?	13	K4	CO5
		(OR)			
	b)	What are the steps in the process for producing insulin using recombinant DNA?	13	K3	CO4

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Draw a flow chart for Organisational set-up in an industrial microbiology establishment and describe it in detail?	15	K4	CO5
		(OR)			
	b)	i. Write about different types of vaccines.	8	K5	CO4
		ii. Compare conventional vaccines and modern vaccines with examples for each group.	7		

Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 9023

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN. 2023

Third Semester

Biotechnology

UT15BT301 – BIOPROCESS CALCULATION

(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are the assumptions underlying to establish the ideal gas equation of state?	2	K2	CO1
2.	Differentiate dew point and bubble point curve.	2	K1	CO1
3.	Define relative humidity and percentage humidity.	2	K1	CO2
4.	What is the significance of COX chart?	2	K2	CO2
5.	Mention the difference between evaporation and distillation.	2	K2	CO3
6.	Distinguish steady state form unsteady state process.	2	K1	CO3
7.	Differentiate stoichiometric proportion and ratio with example.	2	K2	CO4
8.	Define degrees of freedom.	2	K1	CO4
9.	State Hess's law of heat summation.	2	K2	CO5
10.	Give an example of limiting and extent reactant.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	A biochemist is interested in preparing 500ml of one normality, one molarity, one molality solution of H_2SO_4. Assuming the density of H_2SO_4 solution to be 1.075 g/cm^3, calculate the quantities of H_2SO_4 to be taken to prepare these solutions.	13	K3	CO1

(OR)

	b)	A gas mixture has the following composition by volume: SO_2=8.5%, O_2=10%, and N_2=81.5% Find i. the density of gas mixture at a temperature of 473 K and 202.65 KPa ii. composition by weight.	13	K3	CO1
12.	a)	The dry bulb temperature and dew point of ambient air were found to be 302K (29^0C) and 291K (18^0C) respectively. Barometer reads 100 kPa. Calculate i. Absolute humidity ii. the %RH iii. the % saturation iv. humid heat v. humid volume. Data: vapour pressure of water at 291 K=2.0624 kPa. vapour pressure of water at 302 k = 4.004 kPa.	13	K3	CO2

(OR)

	b)	Three hundred kilograms of a saturated solution of $AgNO_3$ at 373 K are cooled at 293 K, and the crystals are filtered out. The wet filter cake, which contains 80 % solid crystals and 20 % saturated solution by weight, passes to a dryer in which remaining water is evaporated. Calculate the fraction of $AgNO_3$ in feed stream eventually removed as dry crystals and the amount of water that must be removed in the drying stage Data: solubility of $AgNO_3$in water =952kg $AgNO_3$/ 100 Kg H_2O.	13	K3	CO2
13.	a)	The spent acid from a nitrating process contains 21% HNO_3, 55% H_2SO_4 and 24% H_2O by weight. This acid is to be concentrated to contain 28% HNO_3 and 62% H_2SO_4 by addition of concentrated sulphuric acid containing 93% H_2SO_4 and concentrated nitric acid containing HNO_3. Calculate the weights of spent acid, concentrated sulphuric acid and concentrated nitric acid that must be obtain 1000 kg of the desired mixture.	13	K3	CO3

(OR)

	b)	5000 Kg mixture of benzene and toluene containing 50 moles % benzene is distilled to get an overhead product containing 95 mole % benzene and a residue containing 90 mole % toluene. Calculate the weights of benzene and toluene in feed, distillate, and residue.	13	K3	CO3
14.	a)	50 Kg of naphthalene and 200 kg of sulphuric acid of 98% strength are charged to a pilot plant reactor. The reaction was carried at 433 K for 3 hours. The reaction goes to completion.	13	K3	CO4

The product distribution was found to be 18.6% monosulphonate naphthalene (MSN) and 81.4% disulphonate naphthalene (DSN). Calculate:

i. the quantities of MSN and DSN produced and
ii. the complete analysis of the product

(OR)

	b)	Discuss the material balance for recycle operation and purge operation with neat sketch for with chemical reactions.	13	K1	CO4
15.	a)	Derive an equation for influence of temperature on heat of reaction.	13	K2	CO5

(OR)

	b)	A combustion reactor is fed with 50 kmol/h of butane and 2000 kmol/h of air. Calculate the % excess air used and composition of the gases leaving combustion reactor assuming complete combustion of butane. Reaction: $C_4H_{10} + 13/2\ O_2 \rightarrow 4CO_2 + 5H_2O$.	13	K3	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Toluene is to be heated from 290 K to 350 K at the rate of 250 g/ s. Calculate the heat to be supplied to toluene using Cp°. Data: $Cp^\circ = a + bT + cT^2 + dT^3$, kJ (kmol.k)	15	K4	CO5

