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Further, in the Elective Papers which are Case Study based, the solutions have been worked out on the basis of certain assumptions/views derived from the facts given in the question or language used in the question. It may be possible to work out the solution to the case studies in a different manner based on the assumptions made or views taken.

PAPER-6A – RISK MANAGEMENT

The Question Paper comprises three case study questions. The candidates are required to answer any **two** case study questions out of **three**.

Answers to Multi Choice Questions should be indicated clearly, by writing the option chosen (i.e. A or B or C or D) in capital letters along with reasoning for your choice.

In case, any candidate answers extra question(s)/ sub-question(s) over and above the required number, then only the requisite number of questions first answered in the answer book shall be valued and subsequent extra question (s) answered shall be ignored.

Wherever necessary, suitable assumption may be made and disclosed by way of a note.

Working notes should form part of the respective answers.

QUESTION NUMBER - I

- (1) ABCD Ltd. is a diversified business group. The consolidated Balance Sheet, Statement of Profit & Loss and Cash Flow Statement of ABCD Ltd. prepared in analytical format are given below:

Customer Name : ABCD LTD	INR (₹) Thousand	
	31-Mar-16	31-Mar-17
	12 months	12 months
Balance Sheet		
CORE ASSETS		
Land and Buildings	249,572	249,594
Construction in Progress	2,744	7,592
Plant and Machinery	189,892	194,166
Furniture and Fixtures	72,952	71,580
Vehicles	14,339	11,788
Less: Accumulated Depreciation	- 307,198	- 320,054
TOTAL FIXED ASSETS	222,301	214,666
Stock	309,806	272,547
Trade Debtors	366,246	308,547
Finance Lease Receivables (Current)	18,728	28,702
Other Debtors	27,988	28,357
Cash and Near Liquid Funds	31,873	31,623

<i>Prepayments</i>	8,787	9,763
<i>Less: Trade Creditors</i>	-217,121	-230,476
: <i>Other Creditors</i>	-153,728	-126,892
<i>Less: Dues to Related Companies</i>	-12,299	-16,923
: <i>Taxation</i>	-12,189	-8,617
OPERATING CAPITAL EMPLOYED	590,392	511,297
NON-CORE/NON-CURRENT ASSETS		
<i>Long Term Lease Receivable</i>	8,848	10,718
<i>Investments in Subsidiaries/Associates</i>	55,226	55,734
<i>Dues from Related Companies</i>	7,547	4,386
TOTAL NON-CORE/NON CURRENT ASSETS	71,621	70,838
OVERALL CAPITAL EMPLOYED	662,013	582,135
CAPITAL STRUCTURE		
<i>Ordinary Share capital</i>	20,000	20,000
<i>Profit and Loss Account</i>	98,278	61,549
<i>Other Reserves</i>	35,080	36,303
<i>Contribution from shareholders</i>	202,248	202,248
<i>Less: Intangibles</i>	-12,112	-9,620
TANGIBLE NETWORTH	343,494	310,480
<i>Minorities</i>	53,422	62,929
<i>Provisions/Other Long Term Liabilities</i>	61,790	56,445
TOTAL	115,212	119,374
EXTERNAL FINANCE		
<i>Bank O/D and Short Term Loans</i>	203,307	152,281
<i>Overall Capital Employed</i>	662,013	582,135
<i>Contingent Liabilities</i>	101,000	131,977
<i>Capital Commitments</i>	52,500	50,000
PROFIT AND LOSS ACCOUNT		
<i>Sales</i>	1,446,791	1,469,762
<i>Less: Cost of Goods Sold</i>	-1,117,664	-1,132,857
GROSS PROFIT	329,127	336,905
<i>Less: Distribution and Selling costs</i>	156,049	160,370
: <i>Administration Costs</i>	-114,623	-106,887

