

Winter, SESSION: 2024-54 (Mid Semester) on 13 September 2024 (10-12 Noon)  
Examination & Semester: Winter MID SEMESTER Ist M.B.A & Ex.M.B.A

Subject: NMSC513 Organizational Behaviour

Instructions: Attempt ANY SIX questions, giving relevant examples, wherever necessary.

**PLEASE DO NOT CREATE AN ANSWER**, if you have not read

Time: 2 Hour

Max. Marks: 30

Q.No.	Question	Marks
1.	What is MBWA? What are advantages & disadvantages? What are the changes that are being faced by managers in today's world, as discussed in Reading Assignment 1?	(5)
2.	What are the various stages of the Organizational Life Cycle? Answer giving an example of an Organization, after naming it.	(5)
3.	What is I-PURE, which is considered the foundation of all benchmarks for business for the Tata Group, as discussed by Tripathi & Kumar (2020)	(5)
4.	What are the advantages and disadvantages of the field survey method in Organizational Behaviour Research?	(5)
5.	Discuss the various differences between Leadership and Management, as discussed in Reading Assignment 8?	(5)
6.	What are Specific Advantages of Trust between Supervisors and Employees?	(5)

Monsoon, SESSION: 2024-25 (End Semester)

Examination & Semester: Monsoon END SEMESTER II M.B.A & Ex.M.B.A

Subject: NMSC 513 Organizational Behaviour

Instructions: Attempt **ANY FIVE** questions, At **ONE PLACE ONLY** giving relevant examples, wherever necessary.

**PLEASE DO NOT CREATE AN ANSWER**, if you have not read

Time: 3 Hour Max. Marks: 100

Q.No.	Question	Marks
1.a.	Why few absolutes apply to the discipline of Organizational Behaviour?	(10)
1.b.	What are the four major factors that determine how an individual is going to experience stress?	(10)
2.a.	What are the potential questions that are needed to be asked by the potential consumer of Organizational Behaviour Research?	(10)
2.b.	What are the primary, secondary and tertiary stress management interventions employed in TCS and Infosys, as discussed in Reading Assignment 17?	(10)
3.a.	Compare and contrast Organizational Theory and Organizational Behaviour.	(10)
3.b.	What are the various dimensions of Conflict handing intentions?	(10)
4.a.	What are T.R.E.A.T. leader behaviours, as discussed in Reading Assignment 10?	(10)
4.b.	What are the five components of Emotional Intelligence, postulated by Daniel Goleman?	(10)
5.a.	What is the difference between Universal Theory and Contingency theory, as discussed in Reading Assignment 8?	(10)
5.b.	What are the five levels in the five stage model of needs, as proposed by Abraham Maslow?	(10)
6.a.	Discuss the two techniques that are used in order to reduce the problems inherent in the traditional interacting groups?	(10)
6.b.	According to Rokeach, what the functions served by 'Values'?	(10)
7.a.	What are the objectives aimed at by the Tata Group for using Tata Code of Conduct (TCC)?	(10)
7.b.	Define 'Attitude'. What are its various components? Answer using a suitable common example.	(10)
8.a.	What are the five steps of Organizational Behaviour Modification, developed by Fred Luthans and his team?	(10)
8.b.	How does culture of an Organization gets transmitted to its Employees?	(10)
9.	Solve the following case: <u>The Pursuit of Happiness: Flexibility</u> The management team at Learner's Edge, an online continuing education company, decided to adopt a ROWE (results-only work environment) policy, developed by Best Buy employees and summarized in its slogan, "Work whenever you want, wherever you want, as long as the work gets done." Kyle Pederson was one of only three Learner's Edge employees who showed up the first day of the ROWE experiment. And the second day, and the third.  "For almost a month, everyone cleared out," Pederson said. "It was just me, my co-founder and our executive director all wondering, 'What on earth	

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2. 100% Skipped  
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have we done?" "Clearly, employees were testing the outer limits of workplace flexibility. Thankfully, it paid off. Learner's Edge reported "better work, higher productivity" after the initial phase of the program. It seems employees knew the ways they work best. In fact, some of Pederson's employees have returned to the office, while others gather at Starbucks or over dinner . . . whatever gets the work done.

Suntell president and COO, Veronica Wooten, whose risk-management software firm adopted the ROWE program a few years ago, is also a fan of the flexible workplace. "We made the transition, and started letting go and letting people make their own decisions," Wooten said. As a result of workplace flexibility, the company's customer base increased 20 percent, meetings were reduced by 50 percent, and expenses decreased 12 percent (Wooten used the savings to give everyone a raise).

It seems that everyone should be happy with this ultimate degree of job flexibility. Employees worldwide do seem to increasingly value flexible work environments, with roughly two of three workers of all ages wanting to work from home, at least occasionally. However, the benefit may not be as great for some people. In a recent study, 62 percent of respondents believed that Gen X individuals benefit most from flexibility arrangements, 35 percent believed Gen Y individuals benefit most, and only 3 percent believed baby boomers benefit most.

Research correlates job satisfaction most strongly with the nature of the work itself, not the location where it is performed. Thus, while as employees we say we want flexibility, what actually makes us satisfied is often something else. Then there are the costs of such work arrangements. Employers such as Yahoo!'s Marissa Mayer have thought that flexible workers become detached from the organization, communicate less, are less available, and lose the benefits of teamwork. Employees have concerns about long periods of working away from the office: Will out of sight mean out of mind to their employers?

For ROWE or any flexible arrangement to work, organizations need to create clear job descriptions, set attainable goals, and rely on strong metrics to indicate productivity. Managers need to foster close connections and communicate meaningfully to keep flexible workers engaged in the company, its culture, and its processes. Most importantly, employees need to get the work done, no matter where and when they do it.

#### Questions

1. Do you think only certain individuals are attracted to flexible work arrangements? Why or why not?
2. How might flexible work place more pressure on managers to organize their employees?
3. How might flexible work affect a company's bottom line?
4. What benefits will a company get if it uses Virtual Team Arrangements?

(25)

(25)

(25)

(25)

**MID -SEMESTER EXAMINATION 2024-25**

**Course Name: Managerial Economics**

**Course Code: NMSC514**

**Max. Time: 2 hrs**

**Max Marks: 50**

**Date: 15.09.2024**

**Time: 1.30 pm-3.30 pm**

**Instructions:**

- Each questions carry 5 marks
- Attempt 10 questions out of 15 questions
- Calculators are allowed
- Make necessary assumptions where needed
- Kindly maintain the sequence of the question paper.

**Question 1 (5 marks) (2+1+2)**

*✓ A.* You were planning to spend Saturday working at your part-time job, but a friend asks you to go skiing. What is the true cost of going skiing? Now suppose you had been planning to spend the day studying at the library. What is the cost of going skiing in this case? Explain. (2 marks)

*✓ B.* You win \$100 in a basketball pool. You have a choice between spending the money now or putting it away for a year in a bank account that pays 5 percent interest. What is the opportunity cost of spending the \$100 now? (1 marks)

*✓ C.* "An increase in the demand for notebooks raises the quantity of notebooks demanded but not the quantity supplied." Is this statement true or false? Explain. (2 marks)

**Question 2 (5 marks) (1+1+1+1+1)**

Consider the market for minivans. For each of the events listed here, identify which of the determinants of demand or supply are affected. Also indicate whether demand or supply increases or decreases. Then draw a diagram to show the effect on the price and quantity of minivans.

- ✓ a.* People decide to have more children.
- ✓ b.* A strike by steelworkers raises steel prices.
- ✓ c.* Engineers develop new automated machinery for the production of minivans.

d. The price of sports utility vehicles rises.

c. A stock-market crash lowers people's wealth.

**Question 3 (5 marks) (3+1+1)**

Consider the markets for DVD movies, TV screens, and tickets at movie theatres.

a. For each pair, identify whether they are complements or substitutes:

- DVDs and TV screens
- DVDs and movie tickets
- TV screens and movie tickets

b. Suppose a technological advance reduces the cost of manufacturing TV screens. Draw a diagram to show what happens in the market for TV screens.

c. Draw two more diagrams to show how the change in the market for TV screens affects the markets for DVDs and movie tickets

**Question 4 (5 marks) (3+2)**

A. Over the past 20 years, technological advances have reduced the cost of computer chips. How do you think this affected the market for computers? For computer software? For typewriters? (3 marks)

B. Market research has revealed the following information about the market for chocolate bars: The demand schedule can be represented by the equation  $Q_D = 1,600 - 300P$ , where  $Q_D$  is the quantity demanded and  $P$  is the price. The supply schedule can be represented by the equation  $Q_S = 1,400 + 700P$ , where  $Q_S$  is the quantity supplied. Calculate the equilibrium price and quantity in the market for chocolate bars. (2 marks)  $Q_D = Q_S$

**Question 5 (5 marks) (3+2)**

A. Using supply-and-demand diagrams, show the effect of the following events on the market for sweatshirts. (1+1+1)

- The pollution in Haryana damages the cotton crop.
- All colleges require morning exercise in appropriate attire.
- New knitting machines are invented.

B. Several years ago, flooding along the Missouri and the Mississippi rivers destroyed thousands of acres of wheat. (1+1)

- a. Farmers whose crops were destroyed by the floods were much worse off, but farmers whose crops were not destroyed benefited from the floods. Why?
- b. What information would you need about the market for wheat to assess whether farmers as a group were hurt or helped by the floods?

**Question 6 (5 marks) (2+3)**

- A.** For each of the following pairs of goods, which good would you expect to have more elastic demand and why? (2 marks)

- a. required textbooks or mystery novels  
 b. Uber rides during the next 6 months or Uber rides during the next 5 years

- B.** Consider public policy aimed at smoking. (1+1+1)

- a. Studies indicate that the price elasticity of demand for cigarettes is about 0.4. If a pack of cigarettes currently costs \$2 and the government wants to reduce smoking by 20 percent, by how much should it increase the price?  
 b. If the government permanently increases the price of cigarettes, will the policy have a larger effect on smoking 1 year from now or 5 years from now?  
 c. Studies also find that teenagers have a higher price elasticity than do adults. Why might this be true?

**Question 7 (5 marks) (3+2)**

- A.** Beachfront resorts have an inelastic supply, and automobiles have an elastic supply. Suppose that a rise in population doubles the demand for both products (that is, the quantity demanded at each price is twice what it was). (1+1+1)

- a. What happens to the equilibrium price and quantity in each market?  
 b. Which product experiences a larger change in price? Which product experiences a larger change in quantity?  
 c. What happens to total consumer spending on each product?

- B.** Suppose that business travellers and vacationers have the following demand for airline tickets from New York to Boston: (2+1)

Price (\$)	Quantity Demanded Business travellers	Quantity Demanded vacationers
150	2,100 tickets	1,000 tickets
200	2,000	800
250	1,900	600
300	1,800	400

- a. As the price of tickets rises from \$200 to \$250, what is the price elasticity of demand for (i) business travellers and (ii) vacationers? (Use the midpoint method in your calculations.)  
b. Why might vacationers have a different elasticity from business travellers?

**Question 8 (5 marks) (4+1)**

**A.** Pharmaceutical drugs have an inelastic demand, and computers have an elastic demand. Suppose that technological advance doubles the supply of both products (that is, the quantity supplied at each price is twice what it was). (1+1+1+1)

- What happens to the equilibrium price and quantity in each market?
- Which product experiences a larger change in price?
- Which product experiences a larger change in quantity?
- What happens to total consumer spending on each product?

**B.** Explain why the following might be true: A drought around the world raises the total revenue that farmers receive from the sale of grain, but a drought only in Kansas reduces the total revenue that Kansas farmers receive. (1)

**Question 9 (5 marks) (3+2)**

**A.** The government has decided that the free-market price of cheese is too low. (1+1+1)

- Suppose the government imposes a binding price floor in the cheese market. Draw a supply-and-demand diagram to show the effect of this policy on the price of cheese and the quantity of cheese sold. Is there a shortage or surplus of cheese?

b. Farmers complain that the price floor has reduced their total revenue. Is this possible? Explain.

- c. In response to farmers' complaints, the government agrees to purchase all the surplus cheese at the price floor. Compared to the basic price floor, who benefits from this new policy? Who loses?

**B.** Suppose the federal government requires beer drinkers to pay a \$2 tax on each case of beer purchased. (In fact, both the federal and state governments impose beer taxes of some sort.) (1+1)

- Draw a supply-and-demand diagram of the market for beer without the tax. Show the price paid by consumers, the price received by producers, and the quantity of beer sold. What is the difference between the price paid by consumers and the price received by producers?

b. Now draw a supply-and-demand diagram for the beer market with the tax. Show the price paid by consumers, the price received by producers, and the quantity of beer sold. What is the difference between the price paid by consumers and the price received by producers? Has the quantity of beer sold increased or decreased?

**Question 10 (5 marks)**

Congress and the president decide that the United States should reduce air pollution by reducing its use of gasoline. They impose a \$0.50 tax for each gallon of gasoline sold. (2+1+1+1)

- a. Should they impose this tax on producers or consumers? Explain carefully using a supply-and-demand diagram. (2 marks)
- b. If the demand for gasoline were more elastic, would this tax be more effective or less effective in reducing the quantity of gasoline consumed? Explain with both words and a diagram. (1 marks)
- c. Are consumers of gasoline helped or hurt by this tax? Why? (1 marks)
- d. Are workers in the oil industry helped or hurt by this tax? Why? (1 marks)

**Question 11 (5 marks) (2+3)**

A. Consider the following policies, each of which is aimed at reducing violent crime by reducing the use of guns. Illustrate each of these proposed policies in a supply-and-demand diagram of the gun market. (0.5 marks each)

- a. a tax on gun buyers
- b. a tax on gun sellers
- c. a price floor on guns
- d. a tax on ammunition

B. The U.S. government administers two programs that affect the market for cigarettes. Media campaigns and labeling requirements are aimed at making the public aware of the dangers of cigarette smoking. At the same time, the Department of Agriculture maintains a price-support program for tobacco farmers, which raises the price of tobacco above the equilibrium price. (1+1+1)

- a. How do these two programs affect cigarette consumption? Use a graph of the cigarette market in your answer.
- b. What is the combined effect of these two programs on the price of cigarettes?
- c. Cigarettes are also heavily taxed. What effect does this tax have on cigarette consumption?

**Question 12 (5 marks)**

The supply and demand for broccoli are described by the following equations: (2+2+1)

Supply:  $QS = 4P - 80$

Demand:  $QD = 100 - 2P$ .

Q is in bushels, and P is in dollars per bushel.

- Graph the supply curve and the demand curve. What is the equilibrium price and quantity?
- Calculate consumer surplus, producer surplus, and total surplus at the equilibrium.
- If a dictator who hated broccoli were to ban the vegetable, who would bear the larger burden—the buyers or sellers of broccoli?

#### Question 13 (5 marks)

Suppose a technological advance reduces the cost of making computers. (1+2+1+1)

- Draw a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for computers.
- Computers and adding machines are substitutes. Use a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for adding machines. Should adding machine producers be happy or sad about the technological advance in computers?
- Computers and software are complements. Draw a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for software. Should software producers be happy or sad about the technological advance in computers?
- Does this analysis help explain why software producer Bill Gates is one of the world's richest men?

#### Question 14 (5 marks) (2+1+1+5)

Suppose you are working as a manager of Himmat Limited where you are involved in the research arm of consumer behaviour division. You have been given the following information about the utility function of a consumer X as follows:

$U(H, C) = HC$  where H represents Hotdogs and C represents Chicken Biryani. You are required to find out answers to the following questions:

- Draw the indifference curve associated with a utility level of 12 and the indifference curve associated with a utility level of 24. Are the indifference curves convex?
- Suppose that hotdogs costs Rs 1 a unit, chicken biryani costs Rs 3 a unit, and X has Rs 12 to spend on hotdogs and chicken biryani. Graph the budget line that he faces.
- What is the utility-maximizing choice of hotdogs and chicken biryani?
- What is the marginal rate of substitution of hotdogs for chicken biryani when utility is maximized?

#### Question 15 (5 marks) (3+2)

There are two consumers on the market: Jim and Donna. Jim's utility function is  $U(x, y) = xy$ , with associated marginal utility functions  $MU_x = y$  and  $MU_y = x$ . Donna's utility function is  $U(x, y) = x^2y$ , with associated marginal utility functions  $MU_x = 2xy$  and  $MU_y = x^2$ . Income of Jim is  $I_J = 100$  and income of Donna is  $I_D = 150$ .