Given	a	b x 10^3	c x 10^6	d x 10^9
CO_2	1.8083	812.223	-1512.67	1630.01

(OR)

	b)	The ultimate analysis of coal sample is given below: carbon: 61.5%, hydrogen: 3.5%, sulphur : 0.4%, ash: 14.2%, nitrogen: 1.8% and rest oxygen. Calculate, i. theoretical oxygen requirement per unit weight of coal ii. theoretical dry air requirement per unit weight of coal iii. the orsat analysis of flue gases when coal is burned with 90% excess dry air.	15	K4	CO5

Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 9022

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN. 2023

Third Semester

Biotechnology

U19BT303 - INTRODUCTION TO BIOCHEMISTRY

(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	How many types of biomolecules are there?	2	K2	CO1
2.	Write any two functions of proteins.	2	K1	CO1
3.	Write about TCA cycle.	2	K1	CO1
4.	Mention the role of enzymes in metabolism.	2	K2	CO1
5.	What is nitrogen metabolism?	2	K1	CO1
6.	Clarify amino acids based on nature R groups.	2	K2	CO2
7.	What are the main contractile proteins and its functions?	2	K2	CO1
8.	What is the function of microtubule?	2	K1	CO4
9.	How many ATP are produced from oxidation of glucose?	2	K3	CO5
10.	What is electro negativity of an element?	2	K1	CO1

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Brief on classification and function of Carbohydrates.	13	K2	CO1
		(OR)			
	b)	Brief on classification, functions and reactions of nucleic acids.	13	K2	CO1
12.	a)	Elaborate the embden-Meyerhof pathway of glycolysis with flowchart.	13	K3	CO2
		(OR)			
	b)	Why pentose phosphate pathway is called shunt? Explain its process.	13	K4	CO2
13.	a)	Explain the metabolic disorders and define the molecules derived from amino acids.	13	K3	CO2
		(OR)			
	b)	Describe on biosynthesis of nucleotides and its metabolic regulation.	13	K2	CO2
14.	a)	Explain the role of microfilament in organelle movements.	13	K2	CO3
		(OR)			
	b)	Define contractile protein and explain the mechanism of myosin ATPase activity.	13	K3	CO4
15.	a)	Draw the structure of ATP and explain the electronegative potential of higher energy compounds.	13	K2	CO4
		(OR)			
	b)	Derive the ATP yield calculation during oxidation of gluclose and fatty acids.	13	K5	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Present an overview of amino acids biosynthesis by employing precursors from i. Glycolysis ii. Citric acid cycle	15	K5	CO4
		(OR)			
	b)	Elaborate the chemistry of lipids with suitable examples.	15	K5	CO5

Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 1002

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN.2023

Third Semester

Biotechnology

U19GE304 – UNIT OPERATIONS

(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

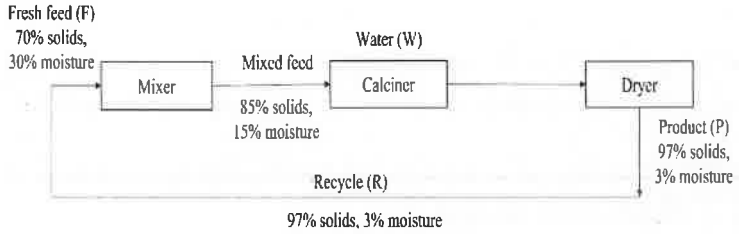
(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	A sample of gas at 25.0 °C has a volume of 11.0 L and exerts a pressure of 660.0 mmHg. How many moles of gas are in the sample?	2	K3	CO1
2.	Calculate the normality of a solution of NaOH if 0.4g of NaOH is dissolved in 100ml of the solution.	2	K3	CO1
3.	State the significance of the law of conservation of mass.	2	K2	CO2
4.	The groundnut seeds containing 45% oil and 45% solids are fed to the expeller. The cake coming out of expeller is found to contain 80% solids and 5% oil. Find the percentage recovery of oil.	2	K3	CO1
5.	Differentiate compressible and incompressible fluids with examples.	2	K2	CO1
6.	How are fluid flows classified?	2	K1	CO4
7.	List the types of flow measuring devices fitted in a pipe flow, which uses the principle of Bernouilli's equation.	2	K4	CO4
8.	Infer the function of pneumatic valve.	2	K2	CO2
9.	What is meant by priming of pumps? Why is it necessary?	2	K2	CO2
10.	What is a reciprocating pump and what is its advantage?	2	K2	CO2