OPERATING PROFIT	58,455	69,648
Share of Profit of Associate Companies	2,030	10,059
Other Income	24,819	13,703
PROFIT BEFORE INTEREST AND TAX	85,304	93,410
Less: Interest Expense	-7,619	-4,777
PROFIT BEFORE TAX	77,685	88,633
Less: Taxation Charge	-6,500	-6,500
PROFIT AFTER TAX	71,185	82,133
Minorities	-11,976	-16,583
PROFIT AVAILABLE FOR APPROPRIATION	59,209	65,550
RECONCILIATIONB OF RETAINED PROFITS / (LOSSES)		
Profit Available for Appropriation	59,209	65,550
Less: Dividends Paid and Proposed	-100,000	-101,056
Adjustment / Transfer(/to) / from Reserves	-705	-1,223
RETAIN PROFIT FOR THE YEAR	-41,496	-36,729
Profit and Loss B/Forward	139,774	98,278
TOTAL REVENUE RESERVES	98,278	61,549
CASH FLOW		
OPERATING CASH FLOW		
Operating Profit	58,455	69,648
Depreciation/Amortization Charges	29,421	32,767
ADJUSTED CASH FLOW FROM OPERATIONS	87,876	102,415
WORKING CAPITAL MOVEMENT		
(Increase)/Decrease in Stock	-34,692	37,259
(Increase)/Decrease in Debtors	9,421	-7,214
(Increase)/Decrease in Creditors	28,665	-8,723
Other Net Working Cap Movement	0	0
NET CASH FLOW FROM OPERATIONS	91,270	123,737
Less: Taxation Paid	-1,660	-10,072
Less: Interest Paid	-9,652	-4,688
NET FREE CASH FLOW FROM OPERATIONS	79,958	108,977
Less: Dividend paid	-105,361	-58,087

<i>Less: Other Cash Outflow</i>	-5,923	-8,378
NET CASH FLOW BEFORE INVESTMENT GROUP AND FINANCE	-31,326	42,512
CASH FLOW FROM INVESTMENT AND GROUP		
<i>Net Cash from Fixed Assets</i>	-21,747	-25,562
<i>Net Cash from Investment</i>	14,746	13,995
<i>Net Intra-Group Funds Flow</i>	0	0
<i>Others</i>	30,059	19,236
NET CASH FLOW BEFORE EQUITY AND FINANCE ACTIVITIES	-8,268	50,181
CASH FLOW FROM EQUITY AND FINANCE ACTIVITIES		
<i>Increase/(Decrease) in Equity</i>	0	0
<i>Increase/(Decrease) in Short Term Debt</i>	5,766	-51,026
<i>Increase/(Decrease) in Long Term Debt</i>	0	0
<i>Other</i>	873	595
NET CASH FLOW FROM EQUITY AND FINANCE ACTIVITIES	6,639	-50,431
<i>Increase/(decrease) Cash and Near Liquid Funds</i>	1,629	250
TOTAL	8,268	50,181

Additional Information [All amounts in ₹ 000s] :

Turnover comprises: Equipment and Automotive: 28680, Consumer Products: 71400, Industrial Products: 29800 and Office Equipment: 17100.

Largest inventory item was trading inventory and finished goods, which towards 2017- end, decreased to 19100 (22200 as at 31st March, 2016).

Shareholders had purchased long outstanding government receivables, amounting to 4900 of a group company to improve its cash flows. Unused bank facilities as at 31st March, 2017 were 16800.

Sales growth of year 2017 is almost in line with the previous years. Trading inventory and finished goods as at 31st March, 2017 was 19100 (22200 as at 31st March, 2016).

Based on the calculation of major financial ratios, prepare a brief analytical report deriving the financial risk involved. You can use various areas covering performance, profitability, working capital management, liquidity and cash flows, capital structure, etc.

Your answer should be supported with relevant workings.

[Financial Ratios: 5 marks; Analytical report for each area: 4 marks each, other areas: 5 marks]
[Total: 5 + (5 x 4) + 5 = 30 Marks]

Multiple Choice Questions: Briefly explain the reasoning for your choice which is mandatory. Answer all of the following (2) to (21) - Each MCQ carries one mark.

(1 x 20 = 20 Marks)

