

Ref. No. : Ex/PG/PHAR/T/127D/2019

Name of the Examination: M. PHARMACY FIRST YEAR SECOND SEMESTER - 2019

Subject : INDUSTRIAL PHARMACY - II Time : 3 hr Full Marks : 100

Answer any five questions from 2 groups and answer at least two questions from each group

Group A

Q1. What are the important points to be considered before media preparation? What are the criteria for the design of a fermenter? Discuss various factors affecting volumetric oxygen transfer coefficient, K_{La} ? Write on the different methods of determination of K_{La} by gassing out techniques? **Marks 4+3+5+8**

OR

What do you mean by Down stream processing? What are the criteria for the choice of recovery process? What are the steps followed in Down stream processing?

What are the steps followed in isolation of Penicillin G from fermentation broth?

Draw a flow sheet for the production of Vitamin B2 by fermentation process and describe the method.

Marks 2+4+3+3+8

Q2. (a) What is the significance of power law exponent 'n' in scale up technique? Give physical interpretation for different values of exponent 'n'?

(b) Apply scale-up method for a batch of injectable solution from a 378 liter pilot batch to a 3780 liter production-size batch to determine shaft speed.

The injectable solution is Newtonian fluid with density of 1.018 g/cm^3 and a viscosity of $0.0588 \text{ g/(cm/sec)}$ (5.88 cp). The tank used in the manufacturing of the pilot batch had the following parameters: T, diameter of the tank 74.6 cm , a cross-sectional area 4371 cm^2 . The agitation was accomplished with a turbine-type mixer (D, diameter 40.64 cm). The pilot batch was mixed at 90 rpm . Apply, $N_Q = 1.1283 - 1.07118D/T$, considering Reynolds number greater than 2000. The tank used for production batches has a capacity of 3780 L . It is equipped with a turbine-type agitator, which has a shaft speed range of $20-58 \text{ rpm}$. The diameter of this tank is 167 cm . The diameter of the largest axial impeller is 87 cm . Determine the appropriate shaft speed to be used in a 3780-L batch.

Marks (5+15)

Q3. What is the purpose of preformulation studies? What are the parameters to be studied in preformulation studies? Discuss on effects of solubility, pKa, salt formation and solvents used for new chemical entity. How does pH of drug influence stability of drug? Why study of polymorphism of a drug is important consideration in preformulation studies?

Marks (1+2+8+4+5)

Q4. Discuss the factors affecting stability of drug products? What are the changes may occur due to instability of different types of dosage forms? What are the different types of stability tests performed for pharmaceuticals?

Marks 5+10+5

M. PHARMACY FIRST YEAR SECOND SEMESTER – 2019

INDUSTRIAL PHARMACY-II

TIME: 3 h

FULL MARKS: 100

ANSWER ANY FIVE QUESTIONS TAKING ATLEAST ONE FROM EACH GROUP

GROUP-B

1. a. A dietician wishes to mix two types of foods in such a way that vitamin contents of the mixture contain atleast 8 units of vitamin A and 10 units of vitamin C. Food 'I' contains 2 units/kg of vitamin A and 1 unit/kg of vitamin C. Food 'II' contains 1 unit/kg of vitamin A and 2 units/kg of vitamin C. It costs Rs. 50 per kg to purchase Food 'I' and Rs. 70 per kg to purchase Food 'II'. Formulate this problem as a linear programming problem to minimise the cost of such a mixture
- b. A manufacturing company makes two models A and B of a product. Each piece of Model A requires 9 labour hours for fabricating and 1 labour hour for finishing. Each piece of Model B requires 12 labour hours for fabricating and 3 labour hours for finishing. For fabricating and finishing, the maximum labour hours available are 180 and 30 respectively. The company makes a profit of Rs 8000 on each piece of model A and Rs 12000 on each piece of Model B. How many pieces of Model A and Model B should be manufactured per week to realise a maximum profit? What is the maximum profit per week?
- c. There are two factories located one at place P and the other at place Q. From these locations, a certain commodity is to be delivered to each of the three depots situated at A, B and C. The weekly requirements of the depots are respectively 5, 5 and 4 units of the commodity while the production capacity of the factories at P and Q are respectively 8 and 6 units. The cost of transportation per unit is given below:

From/To	Cost (in Rs)		
	A	B	C
P	160	100	150
Q	100	120	100

How many units should be transported from each factory to each depot in order that the transportation cost is minimum. What will be the minimum transportation cost?