- Find optimal baskets of Jim and Donna when price of y is  $P_y = 1$  and price of x is P.
- On separate graphs plot Jim's and Donna's demand schedule for x for all values of P.

$$\text{Max } U(x, y) = xy$$

$$MRS = \frac{P_x}{P_y}$$

END -SEMESTER EXAMINATION 2024-25

Course Name: Managerial Economics

Course Code: NMSC514

Max. Time: 3 hrs

Max Marks: 100

Date: 21.11.2024

Time: 9am-12noon

**Instructions:**

- Attempt 10 questions out of 15 questions
- Each question has 10 marks
- Calculators are allowed
- Make necessary assumptions where needed
- Kindly maintain the sequence of the question paper.

**Question 1**

Suppose Ralph sells doughnuts which have the following demand:

$$pR = 100 - qR - 0.5qD$$

where  $pR$  is the price of Ralph's doughnuts and  $qR$  is the number of doughnuts Ralph sells.  $qD$  is the number of doughnuts Ralph's rival Dave sells. Dave's demand is given by:

$$pR = 100 - qD - 0.5qR$$

where  $pD$  is the price Dave can sell his doughnuts for. Suppose each seller has a cost per unit (average and marginal) of \$1.

- How does this game differ from the Cournot model with identical products? Why do the demand curves indicate that the goods are differentiated – not perfect substitutes for one another? (5 marks)
- Compute the best response functions for each seller and the Nash Equilibrium outputs and prices. (5 marks)

**Question 2**

A) Consider a market with (inverse) demand  $p=100-2Q$ . There are two firms in the market with constant marginal and average costs of \$10.

- Determine the Cournot equilibrium quantities and price (2 marks)
- What would be the collusive (joint-profit maximizing) price and quantity? (2 marks)
- Derive the deadweight loss from (i) Cournot Dupoly, (ii) Collusion, and (iii) Perfect competition in this market with the two firms. (3 marks)

B) The market structure of home video gaming systems is best characterized by monopolistic competition. Quasar Entertainment is one of the producers in this market. The inverse demand for Quasar systems is:

$P = 500 - 9.75Q$   $0.25Q^2 + 6$   
 Quasar's cost function is:  $C(Q) = 0.25Q^2 + 6$ . Determine Quasar's profit maximizing level of output and the price charged to customers. Is the market in a long-run equilibrium? (3 marks)

**Question 3**

A) Suppose that in the market for paper, demand is  $p = 100 - Q$ . The private marginal cost is  $MCP = 10 + Q$ . Pollution generated during the production process creates external marginal harm equal to  $MC_e = Q$ . Is social welfare greater under monopoly or under competition? (5 marks)

B) Two neighboring farmers must each decide whether to contribute to a fence that separates their properties. The fence costs a total of \$20. Both farmers currently have a profit of \$30 each. With a fence to keep each farmer's animals from wandering onto the other's property, both farmers would experience a \$15 rise in profits. Draw the payoff matrix and discuss the possible outcomes. (5 marks)

**Question 4**

Suppose the government wishes to regulate mercury emissions of factories in a specific industry by either setting an emissions standard or imposing an emissions fee (per ton of mercury). The government is uncertain as to the marginal abatement costs, which may be high ( $MC_1$ ) or low ( $MC_2$ ).

$$MC_1 = 15M + 500$$

$$MC_2 = 15M - 500$$

where  $M$  is the units of mercury abated. The government believes there is a 50% chance of each of the marginal abatement costs. The marginal benefit of abatement is known to be:

$$MB = 1500 - 10M$$

- What is the optimal level of emissions for each of the cost curves above? (2 marks)
- What is the expected marginal abatement cost (equation)? (2 marks)
- What is the optimal emissions standard according to the expected abatement costs? (2 marks)
- What is the optimal abatement fee according to the expected abatement costs? (2 marks)
- Which regulation will result in a lower DWL in the presence of the uncertainty? Explicitly compute the expected DWL arising from each proposal. (2 marks)

**Question 5**

A) The following is a simplified duopoly model of competition between two firms. Firms simultaneously choose the quantity of outputs to produce, and then profits are realized. Each firm is restricted to producing 25, 35, 50 or 100 units of output. The details of how the payoffs are derived are unimportant because payoffs are all given in the table below.

		Firm 2			
		$Q_2 = 25$	35	50	100
$Q_1 = 25$		125, 125	100, 140	63, 125	-63, -250
Firm 1	35	140, 100	105, 105	53, 75	-123, -350
	50	125, 63	75, 53	0, 0	-250, -500
	100	-250, -63	-350, -130	-500, -250	-900, -900

Find the Nash equilibrium(s) in the game. (5 marks)

B) Two identical firms are considering entering a new market that currently has no suppliers. The demand is large enough for both firms to make a positive profit. There are no fixed costs to enter. Explain how a simultaneous decision to enter on the part of the two firms will lead to a different outcome than a sequential entry decision. (5 marks)

#### Question 6

A) A weapons producer sells guns to two countries that are at war with each other. The guns can be produced at a constant marginal cost of \$10. The demand for guns from the two countries can be represented as:

$$Q_A = 100 - 2p$$

$$Q_B = 80 - 4p$$

Why is the weapons producer able to price discriminate? (3 marks)

What price will it charge to each country? (3 marks)

B) Can a perfectly competitive firm successfully price discriminate? Hint: What does the demand curve look like for a perfectly competitive firm? (4 marks)

#### Question 7

In a recent court case, an expert witness defined a monopoly as a firm that can "raise price without reducing its total revenue." What does this imply about the elasticity of demand? Would this definition hold for a profit-maximizing monopoly? Explain. (5 marks)

B) Suppose a monopolist has  $TC = 100 + 10Q + 2Q^2$ , and the demand curve it faces is  $p = 90 - 2Q$ . What will be the price, quantity, and profit for this firm? (5 marks)

#### Question 8

A monopolist faces a demand curve  $Q = 120 - 2p$  and has costs given by  $C(Q) = 20Q + 100$ .

a. Write the monopolist's profits in terms of the price it charges. (2 marks)

b. Use the derivative (w.r.t. price) to determine the monopolist's profit-maximizing price. (2 marks)

c. Now, derive the monopolist's inverse demand based on the demand equation above. Write out the monopolist's profits in terms of quantity. (2 marks)

d. Use the derivative w.r.t. Q to determine the monopolist's optimal quantity. What price does the monopoly charge? (4 marks)

#### Question 9

A) Consider a town with a single movie theater, and that movie theater faces a downward sloping demand curve for its tickets. The movie theater has a fixed number of seats available for each show but the marginal cost of filling a seat is zero. Why might it be in the movie theater's interest to not to sell out every show even though the marginal cost of selling additional seats is virtually zero? (A graph will help your answer). (5 marks)

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B) When would a profit-maximizing monopolist that operates with no government intervention choose to produce the competitive level of output? (5 marks)

**Question 10**

A monopolist faces the (inverse) demand for its product:  $p = 50 - 2Q$ . The monopolist has a marginal cost of 10/unit and a fixed cost given by  $F$ .

- Assume that  $F$  is sufficiently small such that the monopolist produces a strictly positive level of output. What is the profit-maximizing price and quantity? (4 marks)
- Compute the maximum profit for the monopolist in terms of  $F$ . (3 marks)
- For what values of  $F$  will the monopolist's profit be negative? (3 marks)

**Question 11**

(A) Suppose that market demand for a good is  $Q = 480 - 2p$ . The marginal cost is  $MC = 2Q$ . Calculate the deadweight loss resulting from a monopoly in this market. (5 marks)

(B) Even if two competitive firms in the same market have different production technologies, they will each earn long-run zero profits. Why? (5 marks)

**Question 12**

A) Suppose an industry trade group has convinced legislators that a price floor should be used so that producer surplus is maximized in the market for milk. The group argues that such a policy would save the "family farm." Assuming a downward-sloping linear demand curve and a horizontal long-run supply curve, determine the resulting price, output and social welfare from such a policy. Compare this result to the competitive equilibrium. (5 marks)

B) Explain why the marginal cost curve intersects a U-shaped average cost curve at its minimum point. (5 marks)

**Question 13**

Evren wants to go into the donut business. For \$500 per month he can rent a bakery complete with all the equipment he needs to make a dozen different kinds of donuts ( $K = 1, r = 500$ ). He must pay unionized donut bakers a monthly salary of \$400 each. He projects his monthly production function to be

$$Q = 5KL$$

where  $Q$  is tons of donuts.

- With the current level of capital, what is the marginal product of labor? Is the marginal product diminishing? Explain. (3 marks)
- If Evren wishes to make 25 tons of donuts, how many bakers are required given the current level of capital? How much will it cost to produce this (total cost)? (2 marks)
- Derive Evren's short-run cost function with  $K=1$ . (2 marks)
- Derive the marginal cost curve from your answer to c, and show the relationship between the marginal cost and marginal product of labor. (3 marks)

**Question 14**

For each of the following statements, define all of the underlined terms. Then, explain why the statement is true or false.

- a. If a consumer views two goods as perfect substitutes then their optimal choice will be a corner solution. (2.5 marks each)
- b. The substitution effect from a price increase states that the consumer will always choose a smaller amount of that good to consume. However, the income effect states that consumption can move in either direction.
- c. Suppose Alf and Bo have convex indifference curves. Alf likes units of "X" more than units of "Y" but Bo likes units of "Y" much more than units of "X." Then, in the optimum, Alf's marginal rate of substitution will be different from Bo's even if they face the same prices.
- d. All Giffen goods are normal goods, but not all normal goods are Giffen goods.

**Question 15**

Suppose that a market has the following supply and demand equations:

Demand:  $Q_D = 380 - 10p$

Supply:  $Q_S = 80 + 5p$

- (a) If the government imposes a specific tax of  $\tau$  on suppliers, what will be the price buyers pay and sellers receive, quantity, and government revenue from the tax (as functions of  $\tau$ ). (8 marks)
- (b) What tax level maximizes the revenue the government collects from the tax? (2 marks)



(Answer ALL Questions)

Q1] After completing her B. Pharma course, Nandini started M/s TMB, a tele-medicine business on August 1, 20XX to provide remote clinical services to the residents in her locality. She found a place nearer to her housing colony, which was ideal for providing physical as well as tele-conferencing clinical services to the residents of the colony. She invested her own savings of ₹ 2,00,000 as capital and borrowed ₹ 2,00,000 from the friends @ 12 percent to be paid back at the end of 1 year.

From the available money, she paid ₹ 14,000 in August to rent a space (paid on monthly basis), purchased furniture for ₹ 80,000 (having a life of 5 years, without any salvage value) & paid rent of ₹ 60,000 for 1 year for HIPAA compliant video-conferencing tools. She contacted three reputed doctors available in the nearby locality and engaged them to provide the service with a remuneration @ ₹ 40,000 pm. She decided to charge on an average ₹ 2500 per family (which included 10 calls with some OTC medicines).

During the month, she procured fuel for car for ₹ 1,500 and some OTC medicines to relieve aches, pains, itches, migraines & allergies, for ₹ 54,500. At the end of the month of August, she provided services to 240 families and purchased additional medicines of ₹ 34,000 of which ₹ 10,000 was paid in cash. To manage the requirements of the customers, Nandini hired one helping hand for ₹ 16,000 pm to be paid as wages. She also purchased furniture of ₹ 40,000 on account, having a life of 5 years, without any salvage value.

Included in those 240 families were two neighbours who promised future payment which she had not received, totalling ₹ 22,500. She paid to her friends the monthly interest against the loan. Unused medicines at the month end were of ₹ 18,500. For her personal movement to different places, she purchased a second hand car from 'Maruti True Value' for ₹ 2,30,000 from the business fund. Though the doctors could be paid remuneration in cash, the wages could not be given to the employee by August 31, 20XX.

Required: Prepare the Income Statement; the Statement of Retained Earnings, and the Balance sheet for the month ending August, 20XX in appropriate formats. Support the above statements with requisite analysis/ explanations. [6+2+4+5]

Q2] Burton Corporation, a US based company, commenced retailing operations on January 1, 2023. Purchases of merchandise inventory during 2023 and 2024 appear next:

	Quantity Purchased	Unit Price	Acquisition Cost (in \$)
Jan-23	450	10	4500
Jun-23	150	12	1800
Oct-23	400	15	6000
Total	1000		12300

	Quantity Purchased	Unit Price	Acquisition Cost (in \$)
Feb-24	450	14	6300
Jul-24	500	12	6000
Dec-24	800	10	8000
Total	1750		20300

Burton Corporation sold 800 units during 2023 and 1,500 units during 2024.

Required: Answer the following questions:

- Will FIFO or LIFO result in reporting the larger net income for 2023? Explain.[2]
- Will FIFO or LIFO result in reporting the larger net income for 2024? Explain.[2]
- Which method should be adopted by the firm during 2023, considering the economic recovery after COVID-19? Would your answer change for 2024? Justify.[1]

Q3] The trial balance of Celine's Sports Wear Shop at December 31 shows Merchandise Inventory \$25,000, Sales \$162,400, Sales Returns and Allowances \$4,800, Sales Discounts \$3,600, Cost of Goods Sold \$110,000, Rental Revenue \$6,000, Freight-out \$1,800, Rent Expense \$8,800, and Salaries and Wages Expense \$22,000.

Required: Prepare the closing entries for the above accounts. [4]

Q4] The July 31 bank statement of M/s Computers Services Ltd disclosed a balance of ₹6,87,400. On this date, the company's records showed a bank balance of ₹2,99,400. Review by the audit team reveals the following:

- Cheques under collection on July 31, ₹29,800. +
- Outstanding cheques, ₹1,71,800. -
- A cheque for ₹2,19,400 issued to a supplier was recorded by the bank as ₹2,91,400. +
- A bill receivable of ₹5,00,000 and interest of ₹30,000 collected by the bank have not been recorded in the company's accounts.
- A cheque for ₹73,000 received from a customer was returned by the bank owing to lack of funds with the bank.
- The bank levied a service charge of ₹9,000.
- In accordance with the company's standing instruction, on July 23 the bank paid insurance premium of ₹1,30,000 for the company's car.

Required: (i) Prepare a bank reconciliation for X Ltd. for July, 20XX. [2]

(ii) Determine the cash balance that X Ltd. would report on the July 31, 20XX balance sheet after verification with the Company's books. [2]

Q5] On the basis of the previous business performance, it is expected for M/s Micro Computer Services that out of ₹32,00,000 credit sales, ₹22,00,000 may be collected during the accounting period. At the end of the accounting period, the firm finds ₹73,200 is uncollectible in any period on the basis of the prevailing circumstance.

