INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

End-Spring Semester Examination 2024-25

Date of Examination: 22 April 2025, **Session: AN, Duration:** 3 Hours **Full Marks:** 100, **Subject No.:** EP61201 **Subject:** Entrepreneurship Essentials **Department/Center/School:** RMSoEE, **Specific charts, graph paper, log book, required: Yes.** Graph paper, **_Special Instructions (if any) :** Nil

- Answer all questions. Answer precisely. Do not reproduce questions in the answer script.

Startup Story: "AgriMind AI" — Revolutionizing Farming with Intelligence

In 2023, three final-year CSE students from IIT Kharagpur — Asha, Rahul, and Tanmay — came together with a shared passion for solving real problems using technology. Coming from agrarian families, they knew first-hand the challenges Indian farmers faced: unpredictable weather, crop diseases, and market volatility.

The trio launched **AgriMind AI**, a startup aimed at empowering small and marginal farmers with the power of **Artificial Intelligence and Machine Learning**. Their vision: to make precision farming accessible and affordable.

The Innovation: They developed a mobile app powered by AI that could:

- Analyze soil quality using a photo and low-cost sensors.
- Predict pest infestations and crop diseases of paddy and wheat plants from leaf images using deep learning models.
- Provide personalized crop advisory and yield predictions using ML models trained on satellite data and historical farm records.

They also built an offline-capable version of the app to support areas with poor connectivity and initially used a few local languages for inclusivity. The founders did primary market research collecting qualitative and quantitative data on the requirements of the farmers and got convinced of the relevance of the product and, being hailed from farmer families, realized the immediate need for such a product.

They hired top talent from IIT Kharagpur resulting in significant cost for building the product. To meet the increasing need for funds, the company inducted a new co-founder who introduced good amount of funds. Moving forward, they could arrange more funds from an angel and completed the development process, debugged it, and commercially launched the **pilot trials** in three districts of West Bengal.

The Turning Point

Initially, farmers were sceptical and they did not find it excitingly useful. Based on their feedback **AgriMind AI** added additional modules and eliminated some that were not appreciated by farmers. They partnered with local agricultural officers and offered an elementary version of the app for free and the premium one against payment. To everyone's surprise, farmers reported up to a **25% increase in yield** and **30% savings** on fertilizer and pesticide costs. The number of paid users increased significantly.

This success caught the attention of a leading agri-tech accelerator and later, **Z21 Ventures**, which provided seed funding and mentorship. With the support of IIT Kharagpur's incubation ecosystem, AgriMind AI was able to scale up its models, add real-time market price prediction, and expand to five states within a year.

The Impact: By 2025, AgriMind AI was serving over **100,000 farmers**, had secured a Series A funding round, and was recognized by the Government of India as a key agri-tech innovator. Their solution not only helped increase farm productivity but also reduced crop losses and improved farmers' income, thereby contributing to rural sustainability.

1. While **'AgriMind AI'** is considered a success story, identify five decisions/actions they took that diverged from conventional startup wisdom. [10]

2. Explain the market segment of 'AgriMind AI' (Note that the question does not ask for definition of market segment). Explain briefly their product pricing model, positioning and targeting strategies. (within five sentences only) [4+3+3=10]

3. Marks: [5+5=10]
   a) Your younger brother has launched a startup based on an innovative, non-patentable idea but hesitates to pitch due to fear of idea theft. What advice would you give him??
   b) Explain why investors such as angel, incubator, accelerator, and lenders prefer to fund private limited company over partnership firm? [5+5=10]

4. ABC Pvt. Ltd. manufactures and sells electric bicycles. The data related to fixed and variable expenses can be found among the following (All data are in Indian ₹): [Note that some of the expenses are on per unit basis and some are on annual basis.]. *You may ignore values after decimal point.*

Raw-materials cost per bicycle	5000
Direct labor cost (Wages) per bicycle	700
Battery charger	25,000
Power & Fuel per bicycle	200
Opening stock of inventory for current year	0
Closing stock at the end of current year	0
Depreciation for the current year	20,00,000
Salary for the current year	50,00,000
Interest on working capital loan for the year	200000
Rent for the year	3,60,000
Construction of factory shed	2,00,000

Purchase of a mini truck	3,00,000
Transportation cost incurred during the year	350000
Income tax paid during the year	12,000
Insurance cost during the year	250000
Stationeries	7,501
Packaging cost per product	300
Dividend paid during the year	50,000
Web hosting cost	1,000
Audit fee	20,000
Trade payables	50,000
Interest on long-term loan	500000

Estimate the break-event point and the profit or loss if the company operates at the equilibrium level [to be discovered by plotting the demand-supply data in Table-1.]