- d. Solve the following LPP using Simplex Method:

$$\text{Maximize } Z = 12X_1 + 16X_2$$

Subject to

$$10X_1 + 20X_2 \leq 120$$

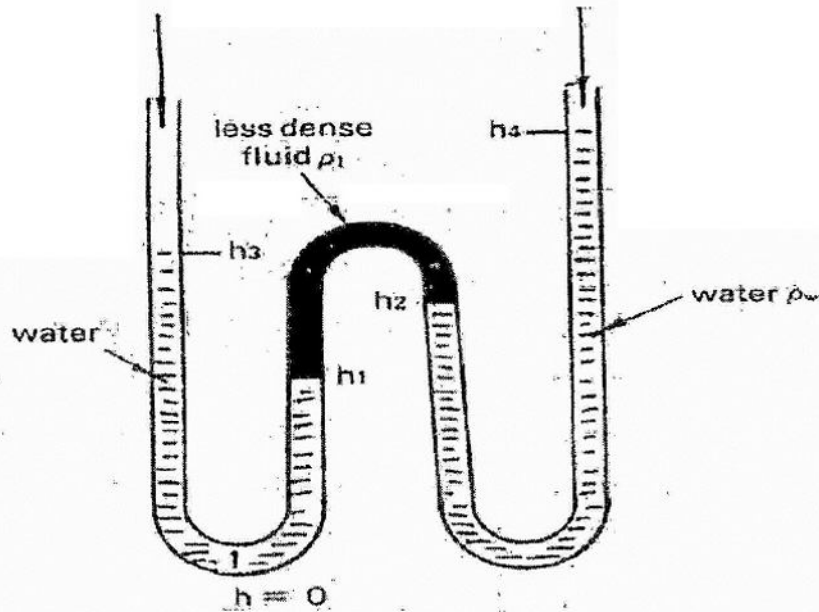
$$8X_1 + 8X_2 \leq 80$$

$$X_1 \text{ and } X_2 \geq 0$$

[5+5+5+5=20]

2.

- a. A simple U-tube can be used to determine the specific gravity "s" of liquids which are denser than water by the arrangement shown below. Derive an expression for "s" in terms of h_1 , h_2 , h_3 and h_4 .



- b. A pipe of diameter 0.4 m carries water at velocity of 25 m/sec pressure at section 1 and 2 are given 29.43 N/cm^2 and 22.563 N/cm^2 , respectively while the datum at 1 and 2 are 28 m and 30 m. Find the loss of head between 1 and 2.
- c. Write a short note of rotameter.
- d. What is the partial pressure of 1% CO_2 at atmospheric pressure (101.325 Kpa) and room temperature (25°C or 298.15K)? Write short notes on humidity, pressure and vibration sensor.
- e. What are the Key Environmental issues addressed in Xith plan? Explain each of the points briefly. [5+4+3+4+4=20 marks]
- 3.
- a. Define a. Beers law, b. Lambert's law, c. Beer-Lambert's law, d. Bragg's law
- b. Draw a schematic diagram of single beam and double beam of a spectrophotometer. How will you select a solvent and container in case of a UV-vis spectroscope? What is apodization function and phase correction. What are the advantages of FTIR spectrophotometer?
- c. Write a short note on column chromatography, gas chromatography and supercritical fluid chromatography,
- d. Write a short note on the various types of monochromators available. Write short note on any two X-Ray diffraction methods.
- e. What are the various types of thermal analysis that a sample can be subjected? Write the final form of any two of the following theories: i. Speil theory, ii. Boersma equation, iii. Pacor expression, iv. Gray general theory related to thermal analysis. Draw the flowsheet of control loupes in DSC. [4+6+3+2+5=20 marks]
- 4.
- a. Draw the flowsheet for the optimization parameters.
- b. Write a note on classic optimization.
- c. Define experimental design. What are the types of experimental design known till date? Write short notes on each of the following.

- d. Demonstrate Newton Raphson Method on the following system :

$$g(x) = (3x - 2)^2(2x - 3)^2$$

- e. UNION DRUG makes two products A and B. Two resources R_1 and R_2 are required to make these products. Each unit of A requires 1 unit of R_1 and 3 units of R_2 . Each unit of B requires 1 unit of R_1 and 2 units of R_2 . The company has 5 units of R_1 and 12 units of R_2 available. The company also makes a profit of €6/unit of product A sold and € 5/unit of product B sold. Find a condition where the company makes a profit.
- f. RANBAXY INC. makes Volini. The estimated demand for the volini for the next four months are 10000, 8000,12000,9000 respectively. RANBAXY has a regular time capacity of 8000 per month and an overtime capacity of 2000 per month. The cost of regular time production is £ 20/unit and the cost of overtime production is £25/unit. RANBAXY can carry inventory to the next month and the holding cost is £3/unit/month. The demand has to be met every month. Minimize the demand for this condition so that the profit will be maximized. [2+2+4+2+5+5=20marks]