Required: Suggest the accounting treatment for M/s Micro Computer Services for the above situation. [2]

**END-SEMESTER EXAMINATION- 2024-25**  
**Department of Management Studies & Industrial Engineering**  
**MSC504/NMSC516 - FINANCIAL ACCOUNTING & REPORTING**  
**Time Allowed - 3 Hours (November 27, 2024) Full Marks - 100**  
**(Answer ALL Questions)**

Q No.	Questions	Marks																																																																																																																	
1)	<p>Saritha Advertising Agency was founded by Saritha S. in January of 2023. Presented below both the adjusted and unadjusted trial balances as of December 31, 2023 (the amounts are in ₹'00).</p> <p style="text-align: center;"><b>SARITHA ADVERTISING AGENCY</b></p> <p style="text-align: center;">Trial Balance for the year ended December 31, 2023</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="text-align: center; width: 25%;">Unadjusted</th> <th style="text-align: center; width: 25%;">Adjusted</th> </tr> <tr> <th></th> <th style="text-align: center;">Dr.</th> <th style="text-align: center;">Cr.</th> <th style="text-align: center;">Dr.</th> <th style="text-align: center;">Cr.</th> </tr> </thead> <tbody> <tr> <td>Cash</td> <td style="text-align: right;">₹ 11,000</td> <td style="text-align: right;">-</td> <td style="text-align: right;">₹ 11,000</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Accounts Receivable</td> <td style="text-align: right;">20,000</td> <td style="text-align: right;">-</td> <td style="text-align: right;">22,500</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Art Supplies</td> <td style="text-align: right;">8,600</td> <td style="text-align: right;">-</td> <td style="text-align: right;">5,000</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Prepaid Insurance</td> <td style="text-align: right;">3,350</td> <td style="text-align: right;">-</td> <td style="text-align: right;">2,500</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Printing Equipment</td> <td style="text-align: right;">60,000</td> <td style="text-align: right;">-</td> <td style="text-align: right;">60,000</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Accumulated Depreciation</td> <td style="text-align: right;">-</td> <td style="text-align: right;">₹ 28,000</td> <td style="text-align: right;">-</td> <td style="text-align: right;">₹ 34,000</td> </tr> <tr> <td>Accounts Payable</td> <td style="text-align: right;">-</td> <td style="text-align: right;">5,000</td> <td style="text-align: right;">-</td> <td style="text-align: right;">5,000</td> </tr> <tr> <td>Interest Payable</td> <td style="text-align: right;">-</td> <td style="text-align: right;">-0-</td> <td style="text-align: right;">-</td> <td style="text-align: right;">150</td> </tr> <tr> <td>Notes Payable</td> <td style="text-align: right;">-</td> <td style="text-align: right;">5,000</td> <td style="text-align: right;">-</td> <td style="text-align: right;">5,000</td> </tr> <tr> <td>Unearned Advertising Fees</td> <td style="text-align: right;">-</td> <td style="text-align: right;">7,200</td> <td style="text-align: right;">-</td> <td style="text-align: right;">5,600</td> </tr> <tr> <td>Salaries Payable</td> <td style="text-align: right;">-</td> <td style="text-align: right;">-0-</td> <td style="text-align: right;">-</td> <td style="text-align: right;">1,300</td> </tr> <tr> <td>Saritha, Capital</td> <td style="text-align: right;">-</td> <td style="text-align: right;">25,500</td> <td style="text-align: right;">-</td> <td style="text-align: right;">25,500</td> </tr> <tr> <td>Saritha, Drawing</td> <td style="text-align: right;">12,000</td> <td style="text-align: right;">-</td> <td style="text-align: right;">12,000</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Advertising Revenue</td> <td style="text-align: right;">-</td> <td style="text-align: right;">58,600</td> <td style="text-align: right;">-</td> <td style="text-align: right;">62,700</td> </tr> <tr> <td>Salaries Expense</td> <td style="text-align: right;">10,000</td> <td style="text-align: right;">-</td> <td style="text-align: right;">11,300</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Insurance Expense</td> <td style="text-align: right;">-</td> <td style="text-align: right;">-</td> <td style="text-align: right;">850</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Interest Expense</td> <td style="text-align: right;">350</td> <td style="text-align: right;">-</td> <td style="text-align: right;">500</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Depreciation Expense</td> <td style="text-align: right;">-</td> <td style="text-align: right;">-</td> <td style="text-align: right;">6,000</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Art Supplies Expense</td> <td style="text-align: right;">-</td> <td style="text-align: right;">-</td> <td style="text-align: right;">3,600</td> <td style="text-align: right;">-</td> </tr> <tr> <td>Rent Expense</td> <td style="text-align: right;">4,000</td> <td style="text-align: right;">-</td> <td style="text-align: right;">4,000</td> <td style="text-align: right;">-</td> </tr> <tr> <td></td> <td style="text-align: right;">₹129,300</td> <td style="text-align: right;">₹129,300</td> <td style="text-align: right;">₹139,250</td> <td style="text-align: right;">₹139,250</td> </tr> </tbody> </table> <p>Required:</p> <p>(a) Journalize the annual adjusting entries that were made. (7)</p> <p>(b) Prepare an income statement and a statement of owner's equity for the year ending December 31, 2023, and a balance sheet at December 31 in appropriate format. (5+2+6)</p>		Unadjusted	Adjusted		Dr.	Cr.	Dr.	Cr.	Cash	₹ 11,000	-	₹ 11,000	-	Accounts Receivable	20,000	-	22,500	-	Art Supplies	8,600	-	5,000	-	Prepaid Insurance	3,350	-	2,500	-	Printing Equipment	60,000	-	60,000	-	Accumulated Depreciation	-	₹ 28,000	-	₹ 34,000	Accounts Payable	-	5,000	-	5,000	Interest Payable	-	-0-	-	150	Notes Payable	-	5,000	-	5,000	Unearned Advertising Fees	-	7,200	-	5,600	Salaries Payable	-	-0-	-	1,300	Saritha, Capital	-	25,500	-	25,500	Saritha, Drawing	12,000	-	12,000	-	Advertising Revenue	-	58,600	-	62,700	Salaries Expense	10,000	-	11,300	-	Insurance Expense	-	-	850	-	Interest Expense	350	-	500	-	Depreciation Expense	-	-	6,000	-	Art Supplies Expense	-	-	3,600	-	Rent Expense	4,000	-	4,000	-		₹129,300	₹129,300	₹139,250	₹139,250	
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2)	<p>A factory engaged in manufacturing scented candles is working to 40% capacity and produces 10,000 units per annum. The present cost break up for one unit of scented candle is as under:</p> <p>Material ₹110; Labour ₹30; and Overheads ₹50 [60% fixed]. The selling price per unit of scented candle is ₹230.</p> <p>If it is decided to work the factory at 50% capacity, the selling price falls by 3%. At 90% capacity, the selling price falls by 5% accompanied by a similar fall in the price of material.</p> <p>Required: Calculate the profit at 50% and 90% capacities and also show break even points for the same capacity production. (14)</p>																																																																																																																		

3)	<p>M/s GrowMore Ltd is a merchandizing firm, engaged in retail sale of readymade dress directly supplied by manufacturers. Following information relates to M/s GrowMore Ltd for the year 2024-25:</p> <p>(i) The sales figures (actual &amp; projected) from October'24 to February'25 are as follows: October'24 - ₹28 lakh; November'24 - ₹36 lakh; December'24 - ₹38 lakh; January'25 - ₹40 lakh; and February'25 - ₹44 lakh.</p> <p>(ii) Gross profit margin is 20% on sale and continue to remain so for the projected period.</p> <p>(iii) 10% of total sale is cash sale. Out of credit sale of each month, 50% is collected in the next month and the balance is collected during the second month following the month of sale. The same procedure will also be followed in future.</p> <p>(iv) There is only credit purchase and creditors are paid in the first month following credit purchase. The same procedure will also be followed in future.</p> <p>(v) As a matter of practice, wages and salaries amounting to ₹3 lakh and are paid on the first day of the next month.</p> <p>(vi) Interim dividend of ₹ 2 lakhs will be paid in February 2025.</p> <p>(vii) Furniture costing ₹ 10 lakhs are purchased in November, 2024. Repayment by instalment of ₹ 60,000 p.m. will start from December, 2024.</p> <p>(viii) Administrative expenses of ₹ 1,20,000 per month (fixed) is paid in the month of their incurrence.</p> <p>(ix) Assume no minimum cash balance is required. Opening cash balance as on 01-12-2024 is estimated at ₹ 10 lakhs.</p> <p><b>Required:</b> Prepare the monthly cash budget for the 3 month period (December, 2024 to February, 2025). (12)</p>																					
4)	<p>Presented below is an incomplete income statement and an incomplete comparative balance sheet of XYZ Limited.</p> <p style="text-align: center;">XYZ Limited</p> <p style="text-align: center;">Income Statement for the Year Ended December 31, 200X</p> <table> <tbody> <tr> <td>Sales</td> <td>₹11,000,000</td> </tr> <tr> <td>Cost of goods sold</td> <td>₹?</td> </tr> <tr> <td>Gross profit</td> <td>₹?</td> </tr> <tr> <td>Operating expenses</td> <td>1,665,000</td> </tr> <tr> <td>Income from operations</td> <td>₹?</td> </tr> <tr> <td>Other expenses and losses</td> <td></td> </tr> <tr> <td>Interest expense</td> <td>₹?</td> </tr> <tr> <td>Income before income taxes</td> <td>₹?</td> </tr> <tr> <td>Income tax expense</td> <td>560,000</td> </tr> <tr> <td>Net income</td> <td>₹?</td> </tr> </tbody> </table>	Sales	₹11,000,000	Cost of goods sold	₹?	Gross profit	₹?	Operating expenses	1,665,000	Income from operations	₹?	Other expenses and losses		Interest expense	₹?	Income before income taxes	₹?	Income tax expense	560,000	Net income	₹?	
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XYZ Limited Balance Sheets as on December 31		
Assets	200X (Current year)	20IX (Previous year)
Current assets		
Cash	₹ 450,000	₹ 375,000
Accounts receivable (net)	₹ ?	950,000
Inventory	₹ ?	1,720,000
Total current assets	₹ ?	3,045,000
Plant assets (net)	4,620,000	3,955,000
<b>Total assets</b>	<b>₹ ?</b>	<b>₹7,000,000</b>
<b>Liabilities and Stockholders' Equity</b>		
Current liabilities	₹ ?	₹ 825,000
Long-term notes payable	₹ ?	2,800,000
Total liabilities	₹ ?	3,625,000
Common stock, ₹1 par	3,000,000	3,000,000
Retained earnings	400,000	375,000
Total stockholders' equity	3,400,000	3,375,000
<b>Total liabilities and stockholders' equity</b>	<b>₹ ?</b>	<b>₹7,000,000</b>

Additional information:

1. The receivables turnover for 200X is 10 times.
2. All sales are on credit basis.
3. The profit margin for 200X is 14.5%.
4. Return on assets is 22% for 200X.
5. The current ratio on December 31, 200X, is 3.0.
6. The inventory turnover for 200X is 4.8 times.

Required: Compute the missing information given the ratios above. Show computations. Marks will be awarded on the basis of computations.

(14)

- 5) Health freak Company produces treadmills. One of its plants produces two versions: a standard model and a deluxe model. The deluxe model has a wider and sturdier base and a variety of electronic gadgets to help the exerciser monitor heartbeat, calories burned, distance travelled, etc. At the beginning of the year, the following data were prepared for this plant:

	Standard Model	Deluxe Model
Quantity produced	20,000	10,000
Sales	15,000	15,000
Selling Price per unit	\$ 300	\$ 600
Prime Cost	\$ 30,00,000	\$ 35,00,000
Machine hours	25,000	25,000
Direct labor hours	50,000	50,000
Engineering support (hours)	9,000	21,000
Receiving (orders processed)	2,000	3,000
Material handling (no. of moves)	10,000	30,000
Purchasing (no. of requisitions)	500	1,000
Maintenance (hours used)	4,000	16,000
Paying suppliers (invoices processed)	2,500	2,500
Setting up batches (number of setups)	40	360

<p style="text-align: center;">Additionally, the following overhead activity costs are reported:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Maintenance</td> <td style="text-align: right;">\$ 4,00,000</td> </tr> <tr> <td>Engineering support</td> <td style="text-align: right;">6,00,000</td> </tr> <tr> <td>Materials handling (Variable)</td> <td style="text-align: right;">8,00,000</td> </tr> <tr> <td>Setups</td> <td style="text-align: right;">5,00,000</td> </tr> <tr> <td>Purchasing (Variable)</td> <td style="text-align: right;">3,00,000</td> </tr> <tr> <td>Receiving (Variable)</td> <td style="text-align: right;">2,00,000</td> </tr> <tr> <td>Paying suppliers (Variable)</td> <td style="text-align: right;">2,00,000</td> </tr> <tr> <td>Total</td> <td style="text-align: right;"><b>\$ 30,00,000</b></td> </tr> </table> <p>The budgeted level of production for 10,000 units and for Deluxe model is 8,000 units. The Variable selling expenses is \$ 35 per unit for both the models. Fixed selling expenses is \$5,00,000 for both the models.</p> <p><b>Required:</b></p> <ol style="list-style-type: none"> <li>(i) Calculate the cost of goods sold per unit for each product using direct labour hours to assign all overhead costs.</li> <li>(ii) Calculate activity rates and determine the overhead cost per unit. Compare these costs with those calculated using the traditional costing method. Which cost is more accurate? Explain.</li> <li>(iii) Calculate the operating profit for both the standard and deluxe models using absorption &amp; variable costing techniques (using the cost assignment method in terms of the production units).</li> </ol> <p style="text-align: center;">OR</p> <p>5(a) "Attributing direct costs and absorbing overhead costs to the product/ service through an activity-based costing approach will result in a better understanding of the true cost of final output". You are required to explain and comment on the above statement. (10)</p> <p>5(b) "A company is contemplating to increase the salary of sales manager. The manager believes that it will increase the fixed operating expenses of the company. But the treasurer explains that it might increase the variable cost also". Explain the statement in line with the different cost segregation methods. (10)</p> <p>6) Presented below are the financial statements of Zenith Company (amount in ₹'000).</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">Zenith Company</th> </tr> <tr> <th colspan="3" style="text-align: center;">Comparative Balance Sheets as on December 31</th> </tr> <tr> <th style="text-align: left;">Assets</th><th style="text-align: center;">200X (Current)</th><th style="text-align: center;">20IX (Previous)</th></tr> </thead> <tbody> <tr> <td>Cash</td><td style="text-align: center;">₹ 24,000</td><td style="text-align: center;">₹ 33,000</td></tr> <tr> <td>Accounts receivable</td><td style="text-align: center;">25,000</td><td style="text-align: center;">14,000</td></tr> <tr> <td>Merchandise inventory</td><td style="text-align: center;">41,000</td><td style="text-align: center;">25,000</td></tr> <tr> <td>Property, plant, and equipment</td><td style="text-align: center;">₹ 70,000</td><td style="text-align: center;">₹ 78,000</td></tr> <tr> <td>Less: Accumulated depreciation</td><td style="text-align: center;">(27,000)</td><td style="text-align: center;">(24,000)</td></tr> <tr> <td><b>Total</b></td><td style="text-align: center;"><b>₹133,000</b></td><td style="text-align: center;"><b>₹126,000</b></td></tr> </tbody> </table>	Maintenance	\$ 4,00,000	Engineering support	6,00,000	Materials handling (Variable)	8,00,000	Setups	5,00,000	Purchasing (Variable)	3,00,000	Receiving (Variable)	2,00,000	Paying suppliers (Variable)	2,00,000	Total	<b>\$ 30,00,000</b>	Zenith Company			Comparative Balance Sheets as on December 31			Assets	200X (Current)	20IX (Previous)	Cash	₹ 24,000	₹ 33,000	Accounts receivable	25,000	14,000	Merchandise inventory	41,000	25,000	Property, plant, and equipment	₹ 70,000	₹ 78,000	Less: Accumulated depreciation	(27,000)	(24,000)	<b>Total</b>	<b>₹133,000</b>	<b>₹126,000</b>
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<b>Liabilities and Stockholders' Equity</b>		
Accounts payable	₹ 31,000	₹ 43,000
Income taxes payable	24,000	20,000
Bonds payable	20,000	10,000
Common stock	25,000	25,000
Retained earnings	33,000	28,000
<b>Total</b>	<b>₹133,000</b>	<b>₹126,000</b>

<b>Zenith Company</b>		
Income Statement for the Year Ended December 31, 200X		
Sales	₹286,000	
Cost of goods sold	204,000	
Gross profit	82,000	
Operating expenses	37,000	
Income from operations	45,000	
Interest expense	7,000	
Income before income taxes	38,000	
Income tax expense	10,000	
Net income	₹ 28,000	

Additional data:

1. Dividends of ₹23,000 were declared and paid.
2. During the year equipment was sold for ₹10,000 cash. This equipment cost ₹15,000 originally and had a book value of ₹10,000 at the time of sale.
3. All depreciation expense, ₹8,000, is in the operating expenses.
4. All sales and purchases are on credit.
5. Additional equipment was purchased for ₹7,000 cash.
6. Accounts payable pertains to merchandise creditors.
7. All operating expenses except for depreciation are paid in cash.

Required:

(a) Prepare a statement of cash flows using the direct method. (18)  
 (b) Compute free cash flow. (2)

**OR**

6(a) "An investor wants to invest in a company A, who's ROE is 12.5% but the ROA is 5.6%. As a consultant conduct a DuPont analysis to advise the investor on his buying decision. (10)

6(b) "Absorption costing is misused by the managers to inflate the income". Do you agree? Give reasons with suitable examples. (10)

**Mid Term Makeup Examination, Session 2024-25**

Class: 1st MBA/B.Tech/JRF/1<sup>st</sup> Ex. MBA      Subject: Management principles and practices  
Subject Code: MSC501/NMSC515  
Time: 02 Hrs.      Maximum Marks: 60

**Instruction:**

- Attempt all the questions.
- Answer sub questions of each question at one place.
- Restrict answers to less than 100 words.

Q1

MPC Energy Solutions, a multinational energy company, operates in a highly competitive and rapidly evolving industry. To remain relevant, the company has historically focused on expanding its presence in emerging markets. Recently, the CEO, Mr. Fernando Zúñiga, pushed for a significant investment in a renewable energy project in the country of Guatemala, a region known for political instability and fluctuating regulations. Despite initial warnings from the risk management team, Mr. Fernando moved forward, believing that early entry into Guatemala would position MPC as a dominant player in the country's emerging green energy sector.

However, six months into the project, MPC is facing major hurdles. The Guatemala government has implemented sudden regulatory changes that have nearly doubled the cost of operations. The projected returns have now plummeted to a break-even scenario at best. Internal debate is escalating: should the company cut its losses or double down to make the project successful?