Table 1: Demand-Supply data with respect to price		
Price	Demand	Supply
5,000	14,000	1,000
14,000	1,000	14,000

The company replaces metal parts with those of composite materials reducing unit variable of the vehicle by 10% and increasing the fixed cost by 20%. The price of the modified product and the quantity to be sold can be found using the new demand supply data provided in Table-2. Show with calculation if the changes in the product leads to improvement in performance in terms of Break-Even Point and profitability. Draw the rough sketch of the break-even point with all relevant plots. [20]

Table 2: Demand-Supply data with respect to price		
Price	Demand	Supply
5,000	25,000	1,000
10,000	3,000	14,000

5. Ayon, Nayon, and Sayon have started **'AI-Powered'**, a startup offering AI-assisted fast learning, investing ₹1,00,000/-, ₹1,50,000/- and ₹2,50,000/- respectively, in the equity shares of face value of ₹5/-. They built an **'AI-Powered'** Personalized Learning Platform for School Students. Initially, the team bootstrapped, operating on a modest budget while developing and validating their MVP. Their breakthrough came when Aneesh, a High-Net-Worth Individual (HNI), impressed by the product's potential, provided seed funding of ₹1 crore at a pre-money valuation of ₹3 crore. This early funding enabled the startup to enhance the prototype, debug, and begin piloting in a few schools. As the product gained traction, the company felt the need of funds to scale the business. Following a successful pitch, due diligence, signing of the term sheet, the Angel invested ₹5 crore in equity shares at a pre-money valuation of ₹15 crore. Besides the much-needed funds, the Angel connected the company with market, helped connecting with potential employees, streamlined the business processes, and fine-tuned the broader strategies for growth and sustainability.

As **'AI-Powered'** began to acquire customers from the early majority, they prepared for the growth phase by hiring a professional CEO and recruiting top talents. **'AI-Powered'** approached a Venture Capital (VC) firm, seeking ₹50 crore in funding based on the following projected performance estimates:

Year	1	2	3	4	5	6	7
Sales (₹cr.)	50.44	108.33	201.15	303.03	452.25	603.25	785.00
Net profit	3%	5%	8.5%	11%	13%	15%	15%

After conducting due diligence and valuing the company using the **Venture Capital method**, the VC invested ₹50 crore seeking a 5X return in the 4th year. At the time of valuation, the price to earnings multiple of companies in the same industry was 30. This funding allowed 'AI-Powered' to scale up operations, recruit top talent, and expand pan India. Moving forward, the company was acquired for ₹200 crore, marking a successful exit.

Estimate the following: Marks [5X4=20]

i. What is the post-money value estimated by the VC? [5]

ii. Percentage holding after the VC round by all founders and investors assuming that the VC invests in **equity shares**. [5]

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

iv. Keeping all the other conditions same and assuming that VC has invested in **preference shares** as explained below, estimate the following: [5]

a. The money to be received by Ayon 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 Ayon during the liquidation event if the VC invest in **PREFERENCE SHARE** with 3X liquidation preference and participation.

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

6. **'AgriMind AI'** is planning to raise funds from a VC. Using the story at the top and the following data prepare a business plan for the company (i) writing one to two sentences each on all the elements of a standard 'business plan' as discussed in the class, (ii) estimate the projected profit and loss account for the next year, (iii) the total project cost, and (iv) Show with data whether the company has achieved financial closure along with your comments on the same. [10+10+6+4 = 30]

	Item	Unit	
i.	Projected sales in number of units	Number	10,000
ii.	Selling price per unit	₹	250
iii.	Selling and marketing expenses	%	10
iv.	Purchase of land:	₹	50,000
v.	Raw materials consumed	%	35%
vi.	Administrative overhead expenses	%	5
vii.	Direct labour cost	%	9
viii.	Purchase of machinery:	₹	5,00,000
ix.	Founders' contribution to equity:	₹	2,50,000
x.	Contingencies: (% of sum of FC and WC)	%	5
xi.	Startup expenses:	₹	2,50,000
xii.	Factory overhead or manufacturing overhead	%	6
xiii.	Purchase of a transporter (Truck)	₹	1,00,000
xiv.	Power and fuel:	%	7
xv.	Packaging:	%	3
xvi.	Bank has committed a long-term loan of	₹	4,00,000
xvii.	Construction of factory shed:	₹	1,50,000
xviii.	Other operating expenses:	%	5
xix.	Interest payment on bank loan:	₹	25,000
xx.	Income tax	%	20
xxi.	Construction of office building:	₹	2,00,000
xxii.	The company wants to maintain cash of	₹	25,000
xxiii.	Cost of electric connection, drainage system, sanitary	₹	85,000
xxiv.	Amount of investment sought from angel	₹	10,00,000
xxv.	Opening stock of finished goods (for the upcoming year)	₹	65,000
xxvi.	Closing stock of finished goods (for the upcoming year)	₹	80,000
xxvii.	Maintenance expenses	%	2
xxviii.	Suppliers credit or deferred payment facility	₹	1,00,000
xxix	Dividend payment as percentage of par value of shares	%	50
	Holding periods for different elements of working capital	Holding period	
xxx.	Raw materials:	Days	35
xxxi.	Goods-in-process:	Days	7
xxxii.	Finished goods:	Days	30
xxxiii.	Receivables:	Days	45
xxxiv	Payables:	Days	40