- (2) While uncertainty means the existence of more than one possibility, risk is a state of uncertainty where some of the possibilities may involve an undesirable outcome. Which one of the following statements correctly describes the above statement?
- (A) One may have uncertainty without risk but risk without certainty.
 - (B) One may have uncertainty without risk but risk without uncertainty.
 - (C) One may have uncertainty without risk but not risk without certainty.
 - (D) One may have uncertainty without risk but not risk without uncertainty.
- (3) In respect of an organization, **Reputation risk** means
- (A) Risk of possible financial loss to the organization.
 - (B) Risk of a failure which may lead to violation of the regulatory requirements that the organization is supposed to comply with.
 - (C) Risk of the organization's reputation in public view which is a key concern in engaged media and social media.
 - (D) None of the above.
- (4) The Probability is that Event A occurs, given that Event B has occurred. The conditional probability of Event A, given Event B, is denoted by:
- (A) $P(A|B)$
 - (B) $P(B|A)$
 - (C) $P(A) + P(B)$
 - (D) None of the above.
- (5) If the risk manager concludes that a company's strategy is less effective in the market, then the company is said to face strategic risks. All of the following would be factor for such strategic risk, EXCEPT
- (A) Shifts in customer demand
 - (B) Increase in interest rates
 - (C) A global entity entering the market
 - (D) Technological changes

- (6) Which one is an external factor in respect of risks for an insurance company?
- (A) Financial position
 - (B) Machine failure
 - (C) Staff Morale
 - (D) Earthquake
- (7) If Risk rating is 5, then the risk is called
- (A) Severe
 - (B) High
 - (C) Moderate
 - (D) Low
- (8) If $\text{Corr}(X, Y) = -1$, then X and Y have
- (A) Perfect positive correlation
 - (B) No correlation
 - (C) Perfect negative correlation
 - (D) None of the above.
- (9) Which of the following statements is NOT true with respect to Risk Management?
- (A) Risk management is as much about identifying opportunities as avoiding or mitigating losses.
 - (B) Risk management can be described as 'coordinated activities to direct and control an organization'
 - (C) Risk management is an essential business activity for enterprises of all sizes.
 - (D) Risk management is recognized as an integral component of good management and governance.
- (10) Code of conduct for employees would most likely be contained in which type of Operational Risk Management Policy?
- (A) Departmental Policies
 - (B) High-Level Policies
 - (C) Human Resource Policies
 - (D) Operational Policies
- (11) In respect of an enterprise, **Knowledge risks** are associated with
- (A) Management and protection of knowledge and information within the enterprise.
 - (B) Primary long-term purpose, objectives and direction of the business

- (C) *On-going day to day operations*
(D) *None of the above*
- (12) *OECD has developed set of principles for better corporate governance. The principle of Disclosures and Transparency would NOT include :*
- (A) *Overseeing the process of disclosure and communications*
(B) *Foreseeable risk factors*
(C) *The financial and operating results of the company*
(D) *Company Objectives and non-financial information*
- (13) *RAROC is*
- (A) *Return on capital adjusted for inflation.*
(B) *Risk-based profitability measurement framework.*
(C) *Return on gilts*
(D) *None of the above*
- (14) *In respect of an exposure, Loss Given Default [LGD] refers to*
- (A) *The actual amount of loss*
(B) *The amount that is exposed to the default risk*
(C) *The loss likely to be suffered in the event of a default occurring in the exposure.*
(D) *None of the above*
- (15) *Gini coefficient is*
- (A) *One of the most popular index to gauge the rich-n-poor income-that is to measure inequality in income distribution.*
(B) *An index to measure the level of corruption perception.*
(C) *An index to measure the level of crimes, violence and military expenditure.*
(D) *None of the above*
- (16) *Enterprise risk governance framework would NOT normally include*
- (A) *Risk Limits*
(B) *Risk Management Procedures*
(C) *Risk Appetite Framework*
(D) *Risk Appetite Statement*

- (17) Which of the following would NOT be included as a principle in determining the risk appetite of the company?
- (A) Risk appetite is not a single, fixed concept.
 - (B) Risk appetite can be complex.
 - (C) Risk appetite needs to be measurable.
 - (D) Risk appetite is about identifying opportunities.
- (18) The risk manager would like to know the risk that refers to ineffective and unethical management of a company by its executives and managerial levels. The risk is known as:
- (A) Staffing Risk
 - (B) Management Risk
 - (C) Strategic Risk
 - (D) Governance Risk
- (19) Which one of the following that a company would LEAST likely choose as a common risk management objective when framing the risk management approach?
- (A) Enhance the level of risk maturity
 - (B) Allocate capital more efficiently
 - (C) Build safeguards against earnings-related surprises
 - (D) Achieve a better understanding of risk for competitive advantage
- (20) The risk manager, in his approach, chose a method for structuring a group communication process so that the process is effective in allowing a group of individuals as a whole to deal with a complex problem. This method is BEST known as:
- (A) Scoring
 - (B) Delphi Technique
 - (C) Judgement and intuition
 - (D) Simulation.
- (21) As per the Standards on Auditing issued by the ICAI, a risk resulting from significant conditions, events, circumstances, actions or inactions that could adversely affect an entity's ability to achieve its objectives and execute its strategies, or from the setting of inappropriate objectives and strategies is BEST known as :
- (A) Significant Risk
 - (B) Business Risk
 - (C) Inherent Risk
 - (D) Control Risk.