Two senior managers have emerged as the key decision-makers regarding the future of the Guatemala project:

Ms. Jessica Coleman, COO, has a high tolerance for ambiguity and tends to make decisions intuitively, often relying on gut feelings and subjective judgment.

Mr. Steven Patel, CFO, has a low tolerance for ambiguity and is a rational thinker, heavily relying on data and analysis before making decisions.

Ms. Coleman believes that with additional investment and some risk mitigation, the project could still be successful in the long run, despite the setbacks. She argues that pulling out now would undermine the company's future presence in Guatemala's renewable energy market, and losing first-mover advantage would have long-term consequences. She is willing to tolerate the uncertainties and sees the bigger strategic picture.

On the other hand, Mr. Patel is highly sceptical. His rational analysis of the numbers shows that the project is already a financial burden, and further investment would likely not yield the desired returns. He advocates for pulling the plug now to prevent further losses, despite the sunk costs already incurred.

Complicating the situation is the escalation of commitment to a failing course of action. The CEO, Mr. Fernando, who originally championed the Guatemala expansion, is emotionally invested in the project. He is hesitant to admit that his decision was flawed and is exerting pressure on the team to continue investing in Guatemala, believing the situation will eventually turn around.

**Questions:**

- a) How does Ms. Coleman's high tolerance for ambiguity influence her decision-making in this situation? What risks does her intuitive approach pose in the context of the Guatemala project's uncertain future? [4]
- b) Mr. Patel's rational decision-making style suggests pulling out of the Guatemala project. Analyze the potential risks and benefits of relying purely on data-driven analysis in this scenario, especially in a highly uncertain environment. [4]
- c) How does the CEO's escalation of commitment to a failing course of action influence the decision-making process? What steps can be taken to prevent this emotional bias from driving further poor decisions? [4]
- d) Given the high stakes and uncertainty, which decision-making style is more appropriate for this situation? [4]
- e) If you were in charge, what would be your recommendation? Should MPC Energy continue with the Guatemala project or cut its losses and exit? Justify your answer. [4]

**Q2**

Mitracon GmbH in Wynau is responsible for the manufacture and sale of center grinding machines and spindle presses according to the FISCHER Dottikon system, a rapidly growing tech firm, has seen significant growth over the past five years. Despite the growth in revenue and market share, the company is facing internal challenges. The operational inefficiencies, misalignment between departments, and employee burnout have led to a chaotic situation where the company risks losing its competitive edge.

The CEO, Mr. Aryan Gupta, believes that the current organizational problems stem from an imbalance in the company's internal systems, which are increasingly becoming entropic. He wants to address these issues by applying systems thinking to realign the organization's operations and negentropy.

The company's leadership team is divided in their approach. The CTO, Ms. Sunita Reddy, believes that introducing more structure and tighter control over processes will reduce chaos. Meanwhile, the CFO, Mr. Rajesh Batra, advocates for decentralization to foster creativity and autonomy. Both of these approaches offer different paths to organizational equifinality, but they have opposing implications for control and flexibility.

**Principal concerns:**

- There is growing confusion and inefficiency in inter-departmental communication and project alignment. Many teams are working on overlapping projects without clear roles.
- Some departments have initiated process improvement efforts, but these are uncoordinated and lead to further conflict between teams.
- The HR department has implemented wellness programs to combat burnout, but these programs are not producing the desired effect. Employees are still leaving the company at a high rate, and the feedback from exit interviews indicates that these wellness programs address symptoms rather than underlying causes.
- Both the CTO and CFO are presenting opposing views for organizational change, with each believing their approach will lead to sustainable growth.

**Questions:**

- a) How can Mitracon reduce its growing internal entropy while encouraging innovation and flexibility? What specific actions would represent negentropic forces in this scenario? [4]
- b) Given that the HR department's wellness programs are not reducing burnout, how can the concept of homeostasis be used to create a balance between work stress and organizational well-being? [4]
- c) Analyze the feedback loop from the exit interviews. Why is the HR department failing to capture useful feedback, and how can they modify their approach to gain better insights into the root causes of employee dissatisfaction? [4]
- d) Both the CTO's structured approach and the CFO's decentralized strategy present different methods for achieving organizational goals. Evaluate which path is more aligned with systems thinking, and how either path can achieve the desired result. [4]
- e) Mitracon Technologies operates in a fast-evolving tech industry. How can the company maintain adaptability while striving for stability and growth? What strategies can ensure the company remains dynamic in its external environment but ordered internally? [4]

Q3

- a) How do the findings of the Hawthorne Studies challenge the core assumptions of Scientific Management Theory, and what implications does this have for modern management practices? [5]
- b) What strategies can companies adopt to achieve and sustain a competitive advantage in a rapidly changing market environment? [5]

Q4

- a) In what ways can the masculine versus feminine dimension of Hofstede's cultural dimensions influence the implementation of TPS in Indian organizations? [5]
- b) In what ways might the reliance on quantitative metrics in MBO lead to unintended consequences, and how can organizations mitigate these risks while maintaining performance standards? [5]

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Monsoon Semester Examination, Session 2024-25

Class: 1st MBA (Ex/Full time)/ JRF/B.Tech

Subject: Management principles and practices  
Subject Code: MSC501/NMSC515  
Maximum Marks: 100

Time: 03 Hrs

**Instruction:**

- Attempt all the questions.
- Answer sub questions of each question at one place.

Q1

TechnoVibe Inc. is a global electronics company known for its wide range of consumer gadgets, from smartphones and home appliances to robotics and smart home solutions. Initially, TechnoVibe organized its divisions independently, allowing each product line to focus on specialized markets and tailor strategies to regional preferences. However, as competition grew and supply chain disruptions became more frequent, TechnoVibe's leadership decided to re-evaluate its structure to improve efficiency, streamline operations, and unify its brand globally.

TechnoVibe experimented with two organizational structures:

1. **9+2+4 Structure:** This included nine product divisions (e.g., smartphones, robotics, home appliances), two core component divisions, and four platforms (digital sales, logistics, R&D, and customer service).
2. **7+8+9 Structure:** TechnoVibe later moved to a 7+8+9 structure, organizing into seven business units, eight shared service functions (e.g., centralized HR, finance, and IT), and nine strategic goals aimed at growth, cost efficiency, and digital transformation.

**Questions:**

- a) How do the 9+2+4 and 7+8+9 structures of TechnoVibe Inc. align with industry attractiveness and relative growth rate, and which structure is better suited for high-growth industries? [10]
- b) How would TechnoVibe's approach to global branding differ between the 9+2+4 and 7+8+9 structures? What challenges might TechnoVibe face in scaling its operations globally with the 9+2+4 structure compared to the 7+8+9 structure? [10]

Q2.

EcoCorp, a multinational manufacturing company, is under scrutiny for its environmental practices. The company operates in a developing country where environmental laws are lenient. The local community depends on the factory for jobs, but the factory's operations have been linked to water pollution in nearby rivers.

EcoCorp's leadership must decide between two options:

1. Invest in environmentally friendly technology to reduce pollution, which will increase costs, potentially leading to layoffs and lower profits.
2. Continue current operations, ensuring profitability and job security for employees but perpetuating environmental damage.

Questions:

a) Do you agree that focusing on the "greatest good for the greatest number" is a suitable approach for EcoCorp's dilemma? Explain [5]

b) What challenges could EcoCorp face in adhering strictly to deontological principles in a competitive industry? [5]

c) In your view, is the concept of a "social contract" realistic in a corporate setting? Justify. [5]

d) Which virtues should be prioritized in this case, and how do they align with EcoCorp's long-term goals? [5]

Q3

Describe and differentiate the directive, analytical, conceptual, and behavioral decision-making styles. Provide examples of the unique characteristics of each style and explain their impact on organizational decision-making. [15]

Q4

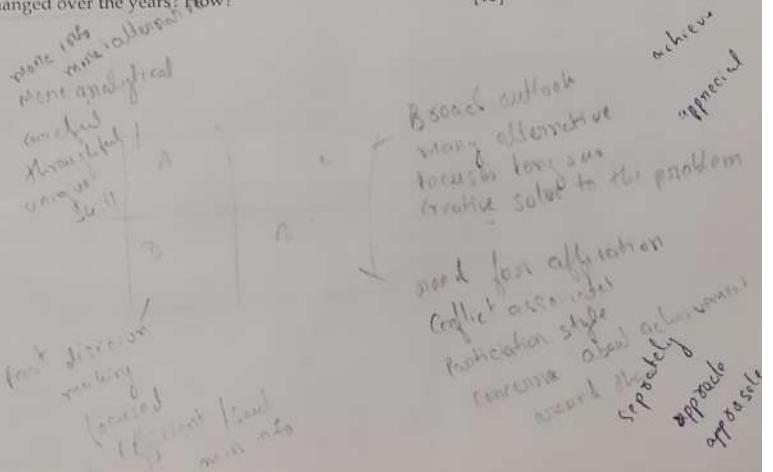
Discuss the key findings of the Hawthorne Studies and critically analyze their implications for management practices. How did the studies contribute to the development of the Human Relations Movement, and what are the long-term impacts on organizational behavior theory? In your answer, evaluate both the strengths and weaknesses of the Hawthorne Studies, and consider their relevance in today's organizational context. [15]

Q5

Compare and contrast the Ameba-Based Organization Structure and Modular Organization based on their key features, advantages, and challenges. Provide a detailed analysis of how each structure influences organizational flexibility, decision-making, and adaptability in the contemporary business environment. [15]

Q6

What are the major social responsibilities of business managers and of government managers? Have these responsibilities changed over the years? How? [15]



INDIAN INSTITUTE OF TECHNOLOGY (ISM) DHANBAD  
Department of Management Studies & Industrial Engineering

Mid-Term Exam  
Decision Modelling: NMSC507/MS507  
(Academic Year 2024-25)

Course: Decision Modelling  
Date: 14/9/24

Max Marks: 64

Instructions: Scientific Calculators are allowed

Duration: 120 Minutes

Q1. Answer the following question:

- I. What is the physical interpretation of slack, surplus, and artificial variables in the linear programming problem? (3 Marks)
- II. A negative shadow price in the linear programming indicates that ..... (2 Marks)
- III. In case of infeasibility, we can achieve at least one feasible point if we subtract the value of the artificial variable appearing in the final iteration as the basic variable from the ..... of the corresponding constraints. (2 Marks)
- IV. A constraint in equation is represented as  $5x_1 - 3x_2 \leq -5$ ; what kind of variable will appear if it is converted into equation. Justify your answer. (2 Marks)
- V. In an LPP if one of the decision variable is zero then the solution is ..... (2 Marks)
- VI. If all the  $a_{ij}$  are less than or equal to zero in the column of incoming variable, it indicates ..... (2 Marks)

Q2. The sensitivity report is generated using solver for the Portfolio Selection problem, provide the interpretation of the reduced cost corresponding to decision variable  $x_3$  & shadow price for cell 10, 11, & 12 in the constraints. Also provide significance of allowable increase & allowable decrease for cell 10 given in the constraints. (7 Marks)

Worksheet: [Portfolio Selection Problem.xlsx]Sheet2						
Report Created: 01-09-2024 16:49:59						
Variable Cells		Final	Reduced	Objective	Allowable	Allowable
Cell	Name	Value	Cost	Coefficient	Increase	Decrease
\$C\$16	x1	20000	0	0.073	0.03	0.055
\$D\$16	x2	30000	0	0.103	1E+30	0.03
\$E\$16	x3	0	-0.011	0.064	0.011	1E+30
\$F\$16	x4	40000	0	0.075	0.0275	0.011
\$G\$16	x5	10000	0	0.045	0.03	0.345
Constraints		Final	Shadow	Constraint	Allowable	Allowable

Cell	Name	Value	Price	R.H. Side	Increase	Decrease
SHS10	Funds Used	50000	0.022	50000	50000	12500
SHS11	Funds Used	40000	0	50000	1E+30	10000
SHS12	Funds Used	0	-0.024	0	50000	12500
SHS13	Funds Used	0	0.03	0	20000	30000
SHS9	Investments in various options Funds Used	100000	0.069	100000	12500	50000

B.) A transport company is considering the purchase of new vehicles for providing transportation between the Kolkata Airport and hotels in the city. There are three vehicles under consideration: Station wagons, minibuses and large buses. The purchase price would be Rs 1,45,000 for each station wagon, Rs 2,50,000 for each minibus and Rs 4,00,000 for each large bus. The board of directors has authorized a maximum amount of Rs 50,00,000 for these purchases. Because of the heavy air travel, the new vehicles would be utilized at maximum capacity, regardless of the type of vehicles purchased. The expected net annual profit would be Rs 15,000 for the station wagon, Rs 35,000 for the minibus and Rs 45,000 for the large bus. The company has hired 30 new drivers for the new vehicles. They are qualified drivers for all three types of vehicles. The maintenance department has the capacity to handle an additional 80 station wagons. A minibus is equivalent to 1.67 station wagons and each large bus is equivalent to 2 station wagons in terms of their use of the maintenance department. Formulate to determine the number of each type of vehicle that should be purchased to maximize profit. (6 Marks)

Q3. A.) Use the graphical method to solve given problem, and discuss the feasible region & type of constraints given in the problem from manager perspective. (6 Marks)

$$\text{Minimize, } Z = 50x_1 + 100x_2$$

Subject to

$$7x_1 + 2x_2 \geq 28;$$

$$2x_1 + 12x_2 \geq 24;$$

$$x_1, x_2 \geq 0$$

B.) A diet is to contain at least 20 ounces of protein and 15 ounces of carbohydrate. There are three foods A, B and C available in the market, costing Rs 2, Re 1 and Rs 3 per unit, respectively. Each unit of A contains 2 ounces of protein and 4 ounces of carbohydrate; each unit of B contains 3 ounces of protein and 2 ounces of carbohydrate; and each unit of C contains 4 ounces of protein and 2 ounces of carbohydrate. How many units of each food should the diet contain so that the cost per unit diet is minimum? Formulate the LPP, and find the optimal solution. (8 Marks)

Q4. Suppose that the following constraints have been provided for a linear programming model with decision variables  $x_1$  and  $x_2$

$$-x_1 + 3x_2 \leq 15$$

$$-3x_1 + x_2 \leq 15$$

$$x_1, x_2 \geq 0$$

C.) Discuss the feasible region we get for the given LP, and also see whether it is possible to get the optimal solution. If the objective is to maximize  $Z = -x_1 + x_2$ , what can be concluded for the optimal solution. In case if there are no good solutions available for the given LP, explain what probably went wrong while formulating the model? (8 Marks)

B.) For the given LP, find the optimal solution using the simplex tableau method. ( 7 Marks)

$$\text{Maximize } Z = 30x_1 - 4x_2$$

Subject to

$$5x_1 \leq 30 + x_2;$$

$$x_1 \leq 5;$$

$x_1 \geq 0$  &  $x_2$  is unrestricted in sign

Q5. Answer the following questions:

A.) Use the simplex tableau method to solve the following LP: (3 Marks)

Minimize  $Z = -x_1 - x_2$   
subject to

$$x_1 - x_2 \leq 1$$

$$x_1 + x_2 \leq 2$$

and  $x_i \geq 0$ .

B.) Find all optimal solutions to the given LP & discuss its significance from manager's perspective (Use simplex Tableau method). (6 Marks)

Maximize  $Z = 2x_1 + 2x_2$ ,  
subject to

$$x_1 + x_2 \leq 6$$

$$2x_1 + x_2 \leq 13$$

and  $x_1 \geq 0$ ,  $x_2 \geq 0$ .

$$Z = 2x_1 + 2x_2 + 0x_3$$

$$x_1 + x_2 + 0x_3 = 6$$

$$2x_1 + x_2 + 0x_3 = 13$$

INDIAN INSTITUTE OF TECHNOLOGY (ISM) DHANBAD  
Department of Management Studies & Industrial Engineering

End-Term Exam  
Decision Modelling: MSC507/NMSC502  
(Academic Year 2024-25)

Max Marks: 100

Course: Decision Modelling

Date: 29/11/24

Instructions: Scientific Calculators are allowed

$$p_0 = 1 - \rho, \rho < 1$$

$$p_n = (1 - \rho) \rho^n, n = 1, 2, \dots (\rho < 1) \quad L_s = \frac{\rho}{1-\rho} = \frac{\lambda}{\mu-\lambda} \quad L_q = \lambda W_q = \frac{\rho^2}{1-\rho}$$

$$W_s = \frac{1}{\mu-\lambda}$$

Duration: 180 Minutes

$$W_q = W_s - \frac{1}{\mu} = \frac{\rho}{\mu(1-\rho)}$$

$$\frac{10}{1(1-15)}$$

$$\frac{10}{-1}$$

Q1. (A.) A company has two grades of inspectors-1 and 2, the members of which are to be assigned for a quality control inspection. It is required that at least 2,000 pieces be inspected per 8-hour day. Grade-1 inspectors can check pieces at the rate of 40 per hour, with an accuracy of 97 per cent. Grade-2 inspectors check at the rate of 30 pieces per hour with an accuracy of 95 per cent. The wage rate of a Grade-1 inspector is Rs 5 per hour while that of a Grade-2 inspector is Rs 4 per hour. An error made by an inspector costs Rs 3 to the company. There are only nine Grade-1 inspectors and eleven Grade-2 inspectors available to the company. The company wishes to assign work to the available inspectors so as to minimize the total cost of the inspection.

