INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

End-Autum Semester Examination 2024-25

Date of Examination: 21 November 2024, **Session: AN, Duration**: 3 Hrs **Full Marks:** 100**, Subject No.:** EP61201 **Subject:** Entrepreneurship Essentials **Department/Center/School:** RMSoEE, **Specific charts, graph paper, log book, required:** Nil, **Special Instructions (if any) :** Nil

- Answer all questions. Answer precisely. Do not reproduce questions in the answer script.
- Leave some space at the left margin. Do not use the same numbering system for listed answers and multi-level lists to avoid confusion.

1. M/S XGTP Bikes has the following data:

(Figures are in Rupees, unless explicitly mentioned otherwise.)

Installed capacity	5,000 units
Selling price per unit	50,000
Cost of raw materials	23,00,00,000
Interest on long-term loan	15,00,000
Rent	5,00,000
Salary	35,00,000
Interest on short-term loan	5,00,000
Wages	50,00,000
Insurance	5,00,000
Transportation	10,00,000
Miscellaneous fixed expenses	10,00,000
Miscellaneous variable expenses	25,00,000
Maintenance expenses	5,00,000
Depreciation	30,00,000
Power & fuel	10,00,000
Packaging expenses	5,00,000
Selling and marketing expenses	40,00,000

It is evident that the company has been incurring losses and it has entrusted you to propose strategies for a turnaround. After thoroughly analyzing the company's operation and financials, you have recommended process optimization through debottlenecking to enhance production and reduce operational expenses. The company accepts your suggestion and proceeds with the debottlenecking. The optimization requires a capital investment of ₹1,50,00,000, reduces the unit variable cost by 3%, increases fixed cost by 30%, and expands manufacturing capacity by 20%. Assuming the company operates at full capacity and sells all the vehicles produced within the same year, **estimate** whether this strategy will help the company to break-even. If yes, calculate **the annual profit.** **Comment** if the company should adopt this strategy. [10]

Sales	*25,00,00,000*
Variable cost	*24,50,00,000*
Fixed cost	*1,00,00,000*
Unit variable cost	*= 24,50,000/5,000 = 49,000*
New unit var cost	*= 49,000*.97 = 47,530*
New Fixed cost	*1,00,00,000*1.3 = 1,30,00,000*
Capacity	*6000*
BEP	*1,30,00,000/(50,000-47,530) = 5,263*
Annual profit =	*1820000*

The company should adopt the new strategy since it is likely to make considerable amount of profit.

Most common mistakes: i. multiplying *24,50,00,000 with 0.97 to arrive at the new variable cost, which is wrong because 24,50,00,000 is variable cost of 5,000 units only and not for 6,000 units.*
ii. Sadly, about 50% of the students could not differentiate between fixed and variable costs.

2. Answer the following questions briefly:
   i. What is value hypothesis and growth hypothesis? Explain with at least one example discussed in the class.
   ii. You have filed a patent application in India on 21.11.2024. Assuming you do not maintain the patent, how many years of protection will it have? Explain why. You have filed a patent application in India on 21.11.2024 and subsequently filed an application under PCT with WIPO on 20.11.2025. Until what date will you have IP protection in USA. Explain why. [5+5]

   Answer:
   i. The 'Value Hypothesis' is an assumption that a startup's product will create superior value for customers by addressing their problems or fulfilling their needs than competing solutions.
   ii. One year. A patent must be maintained by paying an annual maintenance fee every year; otherwise, it will be invalid.
   A PCT filing gives protection of 30 months from the priority date. Here the priority date is 21.11.2024. USA being a signatory to the PCT resolution, I shall have protection in USA until 20.05.2027

Common mistakes: Many of you have focused on how the company will create value for itself and increase its valuation. However, what's more important and desired in the answer is explaining how the company will deliver superior value to customers—why customers would choose its product over competitors' offerings, and how the company plans to attract and retain enough customers to grow and scale.