(1 x 20 = 20 Marks)

Answer**(1) Working Notes:****(a) Profitability Ratios**

	31.03.2016	31.03.2017
(i) Gross Profit Ratio	$\frac{\text{Gross Profit}}{\text{Sales}} \times 100$ $= \frac{3,29,127}{14,46,791} \times 100$ $= 22.75\%$	$\frac{\text{Gross Profit}}{\text{Sales}} \times 100$ $= \frac{3,36,905}{14,69,762} \times 100$ $= 22.92\%$
(ii) Net Profit Ratio	$\frac{\text{Net Profit}}{\text{Sales}} \times 100$ $= \frac{85,304}{14,46,791} \times 100$ $= 5.896\%$	$\frac{\text{Net Profit}}{\text{Sales}} \times 100$ $= \frac{93,410}{14,69,762} \times 100$ $= 6.355\%$
(iii) Return on Capital Employed	$\frac{\text{Operating Profit}}{\text{Capital Employed}} \times 100$ $= \frac{58,455}{5,90,392} \times 100$ $= 9.90\%$	$\frac{\text{Operating Profit}}{\text{Capital Employed}} \times 100$ $= \frac{69,648}{5,11,297} \times 100$ $= 13.62\%$

(b) Performance Ratios

	31.03.2016	31.03.2017
(i) Inventory Turnover Ratio	$\frac{\text{Cost of Goods Sold}}{\text{Closing Inventory}}$ $= \frac{1,117,664}{22,200}$ $= 50.34 \text{ times}$	$\frac{\text{Cost of Goods Sold}}{\text{Closing Inventory}}$ $= \frac{1,132,857}{19,100}$ $= 59.31 \text{ times}$
(ii) Debtor Turnover Ratio	$\frac{\text{Sales}}{\text{Closing Debtors}}$ $= \frac{14,46,791}{3,66,246}$ $= 3.95 \text{ times}$	$\frac{\text{Sales}}{\text{Closing Debtors}}$ $= \frac{14,69,762}{3,08,547}$ $= 4.76 \text{ times}$

(c) Liquidity Ratios

	31.03.2016	31.03.2017
(i) Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$ $= \frac{763,428}{395,337}$ $= 1.93 : 1$	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$ $= \frac{679,539}{382,908}$ $= 1.77 : 1$
(ii) Liquid Ratio	$\frac{\text{Liquid Assets}}{\text{Current Liabilities}}$ $= \frac{4,53,622}{3,95,337}$ $= 1.147 : 1$	$\frac{\text{Liquid Assets}}{\text{Current Liabilities}}$ $= \frac{4,06,992}{3,82,908}$ $= 1.063 : 1$

(d) Capital Structure Ratio

	31.03.2016	31.03.2017
Debt Equity Ratio	$\frac{\text{Debt}}{\text{Equity}}$ $= \frac{61,790}{343,494}$ $= 0.180$	$\frac{\text{Debt}}{\text{Equity}}$ $= \frac{56,445}{310,480}$ $= 0.182$

Analytical Report

To: The Management

From: Chief Risk Officer

Date: 12 May 2018

Subject: Analytical Report on Financial Risks Involved

Introduction

This analytical report covers

- (i) Performance, Profitability, Working Capital Management, Liquidity and Capital Structure etc.
- (ii) Other areas

(i) Performance, Profitability, Working Capital Management, Liquidity and Capital Structure etc.

Performance: Performance of the company has been improved in the year ending 31.03.2017 as the Inventory Turnover and Debtor's Turnover Ratios have been improved.

Profitability: So far as the profitability of the company is concerned there is no improvement in the Gross Profit Ratio which is almost same. Though some improvement is there in Net Profit Ratio and Return on Capital Employed due to following reasons:

- Control on Administration Costs
- Decrease in Short Term Debt leading to reduction in reduced interest cost.