- (a) Compute the hourly cost of each inspector of Grade-1 and 2? (1 marks)
- (b) What will be the daily inspection cost equation? (1 marks)
- (c) How should the company assign the work so that this daily inspection cost is minimum? (4 marks)
- (d) Consider that in the optimal solution, out of the available nine Grade-1 inspectors, only 6 were assigned the work ----- what does it indicate about the shadow price/dual price? (2 marks)
- (e) Consider that in the optimal solution, the reduced cost obtained with respect to the Grade-2 inspectors is 16.4 ----- what does it indicate? (2 marks)

(B.) A textile company produces two types of materials A & B. The material A is produced based on direct orders from furniture manufacturers. The material B is distributed to retail fabric stores. The average production rates for the material A & B are identical at 1000 meters/hour. By running two shifts the operational capacity of the plant is 80 hours per week. The marketing department reports that the maximum estimated sales for the following week is 70000 meters of material A & 45000 meters of material B. According to accounting department the profit from a meter of material A is Rs. 2.50 & from a meter of material B is Rs. 1.50. The management of the company decides that a stable employment level is a primary goal for the firm. Therefore, whenever there is a demand exceeding normal production capacity, the management simply expands production capacity by providing overtime. However, management feels that overtime operation of the plant of more than 10 hours per week should be avoided because of accelerating costs. The management has the following goals in the order of importance: the first goal is to avoid any underutilization of production capacity (i.e., to maintain stable employment at normal capacity), the second goal is to limit the overtime operation of the plant to 10 hours, the third goal is to achieve the sales goals of 70000 meters of material A & 45000 meters of material B. The last goal is to minimize the overtime operation of the plant as much as possible. Formulate this as goal programming problem to help management for the best decision. (10 Marks)

Q2. (A.) Four cargo ships will be used for shipping goods from one port to four other ports. Any ship can be used for making any one of these four trips. However, because of differences in the ships and cargoes, the total cost of loading, transporting, and unloading the goods for the different ship-port

combinations varies considerably, as shown in the following table. The objective is to assign the four ships to four different ports in such a way as to minimize the total cost for all four shipments.

(a) Assign the four ships to four different ports such that the total cost for all four shipments is minimum. (6 marks)

(b) State the cost of this assignment. (2 marks)

	Port-1	Port-2	Port-3	Port-4
Cargo ship-1	Rs 5000	Rs 9000	Rs 3000 ✓	Rs 6000
Cargo ship-2	Rs 8000	Rs 7000	Rs 8000	Rs 2000 ✓
Cargo ship-3	Rs 6000	Rs 10000 ✓	Rs 12000	Rs 7000
Cargo ship-4	Rs 3000 ✓	Rs 10000	Rs 8000	Rs 6000

(B.) Five salesmen are to be assigned to five districts. Estimates of sales revenue (in thousands) for each salesman are given as follows. Find the assignment pattern that maximizes the sales revenue? (6 Marks)

Salesmen	Districts				
	A	B	C	D	E
1	35	41	43	31	43
2	43	27	31	24	39
3	44	30	36	33	40
4	25	41	44	39	39
5	32	36	43	38	42

(C.) A company has taken the third floor of a multi-storied building for rent to locate one of its zonal offices. There are five main rooms in this floor to be assigned to five managers. Each room has its own advantages and disadvantages. Some have two cupboards, some are closer to the washrooms or to the canteens, some are of big sizes and are on different floors, etc. Each of the five managers were asked to rank their room preferences amongst the rooms 201, 302, 103, 304 and 205. Their preferences were recorded in a table as indicated below. Most of the managers did not include all five rooms in the list since they were not satisfied with some of them. Assuming that their preferences can be quantified by numbers, find out which manager should be assigned which room so that their total preference ranking is minimum. (8 Marks)

Rooms	Managers				
	M1	M2	M3	M4	M5
201	302	103	302	201	
103	304	201	205	302	
304	205	304	304	304	
-	201	205	103	-	
-	-	302	-	-	

Q3. (A.) A steel company is concerned with the problem of distributing imported ore from three ports to four steel mills. The supplies of ore arriving at the ports are:

Port	Tonnes per week
a	20,000

b	38,000
c	16,000

The demand at the steel mills is as follows:

Steel mills	A	B	C	D
Tonnes per week	10,000	18,000	22,000	24,000

The transportation cost is Rs 10 per tonne per km. The distance between the ports and the steel mills is as given below.

	Steel mill-A	Steel mill-B	Steel mill-C	Steel mill-D
Port-a	50	60	100	50
Port-b	80	40	70	50
Port-c	90	70	30	50

- (a) Calculate a transportation plan that will minimize the distribution cost for the steel company. (6 marks)  
 (b) What will be the cost of this distribution plan? (2 marks)  
 (B.) The following table provides all the necessary information on the availability of supply to each warehouse, the requirement of each market, and the unit transportation cost (in Rs) from each warehouse to each market.

Warehouse	Market				
	P	Q	R	S	Supply
A	6	3	5	4	22
B	5	9	2	7	15
C	5	7	8	6	8
Demand	7	12	17	9	45

The shipping clerk of the shipping agency has worked out the following schedule, based on his own experience: 12 units from A to Q, 1 unit from A to R, 9 units from A to S, 15 units from B to R, 7 units from C to P and 1 unit from C to R.

- (a) Check and see if the clerk has the optimal schedule. (8 Marks)  
 (b) Find the optimal schedule and minimum total transport cost. (4 Marks)  
 (c) If the clerk is approached by a carrier of route C to Q, who offers to reduce his rate in the hope of getting some business, by how much should the rate be reduced before the clerk would offer him the business. (4 Marks)

Q4. (A.) You have the chance to invest in three mutual funds: utility, aggressive growth, and global. The value of your investment will change depending on the market conditions. There is a 20% chance the market will go down, 45% chance it will remain moderate, and 35% chance it will perform well. The following table provides the investment value under the three conditions:

Alternative	Return on investment		
	Down market	Moderate market	Up market
Utility	+5000	+7000	+8000
Aggressive growth	-10000	+5000	+30000
Global	+2000	+7000	+20000

- (a) Represent the problem as a decision tree. (2 marks)  
 (b) Which mutual fund should you select and why? (3 marks)

(B.) For the upcoming planting season, the farmer can plant corn, wheat, or soybeans or use the land for grazing. The payoffs associated with the different actions are influenced by the amount of rain: heavy rainfall, moderate rainfall, light rainfall, or drought. The payoff matrix (in thousands of rupees) is estimated as below.

	Heavy rainfall	Moderate rainfall	Light rainfall	Drought	
Plant corn	-20	60	30	-5	-20
Plant wheat	40	50	35	0	-5
Plant soybeans	-50	100	45	-10	-5
Use land for grazing	12	15	15	10	10

- (a) What will be the decision of the farmer? (3 marks)  
 (b) Which method have you used to take the appropriate decision? (2 marks)

Q5. (A.) Two politicians soon will be starting their campaigns against each other for a certain political office. Each must now select the main issue he will emphasize as the theme of his campaign. Each has three advantageous issues from which to choose, but the relative effectiveness of each one would depend upon the issue chosen by the opponent. In particular, the estimated increase in the vote for politician 1 (expressed as a percentage of the total vote) resulting from each combination of issues is given in table below. However, because considerable staff work is required to research and formulate the issue chosen, each politician must make her own choice before learning the opponent's choice.

		Issue for Politician 2			
		Issue-1	Issue-2	Issue-3	
Issue for Politician 1					
Issue-1		7	-1	3	-1
Issue-2		1	0	2	0.5
Issue-3		-5	-3	-1	-5

- (a) Which method should the politicians use for selecting the issue? (2 marks)  
 (b) Which issue should be chosen by each politician and why? (3 marks)  
 (C.) A fast-food restaurant has one drive-in window. Cars arrive according to a Poisson distribution at the rate of 2 cars every 5 minutes. The space in front of the window can accommodate at most 10 cars, including the one being served. Other cars can wait outside this space if necessary. The service time per customer is exponential, with a mean of 1.5 minutes. Determine the following:

- (a) The probability that the facility is idle. (3 marks)  
 (b) The expected number of customers waiting to be served. (3 marks)  
 (c) The expected waiting time until a customer reaches the window to place an order. (3 marks)

- (C.) Answer the following questions:  
 (a) What is the logic of Vogel's Approximation Method? (2 marks)  
 (b) Can we say that NWC/MCM/VAM always provides a basic feasible solution even if the solution shows the number of allocations  $< (m+n-1)$ ? (2 marks)  
 (c) Is it true that assignment problems will have degenerate basic feasible solutions? Justify your answer. (4 marks)  
 (d) Is it possible for theta to take zero value in the simplex algorithm? (2 marks)

**End Semester (Winter) Examination, Session 2024 – 2025**

Examination: II – MBA / M.Tech.(IEM) / ExMBA / JRF (Management/IEM)  
 Subject: Research Methodology and Statistics (NMSC595/NMSC596/MSI502/MSC502)  
 Instructions: Answer all questions  
 All tables are provided; Assume any missing data

Max. Marks: 50

Time: 2 Hours

Q. No.	Question	Marks																		
1	<p>(a) Discuss the various types of probability sampling techniques, giving appropriate examples.</p> <p>(b) What you understand by the following types of scale: Paired comparison, Likert and Stapel Scale.</p>	10																		
2	<p>(a) When a sample of 70 retail executives was surveyed regarding the poor November performance of the retail industry, 66 percent believed that decreased sales were due to unseasonably warm temperatures, resulting in consumers' delaying purchase of cold-weather items. Find the upper and lower confidence limits for this proportion, given a 95 percent confidence level. <math>\hat{p} = 0.66</math></p> <p>(b) A public health official claims that the mean home water use is 350 gallons a day. To verify this claim, a study of 20 randomly selected homes was investigated and the sample mean and standard deviation are computed as 353.8 and 21.8478 gallons respectively. Do the data contradict the official's claim? Test at 1% level of significance. <math>\bar{x} = 353.8</math>, <math>s = 21.8478</math></p>	10 $n = 20$ $\alpha = 1 - 0.99$ $z_{\alpha/2} = 2.576$ $\bar{x} = 353.8$ $s = 21.8478$																		
3	<p>The raw material used in the production of a certain synthetic fiber is stored in a location without a humidity control. A study is conducted to study the effect of relative humidity on the moisture content in fiber. Measurements of the relative humidity in the storage location and the moisture content of a sample of the raw material were taken over 8 days with the following data (in percentages) resulting.</p> <table border="1" style="margin-left: 20px;"> <tr> <td>Relative humidity</td> <td>46</td> <td>53</td> <td>29</td> <td>61</td> <td>36</td> <td>39</td> <td>47</td> <td>49</td> </tr> <tr> <td>Moisture content</td> <td>12</td> <td>15</td> <td>7</td> <td>17</td> <td>10</td> <td>11</td> <td>11</td> <td>12</td> </tr> </table> <p>(a) Compute the Sum of Squares, <math>SS_{xx}</math>, <math>SS_{yy}</math>, and <math>SS_{xy}</math>.</p> <p>(b) Fit a Linear Regression Model.</p> <p>(c) Calculate <math>R^2</math> and explain its meaning.</p> <p>(d) Predict the moisture content in fiber given the relative humidity is 65% in a particular day.</p>	Relative humidity	46	53	29	61	36	39	47	49	Moisture content	12	15	7	17	10	11	11	12	10
Relative humidity	46	53	29	61	36	39	47	49												
Moisture content	12	15	7	17	10	11	11	12												
4	<p>Three training methods were compared to see whether they led to greater productivity after training. The following are productivity measures for individuals trained by each method.</p> <table style="margin-left: 20px;"> <tr> <td>Method 1:</td> <td>45</td> <td>40</td> <td>50</td> <td>39</td> <td>53</td> </tr> <tr> <td>Method 2:</td> <td>59</td> <td>43</td> <td>47</td> <td>51</td> <td>39</td> </tr> <tr> <td>Method 3:</td> <td>41</td> <td>37</td> <td>43</td> <td>40</td> <td>52</td> </tr> </table> <p>At the 0.05 level of significance, do the three training methods lead to different levels of productivity?</p>	Method 1:	45	40	50	39	53	Method 2:	59	43	47	51	39	Method 3:	41	37	43	40	52	10
Method 1:	45	40	50	39	53															
Method 2:	59	43	47	51	39															
Method 3:	41	37	43	40	52															
5	<p>A company operates three machines on three shifts daily. The following table presents the machine breakdowns that resulted during the last year. Suppose we are interested in determining whether a machine's breakdown during a particular shift is influenced by that shift. Test the hypothesis at 5% level of significance.</p> <table border="1" style="margin-left: 20px;"> <tr> <th></th> <th>Machine A</th> <th>Machine B</th> <th>Machine C</th> </tr> <tr> <td>Shift 1</td> <td>8</td> <td>12</td> <td>6</td> </tr> <tr> <td>Shift 2</td> <td>7</td> <td>15</td> <td>9</td> </tr> <tr> <td>Shift 3</td> <td>18</td> <td>18</td> <td>7</td> </tr> </table>		Machine A	Machine B	Machine C	Shift 1	8	12	6	Shift 2	7	15	9	Shift 3	18	18	7	10		
	Machine A	Machine B	Machine C																	
Shift 1	8	12	6																	
Shift 2	7	15	9																	
Shift 3	18	18	7																	

t-values (Area under right tailed)

t-values		a					t-values		a				
	df	0.005	0.01	0.025	0.05	0.1		df	0.005	0.01	0.025	0.05	0.1
4	4.604	3.747	2.776	2.132	1.533	1.3	13	3.012	2.650	2.160	1.771	1.350	
5	4.032	3.365	2.571	2.015	1.476	1.4	14	2.977	2.624	2.145	1.761	1.345	
6	3.707	3.143	2.447	1.943	1.440	1.5	15	2.947	2.602	2.131	1.753	1.341	
7	3.499	2.998	2.365	1.895	1.415	1.6	16	2.921	2.583	2.120	1.746	1.337	
8	3.355	2.896	2.306	1.860	1.397	17	17	2.898	2.567	2.110	1.734	1.333	
9	3.250	2.821	2.262	1.833	1.383	18	18	2.878	2.552	2.101	1.729	1.330	
10	3.169	2.764	2.228	1.812	1.372	19	19	2.861	2.539	2.093	1.725	1.328	
11	3.106	2.718	2.201	1.796	1.363	20	20	2.845	2.528	2.086	1.725	1.325	
12	3.055	2.681	2.179	1.782	1.356	21	21	2.831	2.518	2.080	1.721	1.323	

Z-tables (Area under the curve from 0 to a particular value of z)

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2643	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

**Chi-Square values**

Area in Right Tail					Degrees of Freedom
0.20	0.10	0.05	0.025	0.01	
1.642	2.706	3.841	5.024	6.635	1
3.219	4.605	5.991	7.378	9.210	2
4.642	6.251	7.815	9.348	11.345	3
5.989	7.779	9.488	11.143	13.277	4
7.289	9.236	11.070	12.833	15.086	5
8.558	10.645	12.592	14.449	16.812	6
9.803	12.017	14.067	16.013	18.475	7
11.030	13.362	15.507	17.535	20.090	8
12.242	14.684	16.919	19.023	21.666	9
13.442	15.987	18.307	20.483	23.209	10
14.631	17.275	19.675	21.920	24.725	11
15.812	18.549	21.026	23.337	26.217	12
16.985	19.812	22.362	24.736	27.688	13
18.151	21.064	23.685	26.119	29.141	14
19.311	22.307	24.996	27.488	30.578	15

**F table at  $\alpha = 0.05$  (Area in right tailed)**

		Degrees of freedom for the numerator ( $v_1$ )														
		1	2	3	4	5	6	7	8	9	10	12	15	20	24	30
$v_1$	$v_2$	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9	243.9	245.9	248.0	249.1	250.3
1	1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9	243.9	245.9	248.0	249.1	250.3
2	2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.46	
3	3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62
4	4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75
5	5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50
6	6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81
7	7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38
8	8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08
9	9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86
10	10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70
11	11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57
12	12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47
13	13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38
14	14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31
15	15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25
16	16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19
17	17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15
18	18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11
19	19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07
20	20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04
21	21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.03
22	22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98
23	23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96
24	24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94

Mid Semester Examination, Winter Semester, 2024-2025  
II - MBA / M.Tech.(IEM) / ExMBA / JRF (Management/IEM)

Subject: Research Methodology and Statistics (NMSC595/NMSC596/MSI502/MSC502)  
Time: 2 hrs  
Instructions: ANSWER ALL QUESTIONS; ASSUME ANY MISSING DATA;

Full Marks: 30

1. The distribution of heat-storage capacity (in hours) of 30 solar heating systems that were tested in a laboratory is given below. The report on the tests will be used as the basis for tax legislation on solar-heat allowances and thus the measures it uses be as accurate as possible. Compute the mean, mode and median for the data. Select among them the best which reflects the central tendency of the test data and justify your choice. Use Karl Pearson's coefficient of skewness. [5]

Hours	Frequency
1.0 - 1.9	1
2.0 - 2.9	6
3.0 - 3.9	9
4.0 - 4.9	6
5.0 - 5.9	5
6.0 - 6.9	2
7.0 - 7.9	1

- ✓ The number of e-mail messages received per hour has the following distribution: [5]

$x$ = number of messages	10	11	12	13	14	15
$f(x)$	0.08	0.15	0.30	0.20	0.20	0.07

Determine the expected value and standard deviation of the number of messages received per hour. Plot the cumulative distribution function. Also find the probability that the number of e-mail messages received per hour is greater than equal to 12.