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	What is specific gravity? How is it related to density?	6	K3	CO1
		ii.	Calculate the specific weight and specific gravity of 1 litre of a liquid with a density of 713.5 kg/m^3 and which weighs 7N.	7		
			(OR)			
	b)		An aqueous solution is prepared by diluting 3.30ml acetone (d=0.789 g/ml) with water to a final volume of 75ml. The density of the solution is 0.993 g/ml. What is the molarity, molality and mole fraction of acetone in this solution?	13	K3	CO1
12.	a)		Discuss the procedure followed during energy and mass balance calculation.	13	K2	CO2
			(OR)			
	b)		In a particular drying operation, it is necessary to hold the moisture content of feed to a calciner to 15% (W/W) to prevent lumping and sticking. This is accomplished by mixing the feed having 30% moisture (w/w) with recycle steam of dried material having 3% moisture (w/w). The dryer operation is shown in fig below. What fraction of the dried product must be recycled?	13	K3	CO2



13.	a)	i.	Derive Darcy-Weisbach's equation for frictional loss through a pipe.	6	K2	CO2
		ii.	Explain about the major and minor losses with reference to flow through pipes.	7		
			(OR)			
	b)	i.	What are the factors influencing the frictional loss in pipe flow?	6	K2	CO2
		ii.	A 20cm diameter pipe 30km long transport oil from a tanker to the shore at 0.01m^3/s. Find the Reynolds number to classify the flow. Take the viscosity μ=0.1Nm/s^2 and density ρ = 900 kg/ m^3 for oil	7	K3	
14.	a)	i.	Draw a neat diagram of venturimeter and orificemeter and label its part.	7	K2	CO4
		ii.	Explain its principle of operation.	6		
			(OR)			

	b)	i.	What is a valve? Explain its function.	6	K2	CO4
		ii.	Differentiate gate valve and butterfly valve with a neat sketch	7		
15.	a)		Compare and contrast centrifugal pump and positive displacement pump.	13	K2	CO1
			(OR)			
	b)	i.	Demonstrate the working principle of Air lift pump.	7	K1	CO1
		ii.	Predict the advantages and disadvantages of an air lift pump.	6	K2	

PART – C

(1 x 15 = 15Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	State and explain Dalton's law with its formula.	5	K2	CO3
		ii.	At a temperature of 300K, 30 litres of gas A kept under pressure of 1 atm and 15 litres of gas B kept under pressure of 2 atm is transferred into an empty 10L container. Calculate the total pressure inside the container and the partial pressures of gas A and gas B (Assume that A and B are ideal gases).	10	K3	
			(OR)			
	b)	i.	Write short notes on various properties of fluids.	10	K2	CO3
		ii.	Analyze the key differences between Newtonian and non-newtonian fluids.	5	K4	

Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 2009

B.E. / B.Tech. DEGREE END – SEMESTER EXAMINATIONS - DEC.2022 / JAN.2023

Third Semester

Biotechnology

U15MA304 – COMPLEX ANALYSIS PARTIAL DIFFERENTIAL EQUATIONS

(Regulation 2019)

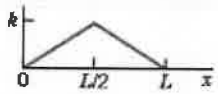
Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Determine whether $f(Z) = \bar{z}$ is analytic or not. Justify your answer.	2	K1	CO1
2.	Write the linear transformation form that maps z_1, z_2, z_3 onto w_1, w_2, w_3.	2	K1	CO1
3.	Compute $\oint_C \frac{\sin z}{z^4} dz$, C:$\|z\| = 1$.	2	K1	CO2
4.	Write the Maclaurin series of $f(z) = \frac{1}{1+z^2}$.	2	K1	CO2
5.	Sketch the odd and even extension of $f(x)$ given in the following figure. 	2	K2	CO3
6.	Find the constant term in the Fourier series corresponding to $f(x) = cos^2 x$ in the interval $(-\pi, \pi)$.	2	K1	CO3
7.	Calculate Fourier cosine transform of $f(x) = e^{-ax}$.	2	K1	CO4
8.	Find the Fourier transform of $f(x) = \begin{cases} 1, & -b < x < b \\ 0, & otherwise \end{cases}$	2	K1	CO4