Working Capital Management: On this front company is performing well as company is reducing the investment in the stock or inventory. However, it appears that company is not using the available credit facilities from the supplier by paying off the old payables.

Liquidity: From the Current Ratio and Liquid Ratio it appears that company enjoys a comfortable liquidity situation.

Capital Structure: The Debt Equity Ratio of the company is very low indicating that the company is too conservative in using cheap source of finance.

(ii) Investment by companies in Government Securities indicates that company is too risk averse and left credit facilities unutilized.

Conclusion: Presently company is not facing any major risk.

- (2) (C) The measure of uncertainty refers only to the probabilities assigned to outcomes, while the measure of risk requires both probabilities for outcomes and losses quantified for outcomes.
- (3) (C) Any event which affects the name or brand image of the entity is Reputational Risk.
- (4) (A) The rule of Conditional Probability is: The probability that Event A occurs, given that Event B has occurred. The conditional probability of Event A, given Event B, is denoted by the symbol $P(A|B)$.
- (5) (B) Increase in interest rate will come under interest rate risk.
- (6) (D) Earthquake is an external factor that cannot be controlled.
- (7) (C) As per the risk rating table, risk rating between 4-8 will be called Moderate Risk.
- (8) (C) According to the properties of Correlation Coefficient, if $\text{Corr}(X, Y) = -1$, then the variables seems to have perfect negative correlation. The movement in one variable results in exact opposite movement in the other variables.
- (9) (B) The correct sentence is risk management is defined as "coordinated activities to direct and control an organization with regard to risk".

- (10) (B) or (C) Code of Conduct for employees would most likely be contained in High Level Policies of Operational Risk Management Policy. They may also be contained in the human resource policies.
- (11) (A) As per ICAI's Standard of Internal Audit, **Knowledge Risks** are associated with the management and protection of knowledge and information within the enterprise.
- (12) (A) The process of disclosure and communications is the responsibility of the Board.
- (13) (B) Risk-adjusted return on capital (RAROC) is a risk-based profitability measurement framework for analysing risk-adjusted financial performance and providing a consistent view of profitability across businesses.
- (14) (C) Loan Given Default refers to the loss likely to be suffered in the event of a default occurring in an exposure. It takes into account the amount of recoveries likely to be made post default.
- (15) (A) the other two indexes are Corruption Perception Index and Global Peace Index.
- (16) (B) Enterprise risk governance framework would not normally include Risk Management Procedures.
- (17) (D) Determination of Risk Appetite starts after identifying opportunities.
- (18) (D) Governance relates to in-effective and un-ethical management of a company by its executives.
- (19) (A) Some common risk management objectives chosen by companies to frame their risk management approach do not include the option "enhance the level of risk maturity"
- (20) (B) The Delphi technique is defined as: 'a method for structuring a group communication process so that the process is effective in allowing a group of individuals as a whole to deal with a complex problem'.
- (21) (B) Other risks are indirectly related to entity's ability to achieve its objectives and execute its objectives.

QUESTION NUMBER - II

About the Company

XYZ Limited is a public limited company incorporated in the year 2003. It has the registered head office in Bhubaneswar, Odisha. The Company has iron ore mines situated in five places in the State. The main business of the Company is extraction and sale of iron ore to many iron and steel industries both inside and outside states.

The Company has decided to diversify its business in trading of shares. Also, the Company is considering the possibility of setting up a Non-Banking Finance Company. For these purposes, the Company is in the process of doing feasibility studies.

Risk Manager

The Company has approached you, being a senior Risk Manager to look into the proposals. The role performed by you would include:

- To gather regular risk management related information from external and internal sources.
- Identify the problems and provide possible solutions to the various issues arising in the risk management.
- To effectively manage specific risk circumstances.
- To monitor the risk of anti-money laundering (AML).
- To monitor the investment portfolio and to analyse the unfavourable movements.
- Advise and make recommendations to the management in the matters of identifying the risks and quantifying the same.
- Help the management in designing and implementing various risk management strategies and their related processes in the banking & investment portfolio and to suggest improvements.
- Get updated with the advances happening in the relevant software technology.
- Have a detailed understanding and knowledge of the credit, operational and market risks of the portfolio and also the software tools used to assess them.
- Understand and reduce the exposures in financial risks by using strategies such as hedging, credit default swap, insurance etc.
- Proactively analyse the market trends for finding out opportunities in expanding the portfolio.
- Adhere to various laws, procedures relating to the financial operations.
- Gather various information relating to the operations of NBFC in India including credit risk management and the underlying Guidelines of RBI with respect to capital adequacy norms, provisioning etc.