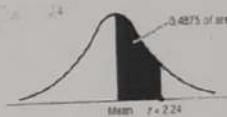
- ✓ 3. The latest nationwide political poll indicates that for Americans who are randomly selected, the probability that they are conservative is 0.55, the probability that they are liberal is 0.30, and the probability that they are middle-of-the-road is 0.15. Assuming that these probabilities are accurate, answer the following questions pertaining to a randomly chosen group of 10 Americans. [5]
- What is the probability that four are liberal?
  - What is the probability that none are conservative?
  - What is the probability that two are middle-of-the-road?
  - What is the probability that at least eight are liberal?

- ✓ 4. From past information, it could be found that the time to failure (in hours) of fans used in personal computer can be modelled by exponential distribution with  $\lambda = 0.0003$ . [5]  
(i) What proportion of the fans will last at least 10,000 hours?  
(ii) What proportion of the fans will last at most 7000 hours?

- ✓ 5. Suppose a tire manufacturer wants to set a minimum kilometre guarantee on its new AT100 tire. Tests reveal that the mean kilometre is 47900 with a standard deviation of 2050 kms and the distribution is normal. The manufacturer wants to set minimum guaranteed kilometre so that no more than 4% of the tires will have to be replaced. What is the minimum guaranteed kilometre should the manufacturer announce? [5]

- ✓ 6. Buses arrive at a specified stop at 15-minute intervals starting at 7 A.M. That is, they arrive at 7, 7:15, 7:30, 7:45, and so on. If a passenger arrives at the stop at a time that is uniformly distributed between 7 and 7:30, find the probability that he waits [5]
- less than 5 minutes for a bus;
  - at least 12 minutes for a bus.

Z-tables (Area under the curve from 0 to a particular value of z)



APPENDIX TABLE 1 AREAS UNDER  
THE STANDARD NORMAL PROBABILITY  
DISTRIBUTION BETWEEN THE MEAN  
AND POSITIVE VALUES OF  $z$

$z$	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0433	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4990	0.4990	0.4990

MID SEMESTER EXAMINATION, IIT(ISM), Dhanbad  
NMSC508: PROJECT MANAGEMENT

Total Marks: 50

Subject: Project Management

Date and Time: 17 Feb 2025, 3:00 PM-5:00 PM

Disciplines: MBA, MTech., Ph.D., Ex MBA

Session- 2024-2025 (Winter)

Instructions: This is a closed book exam. Attempt all questions. Only scientific calculator is allowed.

**Q1.** A company 'FB' has a contract to produce eight flying bikes to support the commute that allows individuals to use a single, portable flying bike in any location in India to commute. 'FB' will develop and produce the eight units. 'FB' has estimated that the R&D costs will be \$12,000,000. Material costs are expected to be \$6,000,000. They have estimated the design and production of the first flying bike will require 100,000 labor hours and an 80 percent learning curve is expected. Skilled labor cost is \$300 per hour. The desired profit for complete projects is 25 percent of total costs.

- i. How many labor hours should the third flying bike require? (4 Marks)  
ii. How many labor hours for the whole project of eight flying bikes? (7 Marks)  
iii. Midway through the project, your design and production people realize that a 75 percent improvement curve is more appropriate. What impact does this have on the project? (6 Marks)

**Q2. a.** The time estimates were made at the 90 percent level (see annexure 1 for calculating Probabilistic Activity Times). All activity times are in days. Using the expected times, find the path with the longest expected time. What is the expected time to complete the following project? Show all the calculation steps (8 Marks)

Act	Pred.	Opt.	Normal	Pess.
A	...	4	5	8
B	...	3	3	5
C	...	7	9	15
D	A	5	5	5
E	B	4	5	6
F	B	10	15	16
G	C	7	11	19
H	C	7	9	16
I	D, E	10	14	18
J	F, G	6	12	20
K	H	7	9	13

Find the probability that the critical path will be completed in 34 days or less. (5 Marks)

**b.** Assume that the times in the table were made on the 95 percent level. Recalculate the activity variances with this assumption and find the probability that the critical path will be complete in 34 days. (4 Marks)  
**c.** Briefly explain the difference in probabilities. (5 Marks)

Q3. Use the information contained below to compress one-time units per move using the least cost method. Reduce the schedule until you reach the crash point of the network. Identify what activity(s) crashed and the adjusted total cost for each move. Explain your choice if you have to choose between activities that cost the same. Construct the cost-duration graph to crash this project. (15 Marks)

Activity	Predecessor	Normal		Crash	
		Time (Days)	Cost (\$)	Time (Days)	Cost (\$)
A	...	4	50	0	...
B	A	5	70	2	190
C	A	5	80	4	120
D	C	4	40	2	120
E	C	5	60	3	140
F	B	5	50	4	90
G	D, F	4	70	3	100
H	D, E	4	80	3	110
I	G, H	3	50	0	...
J	I	2	60	0	...
K	J	2	40	0	...

Table 1: Standard Statistical table

**Cumulative Probabilities for the Standard Normal (Z) Distribution**

The graph shows a standard normal distribution curve (bell curve) centered at 0. The x-axis is labeled with values from -3 to 3. The area under the curve to the left of a point is shaded, representing the cumulative probability for that point. The curve is symmetric about the vertical line at x=0.

Values in the table correspond to the area under the curve of a standard normal random variable for a value at or below  $z$ .

$z$	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000
0.1	0.5398	0.5416	0.5475	0.5517	0.5557	0.5598	0.5636	0.5671	0.5704	0.5733
0.2	0.5793	0.5812	0.5871	0.5910	0.5948	0.5987	0.6020	0.6051	0.6081	0.6113
0.3	0.6197	0.6217	0.6255	0.6293	0.6331	0.6368	0.6403	0.6433	0.6460	0.6487
0.4	0.6594	0.6591	0.6428	0.6424	0.6420	0.6416	0.6412	0.6407	0.6398	0.6384
0.5	0.6991	0.6990	0.6949	0.7019	0.7054	0.7084	0.7123	0.7157	0.7190	0.7224
0.6	0.7387	0.7386	0.7334	0.7367	0.7389	0.7422	0.7454	0.7486	0.7517	0.7547
0.7	0.7781	0.7781	0.7642	0.7737	0.7764	0.7794	0.7824	0.7851	0.7878	0.7905
0.8	0.8175	0.8175	0.7910	0.7939	0.7957	0.7955	0.8023	0.8067	0.8106	0.8133
0.9	0.8567	0.8567	0.8212	0.8236	0.8254	0.8271	0.8344	0.8377	0.8405	0.8435
1.0	0.8943	0.8943	0.8461	0.8481	0.8499	0.8511	0.8554	0.8577	0.8599	0.8621
1.1	0.9314	0.9314	0.8662	0.8686	0.8709	0.8729	0.8759	0.8770	0.8790	0.8810
1.2	0.9684	0.9684	0.9049	0.9065	0.9070	0.9075	0.9084	0.9086	0.9090	0.9097
1.3	0.9947	0.9947	0.9365	0.9082	0.9099	0.9115	0.9137	0.9147	0.9157	0.9167
1.4	0.9994	0.9994	0.9707	0.9222	0.9236	0.9255	0.9265	0.9274	0.9282	0.9291
1.5	0.9999	0.9999	0.9345	0.9362	0.9370	0.9383	0.9395	0.9405	0.9415	0.9424
1.6	0.9999	0.9999	0.9532	0.9463	0.9484	0.9501	0.9519	0.9535	0.9551	0.9565
1.7	0.9999	0.9999	0.9554	0.9577	0.9591	0.9605	0.9619	0.9635	0.9651	0.9665
1.8	0.9999	0.9999	0.9574	0.9597	0.9614	0.9624	0.9638	0.9656	0.9673	0.9689
1.9	0.9999	0.9999	0.9591	0.9726	0.9732	0.9738	0.9744	0.9750	0.9759	0.9767
2.0	0.9999	0.9999	0.9778	0.9783	0.9788	0.9793	0.9799	0.9803	0.9807	0.9811
2.1	0.9999	0.9999	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854
2.2	0.9999	0.9999	0.9863	0.9868	0.9871	0.9875	0.9879	0.9883	0.9887	0.9890
2.3	0.9999	0.9999	0.9890	0.9895	0.9900	0.9904	0.9908	0.9910	0.9913	0.9915
2.4	0.9999	0.9999	0.9920	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9935
2.5	0.9999	0.9999	0.9950	0.9951	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951
2.6	0.9999	0.9999	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963
2.7	0.9999	0.9999	0.9964	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973
2.8	0.9999	0.9999	0.9973	0.9975	0.9977	0.9977	0.9978	0.9979	0.9980	0.9981
2.9	0.9999	0.9999	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986
3.0	0.9999	0.9999	0.9987	0.9987	0.9988	0.9988	0.9988	0.9988	0.9990	0.9991



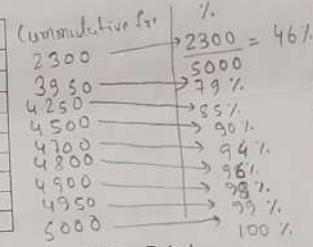
END SEMESTER EXAMINATION, IIT(ISM), Dhanbad  
NMSC508: PROJECT MANAGEMENT

Subject: Project Management  
Date and Time: 22 April 2025, 8:00 AM-10:00 AM  
Disciplines: MBA, MTech., Ph.D., Ex MBA  
Session- 2024-2025 (Winter)  
Instructions: This is a closed book exam. Attempt all questions. Only scientific calculator is allowed. All the answers must be in context of Project Management only.

Total Marks: 50

C1. Finally, after work-experience of 15 years, you are appointed as a shopfloor Manager in a Process workshop at 'ReNew'. 'ReNew' is a manufacturing firm which is famous for manufacturing the best quality components of solar panels. On the day of joining, head of production, 'Hann', called you to discuss the sudden increase in raw material prices; and due to which the lowest price vendor, 'Ani Enterprises' with which ReNew signed the contract for 5 ton of raw material got defaulter. Hann asked you to handle the situation? Analyse and explain in detail, in context of project management (8 Marks). After sharing your insights, you moved to visit the assigned shopfloor in order to conduct a quality assurance visit, you interrogated a quality associate, 'Rahul', to show the rejection/defects details, Rahul immediately opened a page in his tab and started discussing the following information:

Defect	Frequency
Cracks	2300
Microcracks	1650
Hot spots	300
Delamination	250
Internal Corrosion	200
Dust Build-up	100
Broken glass	100
Snail Trails	50
Layering	50



After looking at these numbers, you asked Rahul to show the further details. Rahul expressed about the occurrence of these defects in just last one week, while showing these details, Rahul requested you to help in identifying the major causes of these defects, how will you help him? (4 Marks). While thinking about the defect occurrences, you immediately started relating it to the learning rate of the team, Rahul informed about the applied learning rate of 85% over the last week. Further, it was informed that ReNew started this project in Dec 2024, this type of first solar panel took 450 labour hrs to finish, analyse and explain about the applied learning rate and its impact on the occurrences of defects (3 Marks), does this learning rate help in reducing the project completion time of total 95 panels manufacturing project? Support your answer with logics. (4 Marks).

Immediately after this, Project Manager, 'Pran' started a meeting to discuss the project status with five multiple shopfloor managers of different workshops in the solar manufacturing unit, you were also one of the shopfloor managers, so you were also called. While attending this project progress review meeting, you got confused about your role in "ReNew". What kind of organization you are in? Explain your powers? (3 Marks)

C2. A project to manufacture the 'flyingbike' has been undertaken by a very successful giant firm, 'FlyGin'. Considering the hybrid nature of the 'flyingbike' project, it requires physical manufacturing of some components while software coding for development of the software part. Hence, a Project Manager, 'Aarav', was recruited to manage the project, along with the management of components' manufacturing, he was assigned as the product owner for software feature development. Although a Scrum Master, 'Sam', was recruited to support the facilitation for development of software components, Aarav was the main decision maker. After 6 months of execution phase, Aarav checked the baselines of physical components production plan and started monitored the progress w.r.t baselines for the 7 months as follows:

ACT/ WP	DUR	ES	LF	SL	Total PV	Baseline budget needs											
						0	1	2	3	4	5	6	7	8	9	10	11
A	2	0	2	0	20	10	10										
B	2	2	6	2	15				5	10							
C	4	2	6	0	100				20	30	30	20					
D	3	2	6	1	35				15	10	10						
E	3	6	9	0	120								30	40	50		
F	2	9	11	0	30										10	20	

**Status Report: Ending Period 1**

Task	%Complete	AC
A	50%	10

**Status Report: Ending Period 4**

Task	%Complete	AC
A	Finished	30
B	Finished	20
C	50%	70
D	80%	30

**Status Report: Ending Period 2**

Task	%Complete	AC
A	Finished	30

**Status Report: Ending Period 5**

Task	%Complete	AC
A	Finished	30
B	Finished	20
C	60%	100
D	80%	50

**Status Report: Ending Period 3**

Task	%Complete	AC
A	Finished	30
B	33%	10
C	20%	30
D	60%	20

**Status Report: Ending Period 6**

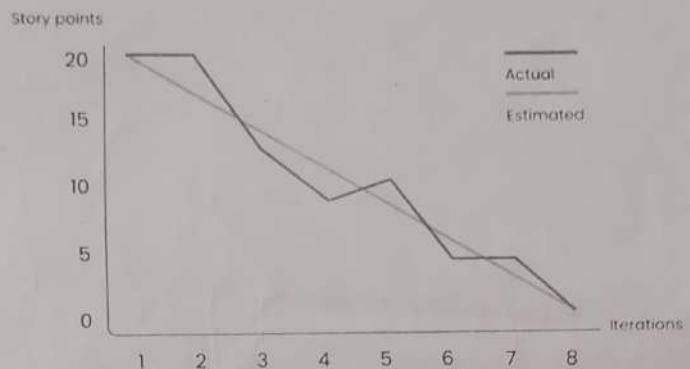
Task	%Complete	AC
A	Finished	30
B	Finished	20
C	80%	110
D	Finished	60

**Status Report: Ending Period 7**

Task	%Complete	AC
A	Finished	30
B	Finished	20
C	90%	120
D	Finished	60
E	0%	0
F	0%	0

Help Aarav in comparing the progress after the end of 3<sup>rd</sup> month and after the end of 7<sup>th</sup> month through summary graphs and the performance indices (12 Marks). Aarav asked his team to calculate and compare the VAC<sub>i</sub> and EAC<sub>i</sub> after the end of 3<sup>rd</sup> month and after the end of 7<sup>th</sup> month w.r.t project status (4 Marks). After monitoring one

segment of the project, Aarav started checking the progress of the software development team. After finalizing the epic and user stories in the initial phase, team started their sprints and completed the prioritized features in 8 sprints, the release burndown chart got expressed as follows, compare the project progress during the 3<sup>rd</sup> and 7<sup>th</sup> iteration (4 Marks).



After a certain point, Aarav thought to declare the project completion, what are the requirements to complete the project formally? (3 Marks) Explain the 6 major differences of the two different project management methodologies between which Aarav juggled in this case (3 Marks).