3. How does design thinking foster innovation? Please limit your answer within a maximum of seven sentences only. [10]

   i. Design thinking breaks down many barriers to innovation by fostering a belief that anyone can generate new ideas and create groundbreaking products. It motivates individuals to embrace their creative potential.

ii. *It instills confidence and eliminates the fear of failure, encouraging individuals to step outside their comfort zones and adopt an iterative approach. This includes tolerating failure, pivoting when necessary, and building cutting-edge products within a specialized domain.*
iii. *With empathy as its cornerstone, design thinking emphasizes understanding and defining problems comprehensively. This focus enables the development of solutions that not only address the issues but also provide unique and meaningful experiences for end users. Such an approach enhances product-market fit, making the solutions more attractive, purposeful, and impactful.*
iv. *By advocating for collaboration, design thinking bridges knowledge gaps among team members, fostering unique synergies. This collective approach accelerates innovation and paves the way for quick and effective success.*

Most common mistakes: Writing the standard steps followed in applying design thinking.
[Design thinking has not been covered this semester]

4. State and define five pricing models, providing one example for each to explain their application context. [10]

Cost-Plus Pricing: Pricing based on the cost of production plus a fixed margin or markup.
I gave the example of Larsen and Toubro who price their contract at 15% above their costs.

Value-Based Pricing: Pricing is determined by the perceived value to the customer and not related to the cost of production.
Luxury products and strong brands are primarily valued based on the perceived value they create for their target customers. This perceived value is often driven by factors such as quality, exclusivity, prestige, and emotional connection rather than just the functional benefits. For instance, Apple assigns value to its products by emphasizing the unique design, seamless user experience, and brand loyalty it fosters, which resonate deeply with its customer base. [The above detailed explanation is not necessary in your answer.]

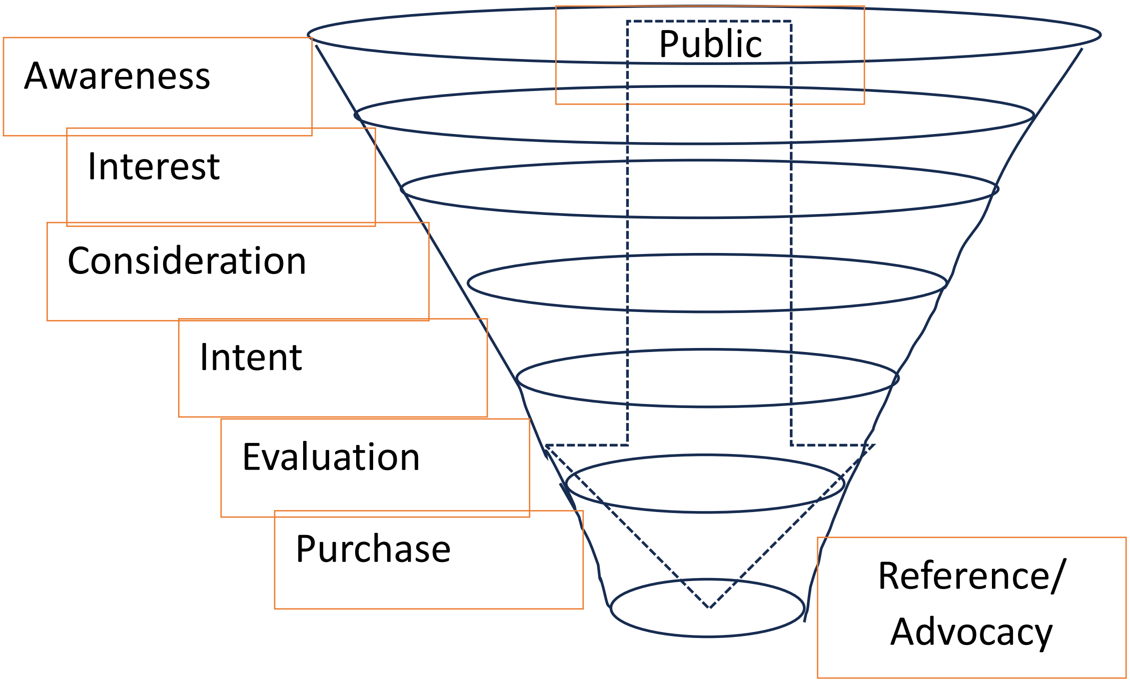
Competitive Pricing: Setting prices based on competitors' pricing strategies.
Products in markets characterized by perfect competition or even oligopolistic competition are priced based on prevalent price by competitors because of price sensitivity. Most of the FMCG products, many consumer products such as cement and steel are also examples.

Penetration Pricing: Offering a low price initially to gain market share, then gradually increasing it.
Markets with a large consumer base, where success is driven by high volume, uses the penetration pricing model. Industries such as telecom companies and e-commerce companies adopt this model to gain market share.

Skimming Pricing: Setting a high price initially and lowering it over time, often used for new, innovative products.
Products of high brand esteem or strong market value are priced higher at the beginning to quickly maximize profit and later reduced when a new model is introduced. For example, Apple.