9.	Classify the equation, $(1+x^2)\frac{\partial^2 u}{\partial x^2}+(5+2x^2)\frac{\partial^2 u}{\partial x \partial t}+(4+x^2)\frac{\partial^2 u}{\partial t^2}=0$.	2	K1	CO5
10.	Whether $\alpha^2\frac{\partial^2 y}{\partial x^2}=\frac{\partial^2 y}{\partial t^2}$ is a one dimensional wave equation or not? Justify your answer.	2	K1	CO5

PART – B

(5 x 16 = 80 Marks)

Q.No.		Questions	Marks	KL	CO
11. a)	i.	Verify that $v=(2x-1)y$ is harmonic in the whole complex plane. If so, construct the corresponding analytic function $f(z)$.	8	K2	CO1
	ii.	Show that the transformation $w=\frac{1}{z}$ transforms all circles and straight lines in the z-plane into circles and straight lines in the w-plane.	8	K3	CO1
		(OR)			
b)	i.	Verify that $u=x^2-y^2-y$ is harmonic in the whole complex plane. If so, construct the corresponding analytic function $f(z)$.	8	K2	CO1
	ii.	Discuss the way in which the z-plane is mapped on to the w – plane by the function $w=z^2$.	8	K3	CO1
12. a)		State and prove Cauchy's residue theorem and hence evaluate $\oint_C \frac{4-3z}{z(z-1)(z-2)}dz$ where C is the circumference of the circle $\|z\|=\frac{3}{2}$.	16	K3	CO2
		(OR)			
b)	i.	Find the Laurent series expansion of the function $f(z)=\frac{7z-2}{z(z+1)(Z-2)}$ in the annular $1<\|z+1\|<3$.	8	K3	CO2
	ii.	Integrate $\frac{z^2}{z^2-1}$ by Cauchy's formula counterclockwise around the circle $\|z-1-i\|=\frac{\pi}{2}$ and $\|z+i\|=1.41$	8	K3	CO2

13.	a)	Express $f(x) = x^2, -\pi < x < \pi$ as the Fourier series which is assumed to have period 2π. And hence deduce that $1 + \frac{1}{2^4} + \frac{1}{3^4} + \cdots = \frac{\pi^4}{90}$	16	K3	CO3
		(OR)			
	b)	i. Find the Fourier cosine series and Fourier sine series for the function $f(x) = sinx, 0 < x < \pi$	12	K4	CO3
		ii. Write the applications of Gibb's phenomena in Fourier series.	4	K2	CO3
14.	a)	i. Obtain the Fourier transform of $e^{-\frac{x^2}{2}}$.	12	K2	CO4
		ii. Show that if $\hat{f}(w)$ is the Fourier transform of $f(x)$, then $\hat{f}(w-a)$ is the Fourier transform of $e^{iax}f(x)$	4	K3	CO4
		(OR)			
	b)	i. Determine the Fourier sine transform of $f(x) = \begin{cases} x & for\ 0 < x < 1 \\ 2 - x & for\ 1 < x < 2 \\ 0 & for\ x > 2 \end{cases}$	11	K4	CO4
		ii. Find the Fourier transform of $f(x-a)$.	5	K3	CO4
15.	a)	Solve the partial differential equation, $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square with sides $x = y = 0, x = y = 3$ with $u = 0$ on the boundary and mesh length =1.	16	K4	CO5
		(OR)			
	b)	Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the conditions $u(x,0) = \sin \pi x, 0 \le x \le 1, u(0,t) = u(1,t) = 0$. Carry out computations for two levels, taking $h = \frac{1}{3}$, $k = \frac{1}{36}$.	16	K4	CO5

Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 9021

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN.2023

Third Semester

Biotechnology

U19BT302 – ESSENTIALS OF MICROBIOLOGY

(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are halophiles? Give any two examples.	2	K1	CO1
2.	Explain the principle of light compound microscope.	2	K1	CO1
3.	What are mycoplasma? Give its etymology and pathophysiology.	2	K1	CO2
4.	What is teleomorph? What are its types?	2	K1	CO2
5.	What is a selective media? Give any two examples.	2	K1	CO3
6.	Distinguish between Commensalism and Mutualism	2	K1	CO3
7.	What is tyndallization? Explain the process and application.	2	K1	CO4
8.	What are β-Lactam antibiotics? Give any two examples.	2	K1	CO4
9.	Biohydro metallurgy? Explain its principle and application.	2	K1	CO5
10.	What are pathogens? List out any two wound causing bacteria.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Explain the theories disproving spontaneous generation with experimental illustration.	5	K2	CO1
		ii.	Explain the Gram's staining with neat sketch.	8		
			(OR)			
	b)	i.	Explain the classification of microorganism with examples.	8	K2	CO1
		ii.	Explain the principle and working of scanning electron microscope.	5		
12.	a)	i.	Explain the structure and multiplication of bacteriophage with neat sketch.	8	K2	CO2
		ii.	Explain the classification of algae based on pigments with examples.	5		
			(OR)			
	b)	i.	Explain the sexual reproduction in bacteria	8	K2	CO2
		ii.	Explain the morphological classification of fungi with examples	5		
13.	a)	i.	Explain the factors affecting the bacteria culture growth.	5	K2	CO3
		ii.	Explain the types of media used for bacteria culture.	8		
			(OR)			
	b)	i.	Explain in detail the different methods to quantitative bacterial growth	8	K3	CO3
		ii.	A bacterial culture has initial cell density of 0.5×10^3 cells/ml. The generation time of the bacteria is 20 min. Calculate the cell density at the end of 1 hr and 40 min.	5		
14.	a)		Explain the different sterilization methods used in microbiology.	13	K2	CO4
			(OR)			
	b)		Explain in the detail the different classes of antimicrobial drugs and their mode of action with suitable examples.	13		CO4
15.	a)	i.	Explain the different techniques of food preservation.	5	K2	CO5
		ii.	What is symbiotic bacteria? Explain its types.	8		
			(OR)			
	b)	i.	What are bio-fertilizers? Explain the types and production of Bio-fertilizers.	7	K2	CO5
		ii.	Explain in detail the production of biopesticides from various sources of microbes.	6		

PART – C

(1 x 15 = 15Marks)

Q.No.			Questions	Marks	KL	CO
16	a)	**i.**	A biological sample is received at a microbiological lab for the diagnosis of mycobacterium tuberculosis. As a microbiologist which staining technique you will use for the characterization of mycobacterium. Explain the steps and procedure in detail	8	K6	CO1
		ii.	Explain the different strain improvement techniques.	7		
			(OR)			
	b)	**i.**	Microorganism has the tendency to utilize the nutrients in the pollutant as a source of energy. As an environmental microbiologist explain various biochemical process where microbes used for the bioconversion of solid and liquid waste to value added products.	8	K6	CO5
		ii.	The bacterial is inoculated in a medium for the production metabolites. Explain the different metabolites at various stages of growth phase.	7		

Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 9026

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN. 2023

Second Semester

Biotechnology

U19BT201 – CELL BIOLOGY

(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Name any two cytoskeletal proteins and write their functions.	2	K1	CO1
2.	Write two important functions of membrane proteins.	2	K2	CO2
3.	What are Oncogenes? Give an example.	2	K1	CO2
4.	What is necrosis?	2	K2	CO2
5.	Distinguish between endocytosis and exocytosis.	2	K2	CO3
6.	What is meant by active and passive transport?	2	K1	CO3
7.	Name any two neurotransmitters and write their functions.	2	K1	CO4
8.	What is the function of voltage gated potassium channels in the membrane?	2	K2	CO4
9.	What is DMSO and how is it used in cell culture?	2	K2	CO5
10.	Define primary culture.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Differentiate between prokaryotic and eukaryotic cells with a neat diagram and with examples.	13	K2	CO1
		(OR)			
	b)	Illustrate the structure of membrane and explain its function.	13	K1	CO1
12.	a)	Write in detail about the growth hormones and their roles in cell cycle.	13	K1	CO2
		(OR)			
	b)	Summarize the various steps involved in meiosis process.	13	K2	CO2
13.	a)	Describe in detail about various mechanisms by which the transport of molecules across cell membrane occurs.	13	K1	CO3
		(OR)			
	b)	Elaborate on cytosolic, nuclear and membrane bound receptors with examples of each.	13	K2	CO3
14.	a)	With a neat labeled diagram explain the mode of signal amplification.	13	K2	CO4
		(OR)			
	b)	Write in detail the four main steps in excitation-contraction coupling in skeletal muscle.	13	K1	CO4
15.	a)	Write a note on the various techniques involved in the propagation of eukaryotic and prokaryotic cells.	13	K1	CO5
		(OR)			
	b)	What are the various steps involved in the generation and characterization of animal cells?	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Infer the connection between cell cycle and cancer with a diagram.	15	K3	CO2
		(OR)			
	b)	How brain controls & carry the information throught the body? Explain.	15	K3	CO3