INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

End-Spring Semester Examination 2022-23

Date of Examination: _____ **Session (FN/AN)** _____ **Duration** 3 hrs. **Full Marks** 50
Subject No. : EP60008 **Subject Name:** Economics of Entrepreneurship
Department/Center/School: RMSoEE
Specific charts, graph paper, log book etc., required:
Special Instructions (if any): Write in brief and to the point. No queries will be entertained during the examination. Clearly state the assumptions made in the solution. ***All questions are compulsory.***

Q.1 Short answer questions: **[4 + (1 x 6) = 10]**

a. Explain difference between independent, mutually exclusive, contingent, and complementary projects.

b. Suppose a toy manufacturer is faced with the following collection of investment projects:

i. Opening a retail outlet.
ii. Introducing a new line of dolls.
iii. Introducing a new action figure in an existing line of action figures.
iv. Adding another packaging line to the production process.
v. Adding pollution control equipment to avoid environmental fines.
vi. Computerizing the doll moulding equipment.

Classify each project into one of the four categories: expansion, replacement, new product or market, or mandated.

Q2. Solve the following: **[6 + (8.75 + 2 + 2.25) = 19]**

a. The Cookies-R-Us bakery is considering the purchase of an additional cookie press for $49,000. It is classified as a seven-year property and will be depreciated using straight line depreciation. The addition of the press is expected to increase revenues by $18,000 a year and cash operating expenses by $5,000 a year. The salvage value is $10,000 at the end of seven years. If the tax rate is 25%, determine the cash flows from asset acquisition, asset disposition, and operating cash flows.

b. A firm experienced the demand shown in the following table.

YEAR	ACTUAL DEMAND	5-YEAR MOVING AVERAGE	3-YEAR MOVING AVERAGE	EXPONENTIAL SMOOTHING (w = 0.9)	EXPONENTIAL SMOOTHING (w = 0.3)
2000	800	xxx	xxx	xxx	xxx
2001	925	xxx	xxx	—	—
2002	900	xxx	xxx	—	—
2003	1025	xxx	—	—	—
2004	1150	xxx	—	—	—
2005	1160	—	—	—	—
2006	1200	—	—	—	—
2007	1150	—	—	—	—
2008	1270	—	—	—	—
2009	1290	—	—	—	—
2010	*	—	—	—	—

*Unknown future value to be forecast

i. Fill in the table by preparing forecasts based on a five-year moving average, a three-year moving average, and exponential smoothing (with a w = 0.9 and a w = 0.3). The exponential smoothing forecasts may begin by assuming $\hat{Y}_{t+1} = Y_t$.

ii. Using the forecasts from 2005 through 2009, compare the accuracy of each of the forecasting methods based on the RMSE criterion.

iii. Which forecast would you have used for 2010? Why?

Q.3 The Mighty Mouse Computer Company is considering whether or not to install a packaging robot. The robot costs $500,000, including shipping and installation. The robot can be depreciated using MACRS as a five-year asset. (MACRS depreciation rates for a five year asset: 20%, 32%, 19.2%, 11.52%, 11.52%, and 5.76%). The robot is expected to last for five years, at which time management expects to sell it for parts for $100,000. The robot is expected to replace five employees in the shipping department, saving the company $150,000 each year. Mighty's tax rate is 30%. **[1 x 9 = 9]**

a. What are the net cash flows for each year of the robot's five-year life?
b. What is the net present value of the robot investment if the cost of capital is 10%?
c. What is the net present value of the robot investment if the cost of capital is 5%?
d. What is the profitability index of this investment if the cost of capital is 5%?
e. What is the payback period of the robot investment?
f. What is the discounted payback period of the robot investment if the cost of capital is 5%?
g. What is the internal rate of return of the robot investment?
h. What is the MIRR of the robot investment if the cash flows are reinvested at 5%?
i. If the cost of capital is 5%, should Mighty Mouse invest in this robot?

Q.4 a. A manager's utility function for profit is $U(\pi) = 20\pi$, where π is the dollar amount of profit. The manager is considering a risky decision with the four possible profit outcomes. The manager makes the following subjective assessments about the probability of each profit outcome: **[(1 x 4) + 2 = 6]**

Probability	Profit Outcome
0.05	-$ 10,000
0.45	-$ 2000
0.45	$ 4000
0.05	$ 20,000

i. Calculate the expected profit.
ii. Calculate the expected utility of profit.
iii. The marginal utility of an extra dollar of profit is ____.
iv. Manager is risk____ because marginal utility of profit is____.

b. Sally purchases only pasta and salad with her income of $160 a month. Each month she buys 10 pasta dinners at $6 each and 20 salads at $5 each. The marginal utility of the last unit of each is 30. What should Sally do?

Q.5 Bell Greenhouses has estimated its monthly demand for potting soil to be: N = 400 + 4X where
N = monthly demand for bags of potting soil
X = time periods in months (March 2006 = 0)
Assume this trend factor is expected to remain stable in the foreseeable future. Following table contains monthly seasonal adjustment factors, estimated using actual sales data from past five years: **[3 x 2 = 6]**

Month	Adjustment Factor (%)
March	+2
June	+15
August	+10
December	−12

a. Forecast Bell Greenhouses' demand for potting soil in March, June, August, and December 2007.
b. If following table shows forecasted and actual potting soil sales by Bell Greenhouses for April in five different years, determine seasonal adjustment factor used for April 2008 forecasting.

YEAR	FORECAST	ACTUAL
2007	500	515
2006	452	438
2005	404	420
2004	356	380
2003	308	320