Freemium Pricing: Offering a basic version for free and charging for premium features or services.
Subscription Pricing: Charging customers a periodic recurring fee for continuous access to a product or service.
Dynamic Pricing: Adjusting prices based on real-time supply and demand or customer behavior (e.g., surge pricing in ride-sharing).
Bundle Pricing: Offering multiple products or services together at a reduced price compared to buying them individually.
Pay-What-You-Want: Allowing customers to choose how much they are willing to pay.
Each pricing model serves different business objectives and markets, depending on the target audience and the nature of the product or service.

5. i. Show customers' journey using the image of a sales funnel. ii. State five types of digital marketing models with one example each. [10]
   Answer i.
   Businesses use marketing techniques like social media ads, SEO, and content marketing to create awareness about their unique value proposition and attract potential customers.
   Some of those prospects express interest in learning more about the product. Companies use marketing techniques such as advertisements and content marketing to influence favorable purchase decisions.
   Some of the people explore more and express intent to buy by registering or adding products to cart, etc. Here companies come up with promotional offer such as discounts or other benefits to call to action and buy.
   Moving forward, some of the above people purchase the products.
   Happy customers may spread word of mouth inviting more people into the funnel.
   The journey from being indifferent individuals to prospect, to customers, and to finally evangelists is shown in the following diagram:



Answer ii.

Content marketing: *Creating and sharing valuable, relevant, and engaging content to attract and retain a clearly defined audience. This includes blog posts, infographics, videos, and whitepapers aimed at addressing customer needs and interests. Example: Nykaa, Huggies.*

Search engine optimization: *Optimizing your website and content to rank higher in search engine results pages (SERPs). This includes using relevant keywords, building backlinks, improving site speed, and ensuring mobile-friendliness to increase organic traffic.*

Social media marketing: *Using platforms like Facebook, Instagram, LinkedIn, and Twitter to promote products or services, engage with audiences, and build brand awareness. Paid ads and organic posts both play a significant role in this strategy.*

Influencer marketing: *A strategy that leverages influential individuals on social media or other platforms to promote a product or service to their followers, capitalizing on their credibility and reach.*

e-mail marketing: *Building and nurturing relationships with customers through personalized email campaigns. It is one of the most cost-effective techniques for delivering updates, promotions, and valuable content directly to your audience's inbox.*

Affiliate marketing: *A performance-based marketing strategy where businesses reward affiliates (individuals or entities) for driving traffic or sales to their website through unique referral links.*

Pay-per-click advertising: *Running paid ads on platforms like Google Ads or social media, where advertisers pay a fee each time their ad is clicked. PPC allows for precise targeting based on demographics, keywords, and user behavior.*

6. In 2020, three friends—Aryan, Sameer, and Asif—came together to launch an innovative tech startup called ***NextGen Solutions***. Aryan held a 50% equity stake contributing to 50,000 equity shares of par value of ₹10 and providing strategic vision, Sameer took a 30% share by contributing to 30,000 equity shares of par value of ₹10 and bringing critical technical expertise. Asif received a 20% equity stake for his proportionate financial contribution and experience in operations and marketing.

The Early Stages: Bootstrapping and funding by High-Net-Worth Individual (HNI)

Initially, the team bootstrapped, operating on a modest budget while developing a prototype for a unique AI-powered supply chain tool. Their breakthrough came when Aneesh, a High-Net-Worth Individual impressed by the product's potential, provided seed funding of ₹1 crore at a pre-money valuation of ₹4 crore. This early funding enabled the startup to enhance the prototype and begin testing with small businesses.

First Major Funding: Angel Funding

As the product gained traction, it caught attention of an angel investor. Following a successful pitch, the Angel invested ₹10 crore in equity at a pre-money company valuation of ₹40 crore, helping the team expand their market reach. By this point, Aryan's leadership in securing partnerships was crucial, while Sameer and Asif took charge of technology and customer acquisition, respectively.

Funding by VC

As NextGen Solutions continued to grow, it was ready to seek larger investment. The team approached a Venture Capital (VC) firm, seeking ₹100 crore in funding based on the following projected performance estimates:

Year	1	2	3	4	5	6	7
Sales (₹cr.)	100	300	650	830	1010	1550	1680
Net profit	3%	5%	5.5%	6%	7%	7.5%	7%

After conducting due diligence and valuing the company using the Venture Capital method, the VC invested ₹100 crore, aiming for a 6X return in the 5th year. At the time of valuation, the price to earnings multiple of companies in the same industry was 25. This funding allowed NextGen Solutions to scale up operations, recruit top talent, and expand internationally. Aryan, Sameer, and Asif each played pivotal roles, overseeing smooth scaling and managing increased responsibilities. At the VC's recommendation, *NextGen* has hired an experienced CEO to lead the company's growth.