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END

**Some Useful Expressions:**

$$CV = EV - AC$$

$$SV = EV - PV$$

$$CPI = \frac{EV}{AC}$$

$$SPI = \frac{EV}{PV}$$

$$EAC_t = \frac{(BAC - EV)}{\left(\frac{EV}{AC}\right)} + AC$$

$$VAC_t = BAC - EAC_t$$

$$EAC_{re} = AC + ETC_{re}$$

$$\sigma_{T_e} = \sqrt{\sum \sigma_t^2}$$

$$t_e = \frac{a + 4m + b}{6}$$

$$Z = \frac{T_s - T_e}{\sqrt{\sum \sigma_t^2}}$$

$$\sigma_{t_0} = \left( \frac{b - a}{6} \right)$$

$$NPV = I_0 + \sum_{i=1}^n \frac{F_i}{(1 + k)^i}$$

$$T_n = T_1 n^r$$

**Table: Learning Curves Cumulative Values**

Units	60%	65%	70%	75%	80%	85%	90%	95%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	1.600	1.850	1.700	1.750	1.800	1.850	1.900	1.950
3	2.045	2.155	2.268	2.384	2.502	2.623	2.746	2.872
4	2.405	2.578	2.758	2.940	3.142	3.345	3.556	3.774
5	2.710	2.945	3.195	3.459	3.738	4.031	4.339	4.662
6	2.977	3.274	3.593	3.934	4.299	4.689	5.101	5.530
7	3.216	3.577	3.960	4.380	4.834	5.322	5.845	6.404
8	3.432	3.847	4.303	4.802	5.346	5.936	6.574	7.261
9	3.630	4.102	4.676	5.264	5.839	6.533	7.290	8.111
10	3.813	4.341	4.931	5.589	6.315	7.116	7.994	8.955
12	4.144	4.780	5.501	6.315	7.227	8.244	9.374	10.62
14	4.438	5.177	6.025	6.994	8.092	9.331	10.72	12.27
16	4.704	5.541	6.514	7.535	8.920	10.38	12.04	13.91
18	4.945	5.879	6.972	8.245	9.716	11.41	13.33	15.52
20	5.171	6.195	7.407	8.828	10.48	12.40	14.64	17.13
22	5.379	6.492	7.819	9.388	11.23	13.38	15.66	18.72
24	5.574	6.773	8.213	9.978	11.95	14.33	17.10	20.31
25	5.668	6.903	8.404	10.19	12.31	14.80	17.71	21.10
30	6.091	7.540	9.305	11.45	14.02	17.03	20.73	25.00
35	6.478	8.109	10.13	12.72	15.64	19.29	23.67	28.86
40	6.821	8.631	10.90	13.72	17.19	21.43	26.54	32.68
45	7.134	9.114	11.62	14.77	18.68	23.50	29.37	36.47
50	7.422	9.565	12.31	15.78	20.12	25.51	32.14	40.22
60	7.941	10.39	13.57	17.67	22.87	29.41	37.57	47.65
70	8.401	11.13	14.74	19.43	25.47	33.17	42.87	54.99
80	8.814	11.82	15.82	21.09	27.96	36.80	46.05	62.75
90	9.191	12.45	16.83	22.67	30.35	40.32	53.14	69.45
100	9.539	13.03	17.79	24.18	32.65	43.75	58.14	76.59

Winter, SESSION: 2024-25 (Mid Semester) II MBA  
Subject: NMSC 519 Human Resource Management  
Instructions: Attempt **ANY TEN** questions, giving relevant examples, wherever necessary.  
**PLEASE DO NOT CREATE AN ANSWER, if you have not read the Assignments**  
Time: 2 Hour Max. Marks: 100

Q.No.	Question	Marks
<input checked="" type="checkbox"/> a. <input checked="" type="checkbox"/> b. <input checked="" type="checkbox"/> c. <input checked="" type="checkbox"/> d.	<p>1. Discuss the implications of hiring temporary workers instead of permanent employees in India's present context, by focusing on the following questions:</p> <p>What potential benefits do companies get from hiring temporary workers?</p> <p>What HR and productivity-related issues can arise due to reliance on temporary workers?</p> <p>What are the major disadvantages faced by the temporary workers?</p>	3 1.5 1.5
<input checked="" type="checkbox"/>	<p>2. Assume you are the human resource manager of a small seafood company. The general manager has told you that customers have begun complaining about the quality of your company's fresh fish. Currently, training consists of senior fish cleaners showing new employees how to perform the job. In reference to the case answer the following:</p>	
<input checked="" type="checkbox"/> a. <input checked="" type="checkbox"/> b. <input checked="" type="checkbox"/> c. <input checked="" type="checkbox"/> d.	<p>Would you first ascertain whether training is required, or would you start designing the training process at once? Why/why not?</p>	1
	<p>How would you ascertain who should receive the training and in which task training should be given?</p>	1
	<p>What technique/ method of training is being currently used? How would you like to change it?</p>	1
	<p>Explain the ways in which you would evaluate the effectiveness of the training program.</p>	2
<p>3.</p>	<p>Using the point method create a market-competitive pay plan so that your pay rates are equitable both internally and externally. (Note: Assume the compensable factors and assign weights accordingly). After establishing the rate ranges you find that there are a few employees who are being paid over the pay range. How would you deal with their pay?</p>	4+1
<p>4.</p>	<p>Compare and contrast performance management and performance appraisal. Should one be preferred over the other or should both be done? What is the advantage or disadvantage of choosing one?</p>	5

5.	You have recently assumed the role of HR Manager in your company. In reviewing the company records, you note that the job descriptions were last updated 5 years ago. The company president has taken the position that there is no need to update the job descriptions. However, you also note that the company has grown by 50% during the last 5 years, resulting in many changes, including some in job functions. In light of the above information answer the following questions:  a. Focusing on the importance of job analysis, how would you convince your company president to reconsider his decision regarding updating job descriptions?	1
6.	b. After you have successfully convinced your Company President, how would you go about in conducting the job analysis? Justify your answer with reference to the case. Imagine that while conducting the job analysis you came across a particular job role that is very flexible and requires the person to switch between several different functionalities and activities.	1
7.	c. Which method of job analysis would be applicable here and why?	1
8.	d. What are the barriers to the Process of Human Resource Planning?	2
9.	What are the barriers to the Process of Human Resource Planning?	5
10.	What are advantages of Artificial Intelligence in Performance Management System?	5
11.	What are the various components of the Compensation offered to an Average Employee in the Organized Sector in India?	5
12.	What are the objectives of Employee Welfare in India?	5
13.	What are the qualities that future HR managers should have in order to pursue the vision of strategic alignment with the business objectives?	5
	What are the advantages and disadvantages of 'Graphology' as a selection Device?	5
	What are the key Human Resource Functions?	5
	What steps can Women follow to find the right opportunities at the Workplace?	5

Masala

decisive  
Employment  
opportunities  
competitive  
maternal

Winter, SESSION: 2024-25 (Mid Semester) II MBA

**Subject:** NMSC 519 Human Resource Management  
**Instructions:** Attempt ANY FIVE questions, giving relevant examples, wherever necessary.  
**PLEASE DO NOT CREATE AN ANSWER,** if you have not read the Assignments

Time: 2 Hour

Max. Marks: 30

Q.No.	Question	Marks
1	For several years, many HR activities have been easily chopped off during the time of recession or any crisis. a. Has the position of HRM undergone any changes since then? b. What are the current trends that are fuelling this change?	3 3
2	You are the HR Manager for a growing tech startup. The company has been running smoothly for the past few years and has recorded a steady growth. It is now looking to hire a software engineer with expertise in a specific programming language. However, there are not many qualified candidates in your local area. a. Which sources of recruitment would you consider for this position and why? b. What are the external factors that can affect the recruitment of these candidates?	3 3
3	What are the different ways in which a company can achieve competitive advantage? Explain how HR can be instrumental in helping a company create competitive advantage	6
4	Suppose you work as the HR manager in a multinational company in Sweden. You find out that a particular job role "systems engineer" is facing the problem of high turnover. There are a total of 150 systems engineers at your company, out of which 30 people have resigned in the last year. Among the rest, 22 have been selected to be promoted to the next position, 2 were demoted and 8 were due to retire the upcoming year. You also find that 18 employees were eligible to be promoted to this position "systems engineer" and 4 more would be joining as transfers from other branches. a. Calculate the turnover rate for the job role "systems engineer". b. Using the given data, analyse the internal supply of "systems engineer" for the upcoming year. c. How would you go ahead and forecast the demand of the job role "systems engineer"?	1 3 2
5	As an HR manager of a well reputed IT firm, Ravi is aware that employee selection is one of the most crucial decisions taken by his organization. Given its importance, Ravi prefers to hire candidates from within the organization, against hiring from outside. However, when hiring from outside, he almost always uses psychometric tests followed by interviews. a. Why does Ravi prefer to hire candidates from within the organization? b. Should organizations always prefer hiring from within? In which situations should organizations hire from outside? c. Why do you think Ravi always uses psychometric tests in the selection process? Is it a wise decision?	2 2 2
6	What are the various barriers to the effective selection process in a Public Sector Enterprise?(as discussed in Reading Assignment 9)?	6
7	What are the benefits of Training to the Individual employee, which in turn ultimately benefits the Organizations in the Private Sector? (as discussed in Reading Assignment 14)?	6

Mid-Winter Semester Examination 2024-25  
Corporate Finance (MSC510/NMSC517)  
February 20, 2025 (3 - 5pm) Full Marks - 30 (Answer ALL Questions)

Q1] Jagdish Ltd. has the following capital structure:

Components of Capital	₹(in lakhs)
Equity share capital (10 lakhs shares)	100
12% Preference share capital (10,000 shares)	10
Retained Earnings	120
14% Debentures (70,000 Debentures)	70
14% Term Loan	100
Total	400

The market price per equity share is ₹25. The next expected dividend per share is ₹2 and is expected to grow at 8%. The preference share are redeemable after 7 years at par and are currently quoted at ₹75 per share. The debentures are redeemable after 6 years at par and their current market quotation is ₹90 per debenture. The tax rate applicable to the firm is 50%.

Required: Compute weighted average cost of capital of the company using (a) Book value, (b) Market value as weights. [9 Marks]

Q2] Your friend took an Educational Loan of ₹5,00,000 from State Bank of India for joining this program. The loan requires 11 per cent interest and five equal end-of-year payments. Prepare a loan amortisation schedule for your friend. [4 Marks]

Q3] (a) A company has an operating leverage of 1.2 against 1.25 during the previous year. If the current fixed cost is 20% more than the previous year, then to what extent has the contribution earned by the firm changed over the previous year? [2 Marks]

Q3] (b) X Ltd is considering three plans for which the key information is as below:

- Total investment to be raised is ₹4,00,000.
- Alternative plans of financing: Plan A comprises of 100% Equity capital; Plan B will have 50% in the form of Equity and 50% in the form of debt; and Plan C will have 50% Equity and 50% Preference capital.
- Cost of debt is 8% and rate of preference dividend is 12%.
- Equity shares of ₹10 each will be issued at a premium of ₹10 per share.
- The expected EBIT is ₹1,60,000 and the tax rate is 30%.

Required: i) EPS for each plan, ii) Financial Break-Even Point for each plan; and iii) the EBIT at the indifference points between Plans A & B, Plans A & C and Plans B & C respectively. [9 Marks]

Q4] (a) Illustrate the NOI Approach of Capital Structure. [4 Marks]

Q4] (b) Illustrate the concept of 'Interest Tax Shield'. [2 marks]

End-Winter Semester Examination 2024-25  
MSC510/NMSC517 CORPORATE FINANCE  
April 26, 2025 Full Marks - 50 (Answer ALL Questions) Time: 4 - 6pm

Q1] The following information is available for ABC Ltd. EBIT - ₹ 11,20,000; Profit before Tax - ₹ 3,20,000; and Fixed Costs - ₹ 7,00,000. Calculate % change in EPS if the sales are expected to increase by 5%. [5 Marks]

OR

Q1] Explain:

- a) 'Financial Breakeven' and its linkage with financial leverage. [2 1/2 Marks]
- b) 'Cost Breakeven' and its linkage with operating leverage. [2 1/2 Marks]

Q2] From the following information extracted from the books of M/s Bhadra Limited, compute the operating cycle in days. [5 Marks]

Period covered: 365 days

Average period of credit allowed by suppliers is 16 days.

Particulars	(₹'000)
Average total of debtors outstanding	480
Raw materials consumed	4,400
✓ Total production cost	10,000 ✓
✓ Total cost of sales	10,500 ✓
✓ Sales for the year	16,000 ✓

Value of average inventory maintained:

Raw materials	320
Work-in-progress	350
Finished goods	260

Q3] (a) Kothari & Sons is considering a capital project which requires an investment of ₹130 million for procuring new machinery. The installation expenses of such machinery shall be of ₹5 million. The workers' training expenses to be incurred to put the machinery to use will be ₹5 million. In order to use the machinery for its production purposes, the firm will require an additional working capital of ₹15 million each year. The life of the project is expected to be 5 years. The project is expected to generate earnings (EBITDA) @ ₹140 million p.a. for the first two years and 20% extra thereafter for the remaining period of three years.

The firm decides to finance the project by raising 9% long-term loan of ₹100 million and the remaining from its retained earnings. Plant & machinery will be depreciated @20% on 'written down value' basis. The scrap value of the machinery at the end of its life may be taken as ₹15 million. The net working capital will be liquidated at its book value at the end of the project. Income tax applicable to the company is 35%.

Ans

Considering the overall cost of capital of the project as 15%, advise the management to take appropriate decision. For the purpose of computation, consider the value correct up to two decimal places. [20 Marks]  
(b) Calculate the IRR of the project. [5 Marks]

OR

Q3] (a) Discuss the working capital policies usually adopted by a manufacturing firm with appropriate diagrammatic representations. [17 Marks]  
(b) Explain the concept of 'Multiple IRRs' with a suitable illustration. [8 Marks]

Q4] A company has a book value per share of ₹137.80. Its return on equity is 15% & it follows a policy of retaining 60% of its earnings. If the opportunity cost of capital is 18%, what will be the price of share today as per Walter's Model as well as Gordon's Model? State the reasons for difference in price under both these models? [2+2+2 Marks]

OR

Q4] Explain 'Certainty Equivalent Approach' with a suitable illustration. How does it differ from 'Risk Adjusted Discount Approach' Approach? [4+2 Marks]

Q5] (a) ABC Ltd. Wishes to raise additional finance of ₹20,00,000 for meeting its investment plans. The company has ₹4,00,000 in the form of retained earnings available for investment purposes. The following are the further details:  
Debt-equity ratio 25: 75. Cost of debt at the rate of 10 percent (before tax) up to ₹ 2,00,000 and 13% (before tax) beyond that.  
Earnings per share is ₹ 12 and dividend payout will be 50% of earnings. Expected growth rate in dividends 10%. Current market price per share is ₹ 60. Company's tax rate is 30%.

Required:

- (i) Calculate the post-tax average cost of additional debt. [2 Marks]
- (ii) Calculate the cost of equity and cost of retained earnings. [1 Marks]
- (iii) Calculate the overall weighted average cost of additional finance as per the Book Value weightage. [2 Marks]

Q5] (b) Compute the value of the firm, market value of equity shares and average cost of capital of the firm from the following information under the three capitalization plans. Give your observation on the findings.

Net Operating Income - ₹ 3,00,000; and the Total investment - ₹ 15,00,000

Equity Capitalization Rate, if:

- |                                 |     |
|---------------------------------|-----|
| 1. Firm uses no debt            | 10% |
| 2. Firm uses ₹ 6,00,000 as debt | 11% |
| 3. Firm uses ₹ 9,00,000 as debt | 15% |

Assume that ₹ 6,00,000 debt can be raised at 5% and ₹ 9,00,000 can be raised at 7% rate of interest. [4 Marks]

Mid Semester Examination (winter), Session 2024-25

Class: MBA/MBA BA/ JRF/B.Tech

Subject: Marketing Management  
Subject Code: NMSC518/MS513

Time: 02 Hrs.