The Liquidation Event: Acquisition and Substantial Profits

By 2024, *NextGen Solutions* had established itself as prominent player in supply chain technology, attracting interest from a large multinational corporation seeking strategic expansion. Following negotiations, the company was acquired for ₹2000 crore, marking a successful exit.

Their journey highlights the power of teamwork, strategic growth, and market adaptability. Each co-founder realised substantial profits, celebrating the culmination of years of hard work and entrepreneurial risk.

Estimate the following:

i. What is the pre-money value estimated by the VC if the average Price to Earnings ratio for similar companies is 25? [5]

ii. Percentage holding after the VC round by all founders and investors, including Aryan, Sameer, Asif, the HNI, the Angel, and the VC assuming that the VC invests in equity shares. [5]

iii. Assuming that the VC invests in equity shares, estimate: a. the number of shares to be received by the VC, b. the market value of one share, and c. the percentage increase in the value of the founders' investment post the VC's investment. [5]

iv. Keeping all the other conditions same except the form of investment by VC, estimate the following: [5]

   a. The money to be received by Aryan during the liquidation event if the VC invests in **PREFERENCE SHARE** with no liquidation preference and only participation.
   b. The money to be received by Aryan during the liquidation event if the VC invest in **PREFERENCE SHARE** with 3X liquidation preference and participation.
   c. The money to be received by Aryan during the liquidation event if the VC invest in **PREFERENCE SHARE** with 4X liquidation preference only and no participation.

i. *Exit in 5^{th} year. Sales during the 5^{th} year = 1010 cr. Net profit during the 5^{th} year = 1010*0.07 = 70.70 cr. Market value of the startup at the end of 5^{th} year = 25*70.70 = 1,767.50.*
Present post-money value of the startup = 294.58 cr, pre-money value = 194.58 cr.

ii. *HNI round: Post-money value = 5 cr. Percentage holding by Aneesh = 1/5 = 20%.*
*Number of shares to Aneesh = (50,000 + 30,000 + 20,000)/0.8*0.2 = 1,25,000*.2 = 25,000*
*Shareholding **(%)***

	Initial	HNI round	Angel round	VC round
Aryan	50	50*.8 = 40	40*.8 = 32	32*.6605 = 21.14
Sameer	30	30*.8 = 24	24*.8 = 19.2	19.2*.6605 = 12.68
Asif	20	20*.8 = 16	16*.8 = 12.8	8.45
HNI	-	20	20*.8 = 16	10.57
Angel	-	-	20	13.21
VC	-	-	-	100/294.58=33.95
Total		100	100	100

iii. *a. Number of shares to VC*

Initial number of shares = 1,00,000
Number of shares post HNI = 1,00,000/0.8 = 1,25,000
Number of shares post Angel round = 1,25,000/0.8 = 1,56,250
Number of shares post VC round = 1,56,250/0.6605 = 2,36,563
Number of shares receives by VC = 2,36,563.3395 = 80,313*
b. Market value of the company = 1767.50 (for 2,36,563 shares)
Value of one share = 294.58 cr. /2,36,563 = ₹12,452
This means that ₹10 originally invested by the founders has grown to ₹12,452 or a multiple of 1,245.2 or has grown by % 1245200%.

iv. *Aryan is to receive 32% of the money left after the VC takes its share of the proceeds.*

	a: participation by VC	*b: 3X liuidation & participation by VC*	*c: 4X liquidation by VC, no participation*
VC (₹ cr.)	*0.3395*2000 = 679*	*100*3 + (2000-100*3)*.3395 =877.15*	*100*4 = 400*
Aryan (₹ cr.)	*(2,000 – 679)*.32 = 422.72*	*(2,000 – 877.15)*.32 = 359.312*	*1600*0.32 = 512*