Maximum Marks: 50

**Instruction:**

- Attempt all the questions.
- Answer sub questions of each question at one place

Q1

FabWear, an emerging Indian fashion brand, has gained traction in the premium ethnic and fusion wear segment. Established in 2015, the brand caters to Millennials and Gen Z consumers, offering trendy designs inspired by India's rich cultural heritage. The brand has been successful in major metropolitan areas but faces challenges in expanding to Tier 2 and Tier 3 cities due to varying consumer mindsets and preferences. To enhance its market penetration, FabWear conducted an extensive psychographic segmentation study to understand its consumers better. The study aimed to classify customers based on lifestyle, values, attitudes, and personality traits, rather than just demographics. The research agency divided consumers into five psychographic segments:

- Trendsetters - Fashion-forward individuals who seek exclusivity and high-quality products.
- Value Seekers - Customers who prefer durability and price-effectiveness over brand image.
- Ethnic Enthusiasts - Consumers passionate about traditional Indian craftsmanship and heritage wear.
- Conscious Consumers - Environmentally conscious buyers who opt for sustainable and ethical fashion.
- Experimental Buyers - Those who love mixing styles and are open to trying bold fashion statements.

Using advanced analytics, FabWear identified that Trendsetters and Ethnic Enthusiasts formed 60% of its urban consumer base, while Value Seekers dominated semi-urban areas. The challenge remained in targeting Conscious Consumers and Experimental Buyers effectively.

**Key Challenges Faced:**

- Marketing Messaging: Crafting tailored messages for diverse psychographic groups.
- Retail Expansion: Adapting store layouts and collections for varied consumer expectations.
- Digital Penetration: Enhancing engagement on social media platforms with segment-specific content.
- Sustainability Positioning: Convincing Conscious Consumers of the brand's commitment to ethical fashion.

[3 marks x 5= 15]

**Questions:**

- How can FabWear refine its marketing strategy to target all identified psychographic segments effectively?
- What steps can FabWear take to expand in Tier 2 and Tier 3 cities?
- How can digital and social media marketing be optimized to engage different psychographic segments?
- What are the potential risks in relying too much on psychographic segmentation, and how can FabWear mitigate them?
- How should FabWear position itself against competitors using psychographic insights?

Q2

Akasha Airlines, a global carrier, recently launched an exclusive loyalty program, Akasha Elite Rewards, to retain customers in an industry where competition is fierce. The airline aims to differentiate itself by offering tier-based benefits, such as lounge access, priority boarding, and free ticket upgrades. However, within six months of launch, Akasha Airlines has encountered several challenges:

- Redemption Complexity: Customers struggle to redeem points due to unclear rules, black-out dates, and fluctuating reward values.
- Lack of Transparency: Unlike its competitors, Akasha doesn't provide a clear structure on how miles are earned and redeemed.
- Customer Complaints & Attrition: Frustrated customers voice their dissatisfaction on social media, leading to an increase in customer churn.
- Competitor Edge: Rival airlines have simpler, more transparent, and customer-friendly loyalty programs, causing frequent flyers to switch.

Akasha Airlines' management is now under pressure. Their brand reputation is at stake, and they must quickly revamp the loyalty program to retain their most valuable customers while ensuring financial sustainability.

The airline's CEO has assembled a task force, including marketing strategists and customer experience managers, to analyze the flaws and implement changes. The task force must answer three key questions:

[5 marks x 3 = 15]

Questions:

- ✓ a) How does customer loyalty create a barrier to exit for customers?
- ✓ b) What changes should the airline make to improve its loyalty program?
- ✓ c) How can they use Net Promoter Score (NPS) to assess their customer advocacy?

Q3

Harley Davidson has successfully built a strong brand community, where customers feel emotionally attached to the brand. A new motorcycle company wants to replicate this strategy.

Questions:

- ✓ a) What are the key stages of customer development? [4 marks]
- ✓ b) What tactics can the new company use to convert first-time buyers into loyal brand advocates? [3 marks]
- ✓ c) How can the company measure and improve customer engagement? [3 marks]

Q4

AutoTech Ltd., a mid-sized automobile manufacturer, is struggling to maintain its market share. The company primarily sells affordable cars, competing with brands like Tata and Maruti Suzuki. However, recent surveys indicate a decline in customer satisfaction. While customers appreciate the affordability, they find the after-sales service poor, and many are shifting to competitors.

The CEO has called a strategy meeting, and the marketing team must find answers to the following pressing questions:

Questions:

- ✓ a) How can AutoTech Ltd. apply the 4Ps to reposition itself successfully? [3 marks]
- ✓ b) How should AutoTech Ltd. respond to globalization paradoxes affecting its market strategy? [4 marks]
- ✓ c) How can AutoTech Ltd. implement holistic marketing to build a strong brand? [3 marks]

**Winter Semester Examination, Session 2024-25**

Class: MBA/MBA BA/ JRF/B.Tech

Subject: Marketing Management

Time: 02 Hrs.

Subject Code: NMSC518/MSC513

Maximum Marks: 50

**Instruction:**

- Attempt all questions.
- Answer all sub-questions of each question in one place.

Q1

In 2013, Anuj Rakyan founded **RAW Pressery** in Mumbai with a mission to provide fresh, cold-pressed juices made from natural ingredients without preservatives, added sugars, or concentrates. The brand focused on urban, health-conscious consumers who were becoming increasingly aware of the ill effects of sugary carbonated drinks.

RAW Pressery positioned itself as a **premium health brand**, emphasizing its cold-press technology and clean-label promise. Its marketing was minimalist, aspirational, and focused on wellness and lifestyle. Initially available only in upscale gyms and cafes, it later expanded through modern trade, e-commerce, and its own delivery network. Meanwhile, Coca-Cola, PepsiCo, and Dabur, which dominated the Indian beverage market with mass-market sugary drinks or packaged juices, started taking note.

RAW Pressery's rise prompted a response: competitors launched new sub-brands, introduced healthier options, and revamped their marketing messages.

In 2021, RAW Pressery was acquired by **Winggreens Farms**, with the goal of expanding its healthy product portfolio and scaling further.

**Questions:**

- What entry strategy from Ansoff's Matrix best represents RAW Pressery's initial market approach? Justify [4]
- Which competitive force(s) from Porter's Five Forces did RAW Pressery leverage to create disruption in the beverage industry? Justify [4]
- Dabur responded with its own line of premium fruit juices (Real Activ), and Coca-Cola launched "Minute Maid Pulpy" variants. Which competitive strategy does this illustrate? Explain. [4]
- Suppose PepsiCo had launched a digital campaign promoting Tropicana's "no added sugar" tagline right after RAW Pressery's retail expansion. Which defensive strategy is that an example of? Explain [4]
- Post-acquisition by Winggreens, how can RAW maintain its premium positioning while scaling to mass-market distribution? [4]



Q2

A premium smart watch brand recently launched its latest model at ₹49,999, positioned next to an earlier model now priced at ₹44,999, and a new budget variant priced at ₹19,999. In a parallel move, an emerging competitor introduced a similar-featured watch at ₹29,999, with aggressive advertising and installment-based pricing options ("₹2,499/month for 12 months").

Assuming both companies have different pricing objectives and are targeting distinct consumer psychologies, critically analyze the pricing strategies used in the above scenario. Your analysis should account for perceived value, demand elasticity, and pricing method selection, while also explaining how consumer perceptions are being shaped. [10]

Q3

A global consumer electronics company, after experiencing strong growth in its smart speaker category, is now facing plateauing sales despite increased promotional spend and product variants. The brand manager proposes a shift in strategy to counter competitor encroachment and restore momentum. Based on your understanding of product life-cycle dynamics, identify the probable stage of the product and critically examine what strategic missteps might occur if the company treats this phase as a continuation of the previous one. Suggest strategic interventions to align with the actual stage, drawing from both marketing mix adaptations and modification strategies. [10]

Q4

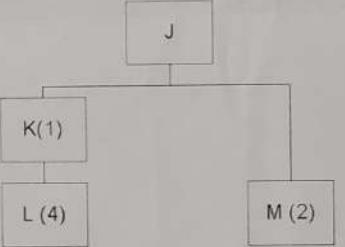
A company with a robust network of traditional wholesalers and retailers is facing declining market share in urban India, particularly among high-involvement and variety-loving shoppers. In response, the firm is considering bypassing intermediaries in select markets and building a more digitally integrated, direct-to-consumer model.

Evaluate the strategic implications of this shift in distribution. How might this reconfiguration of the channel structure impact value delivery, control dynamics, and channel performance? [10]



Full Marks : 30

Instructions: All questions are compulsory.

QN	Question	Marks																									
1	<p>BR Cycles company is interested in forecasting sales of cycles in Dhanbad. The company observed seasonality in sales of cycles historically. For forecasting, the company collected historical data quarter-wise. The data are shown below:</p> <table border="1"> <thead> <tr> <th>Year</th><th>2021</th><th>2022</th><th>2023</th><th>2024</th></tr> </thead> <tbody> <tr> <td>Quarter 1</td><td>135</td><td>113</td><td>185</td><td>168</td></tr> <tr> <td>Quarter 2</td><td>100</td><td>109</td><td>185</td><td>222</td></tr> <tr> <td>Quarter 3</td><td>201</td><td>148</td><td>238</td><td>141</td></tr> <tr> <td>Quarter 4</td><td>194</td><td>202</td><td>159</td><td>140</td></tr> </tbody> </table> <p>The company is interested in forecasting sales of cycles. Apply suitable methods to forecast the sales quarter-wise for the year 2026.</p>	Year	2021	2022	2023	2024	Quarter 1	135	113	185	168	Quarter 2	100	109	185	222	Quarter 3	201	148	238	141	Quarter 4	194	202	159	140	6
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2	<p>Consider the bill of material for Product J and the data given in the following table. The gross requirements for J are 200 units in week 6 and 250 units in week 8. Develop the MRP tables for each item for an 8-week planning period. Use the lot-for-lot lot-sizing rule.</p>  <table border="1"> <thead> <tr> <th>Item</th><th>Lead Time</th><th>Quantity on Hand</th><th>Scheduled receipts</th></tr> </thead> <tbody> <tr> <td>J</td><td>1</td><td>0</td><td></td></tr> <tr> <td>K</td><td>2</td><td>20</td><td>30 in week 2</td></tr> <tr> <td>L</td><td>2</td><td>0</td><td></td></tr> <tr> <td>M</td><td>1</td><td>20</td><td>10 in week 1</td></tr> </tbody> </table>	Item	Lead Time	Quantity on Hand	Scheduled receipts	J	1	0		K	2	20	30 in week 2	L	2	0		M	1	20	10 in week 1	1.5*4 = 6					
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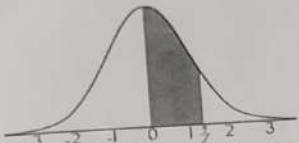
3	Consider the following 3 machines and 5 jobs flow shop problem. Check whether Johnson's rule can be extended to this problem. If so, what is the optimal schedule and the corresponding makespan?	3+3
4	<p>(a) How does forecasting impact the production planning process in the automotive industry, and what are the consequences of inaccurate forecasts?</p> <p>(b) In what ways does Disney balance demand and supply to optimize visitor experience while maximizing profits?</p>	3+3
5	<p>(a) How do textile manufacturers deal with demand fluctuations in aggregate planning?</p> <p>(b) How does IKEA's operations management contribute to its business success?</p>	3+3

Competitive  
entertainment

QN	Question	Marks																																																					
1	<p>A manufacturing plant needs to schedule four jobs on two machines (Machine A followed by Machine B) to minimize the total completion time (makespan). Each job has deterministic processing times on Machine A (<math>PA_i</math>) and Machine B (<math>PB_i</math>). However, the setup times for both machines are stochastic and modeled using definite integrals. The setup time for Machine A (<math>SA_i</math>) is calculated as the integral of <math>x</math> with respect to <math>x</math> over a given interval <math>[a_1, a_2]</math> (i.e. <math>\int_{a_1}^{a_2} x dx</math>), while the setup time for Machine B (<math>SB_i</math>) is the integral of <math>(\frac{1}{2})x</math> with respect to <math>x</math> over <math>[b_1, b_2]</math> (i.e. <math>\int_{b_1}^{b_2} \frac{1}{2}x dx</math>).</p> <p>The data for each job is as follows: Job 1 has <math>PA_1=5</math> and <math>PB_1=4</math>, with <math>SA_1</math> integrated over <math>[1, 3]</math> and <math>SB_1</math> over <math>[0, 2]</math>. Job 2 has <math>PA_2=3</math> and <math>PB_2=6</math>, with <math>SA_2</math> over <math>[0, 4]</math> and <math>SB_2</math> over <math>[1, 3]</math>. Job 3 has <math>PA_3=6</math> and <math>PB_3=5</math>, with <math>SA_3</math> over <math>[2, 5]</math> and <math>SB_3</math> over <math>[0, 4]</math>. Job 4 has <math>PA_4=4</math> and <math>PB_4=7</math>, with <math>SA_4</math> over <math>[1, 5]</math> and <math>SB_4</math> over <math>[2, 6]</math>.</p>	8																																																					
2	<p>M/S Raj Textiles, a prominent cotton fabric manufacturer based in Surat, has been monitoring its daily fabric demand over a 14-day period, recording values (in meters) of <math>[120, 90, 110, 85, 105, 115, 100, 95, 125, 80, 130, 75, 140, 70]</math>. The company's inventory management parameters include an ordering cost of ₹2,500 per order, an annual holding cost of ₹50 per meter, a lead time of 3 days, 365 operating days per year.</p> <table border="1"> <thead> <tr> <th>Period</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th></tr> </thead> <tbody> <tr> <td>Demand fulfilled (Y/N)</td><td>Y</td><td>Y</td><td>Y</td><td>N</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>N</td><td>Y</td><td>Y</td><td>Y</td></tr> </tbody> </table> <p>Suppose similar scenario persists; From the data calculate: EOQ &amp; Reorder point (ROP)</p>	Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Demand fulfilled (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	7																							
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Demand fulfilled (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y																																									
3	<p>A retailer provides the following information about a product: Annual demand (D): 15,000 units, Ordering cost (<math>C_o</math>): Rs 15 per order, Price (C): Rs 25 per unit; Inventory carrying cost (<math>C_h</math>): 18% of the unit price per year, Stockout/backorder cost (<math>C_s</math>): 30% of the unit price per year. The retailer is considering allowing backorders (stockouts).</p> <p>(a) What is the optimal order quantity if backordering is not allowed and if allowed?          (b) What is the optimal backorder quantity?          (c) What is the maximum inventory level at any time?          (d) Should the retailer allow backordering? If yes, what is the annual cost savings compared to the no-backordering policy?</p>	7																																																					
4	<p>GreenText Apparel is expanding its operations in Maharashtra and needs to determine optimal locations for new distribution centers (DCs) to serve 6 demand points. The company has identified 4 potential DC locations with the following parameters:</p> <table border="1"> <thead> <tr> <th colspan="3">Fixed Costs (₹1000/year) Capacities (tons/month)</th> </tr> <tr> <th>DC Location</th><th>Fixed Cost</th><th>Capacity</th></tr> </thead> <tbody> <tr> <td>Nashik</td><td>1,200</td><td>500</td></tr> <tr> <td>Pune</td><td>1,800</td><td>700</td></tr> <tr> <td>Aurangabad</td><td>900</td><td>400</td></tr> <tr> <td>Nagpur</td><td>1,500</td><td>600</td></tr> </tbody> </table> <p>Monthly Demand (tons)</p> <table border="1"> <thead> <tr> <th>Demand Point</th><th>Mumbai</th><th>Thane</th><th>Kolhapur</th><th>Nashik</th><th>Nagpur</th><th>Ahmednagar</th></tr> </thead> <tbody> <tr> <td>Demand</td><td>300</td><td>150</td><td>200</td><td>100</td><td>250</td><td>180</td></tr> </tbody> </table> <p>Transportation Costs (₹/ton):</p> <table border="1"> <thead> <tr> <th>From To</th><th>Mumbai</th><th>Thane</th><th>Kolhapur</th><th>Nashik</th><th>Nagpur</th><th>Ahmednagar</th></tr> </thead> <tbody> <tr> <td>Nashik</td><td>450</td><td>500</td><td>600</td><td>0</td><td>550</td><td>400</td></tr> <tr> <td>Pune</td><td>300</td><td>350</td><td>450</td><td>400</td><td>500</td><td>350</td></tr> </tbody> </table>	Fixed Costs (₹1000/year) Capacities (tons/month)			DC Location	Fixed Cost	Capacity	Nashik	1,200	500	Pune	1,800	700	Aurangabad	900	400	Nagpur	1,500	600	Demand Point	Mumbai	Thane	Kolhapur	Nashik	Nagpur	Ahmednagar	Demand	300	150	200	100	250	180	From To	Mumbai	Thane	Kolhapur	Nashik	Nagpur	Ahmednagar	Nashik	450	500	600	0	550	400	Pune	300	350	450	400	500	350	7
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### STANDARD NORMAL TABLE (Z)



Entries in the table give the area under the curve between the mean and  $z$  standard deviations above the mean. For example, for  $z = 1.25$  the area under the curve between the mean (0) and  $z$  is 0.3944.