7. ***NextGen Solutions*** has developed an innovative product and is ready to raise funds from an angel investor. Prepare a business plan for the company that includes (i) all the elements of a standard 'business plan', (ii) the projected profit and loss account, (iii) the total project cost, and (iv) an estimation of whether the company has achieved financial closure, along with your comments on the same. Use the following data: (All amounts are in Rupees). [10+10+6+4 = 30]

i.	The TAM, SAM and SOM (in the first year)	are 10,00,000, 7,50,000, and 200,000 units respectively.
	Selling price per unit	₹100
ii.	Selling and marketing expenses	@ 10% of sales
iii.	Purchase of land:	₹500,000
iv.	Raw materials consumed	@ 40% of sales
v.	Administrative overhead expenses	@ 5% of sales
vi.	Direct labour cost	@ 10% of sales
vii.	Purchase of machinery:	₹15,00,000
viii.	Founders' contribution to equity:	₹ 15,00,000
ix.	Contingencies:	@ 7% of Fixed capital plus Working capital investment
x.	Startup expenses:	₹500,000
xi.	Factory overhead or manufacturing overhead	@ 5% of sales
xii.	Purchase of a transporter (Truck)	₹ 5,00,000
xiv.	Power and fuel:	@ 2% of sales
xv.	Packaging:	@ 1% of sales
xvi.	Bank has committed a long-term loan of	₹10,00,000
xvii.	Construction of factory shed:	₹9,00,000
xviii.	Other operating expenses:	@1% of sales
xix.	Closing stock of finished goods	₹5,33,333

xx.	Interest payment on bank loan:	₹500,000
xxi.	Income tax	@ 20%
xxii.	Construction of office building:	₹6,00,000
xxiii.	The company wants to maintain cash of	₹50,000
xxiv	Opening stock of finished goods	₹ 4,75,000
xxv	Cost of electric connection, drainage system, sanitary, etc.:	₹1,15,000
xxvi	The angel is expected to invest	₹50,00,000
xxvii	Suppliers' credit for fixed assets	₹8,00,000
	The following information may be used wherever necessary:	
xxviii.	Holding period for raw materials:	30 days
xxix.	Holding period for goods-in-process:	7 days
xxx.	Holding period for finished goods:	30 days
xxxii.	Holding period for receivables:	50 days
xxxiii.	Holding period for payables:	60 days

i.	The TAM, SAM and SOM (in the first year)	are 10,00,000, 7,50,000, and 200,000 units respectively.
	Selling price per unit	₹ 100
ii.	Selling and marketing expenses	@ 10% of sales
iii.	Purchase of land:	₹ 5,00,000
iv.	Raw materials consumed	@ 40% of sales
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vi.	Direct labour cost	@ 10% of sales
vii.	Purchase of machinery:	₹ 15,00,000
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xviii.	Other operating expenses:	@1% of sales
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xx.	Interest payment on bank loan:	₹ 5,00,000
xxi.	Income tax	@ 20%
xxii.	Construction of office building:	₹ 6,00,000
xxiii.	The company wants to maintain cash of	₹ 50,000

xxiv	Opening stock of finished goods	₹ 4,75,000
xxv	Cost of electric connection, drainage system, sanitary, etc.:	₹ 1,15,000
xxvi	The angel is expected to invest	₹ 50,00,000
xxvii	Suppliers' credit for fixed assets	₹ 8,00,000
	The following information may be used wherever necessary:	
xxviii.	Holding period for raw materials:	30 days
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xxxii.	Holding period for receivables:	50 days
xxxiii.	Holding period for payables:	60 days

Sales (Units)	2,00,000
Selling price	100
Sales (Rs.)	**2,00,00,000**
Cost of production	
RM	80,00,000
Direct labor	20,00,000
Factory ovehead	10,00,000
Power & Fuel	4,00,000
Packaging	2,00,000
Cost of production	**1,16,00,000**
Cost of goods sold	1,15,41,667
Gross profit	**84,58,333**
Operating expenses	
Selling and marketing	20,00,000
Admin overhead	10,00,000
Other operating exp	2,00,000
	32,00,000
Cost of sales	1,48,00,000
Operating profit	**52,58,333**
Profit before tax	47,58,333
Income tax	9,51,667
Net profit	38,06,666
Fixed capital investment	
Land	5,00,000
Machinery	15,00,000

Truck	5,00,000
Factory shed	9,00,000
Office building	6,00,000
Utilities	1,15,000
Startup exp	5,00,000
	46,15,000
Working capital equirement	
Raw materials	8,00,000
Goods-in-process	2,70,667
Finished good stocks	11,60,000
Recievables	24,66,667
Cash	50,000
Payables	-16,00,000
	31,47,333
Total of FC+WC	77,62,333
Contingencies	5,43,363
Total requirement of funds	**83,05,697**
Means of funding	
Founders' equity	15,00,000
Bank loan	10,00,000
Suppliers' credit	8,00,000
Angel investor	50,00,000
Total funds available	**83,00,000**

With the allocation of ₹5,43,363 for contingencies, it can be reasonably concluded that the project achieved financial closure.