Required by the Risk Manager

In order to have a better understanding of the risk factors involved thereon, the Risk Manager needs a better understanding on the following issues:

- (i) The purchase order for a script would be authorised by a manager. The risk manager is bothered about authorising the order for a wrong script, instead of the intended one by the manager. Thus, he is interested to learn the controls placed and if any weakness is found he wants to strengthen the same.
- (ii) A machine learning program dynamically responds to change in data / situation by changing the rules that govern the behavior and the algorithm "learns" from new data inputs and gets better over time. The risk manager tries to explore the possibility of employing a new software towards the same.

- (iii) Calculation or measuring the loss in the value of the portfolio in a given period of time for a distribution of historical returns.
- (iv) The risk manager is interested to find out as to how the portfolio would fare during the period of a financial crisis. He is also interested to build the stress testing capabilities and to explore the ways of using them to meet the broader risk management and business objectives.
- (v) The rules and regulations existing in a foreign country and also the risk factors involved with reference to the investment climate of that country that are to be considered before buying shares of a foreign company.
- (vi) While applying for a bank loan for the expansion of the portfolio, the parameters of credit risk that the bank might consider and also the credit scoring model that might be applied by the bank, while approving such loan to the company. The Company would be offering some of its immovable properties as collateral to the proposed loan with the bank.
- (vii) The certainty equivalence is a guaranteed return that the management would accept rather than accepting a higher but uncertain return. The risk manager would like to explore the possibility of "certainty equivalent" technique.
- (viii) Effectively employing big data analytics in analysis of various transactions to study the patterns of investments and also the possibility of using block-chain technology in ensuring the veracity of the transactions.

You are appointed as a risk management consultant and you are expected to give your valuable inputs by answering the following.

(a) **Multiple Choice Questions:**

Answer all of the following – Each MCQ carries **one** mark (1 x 20 = 20 Marks)

Choose the most appropriate answer from the answer options, and give brief reasoning for your choice.

- (i) The Risk Manager is trying to quantify the level of financial risk in the portfolio using VaR. Which of the following VaR methods draws a sample from the dataset and records its VaR ?
 - (A) Historical Simulation
 - (B) Delta-Normal Methods
 - (C) Monte Carlo Simulation
 - (D) Bootstrap Simulation
- (ii) A measure of an investment's excess return, above the risk-free return, per unit of standard deviation is known as
 - (A) Beta
 - (B) Jensen Index

- (C) *Sharpe Ratio*
- (D) *R Squared*
- (iii) *Which one of the following statements is NOT true with respect to correlation coefficient properties?*
 - (A) *It does not have any units.*
 - (B) *Correlation Coefficient value ranges from -1 to +1.*
 - (C) *It is a measurement of deviation from the mean for one variable.*
 - (D) *It measures the strength of linear relationship between two random variables.*
- (iv) *The Manager is considering to employ VaR to quantify the level of financial risk. Which one of the following is NOT a limitation of VaR ?*
 - (A) *not sub-additive*
 - (B) *uninformative of tail losses*
 - (C) *can encourage diversification*
 - (D) *can create perverse incentives structures*
- (v) *As per BIS capital adequacy rules, banks should operate with a holding period of*
 - (A) *one week (or 5 business days)*
 - (B) *one week (or 7 days)*
 - (C) *two weeks (or 10 business days)*
 - (D) *two weeks (or 14 days)*
- (vi) *Real-time risk is defined as the probability of instantaneous or near- instantaneous loss, and can be due to flash crashes, other market crises, malicious activity by selected market participants and other events. Which of the following would CHIEFLY be the cause of such a risk in a financial market?*
 - (A) *Deployment of poorly tested algorithm*
 - (B) *A malicious activity done by a hacker on a computer belonging to a financial services company.*
 - (C) *Information timing and source risk*
 - (D) *Risk of ineffective current market study on financial markets*
- (vii) *While analysing the credit risk, which one of the following internal factors would NOT be considered by the bank as a credit risk in its transactions?*
 - (A) *Ignoring the purpose for which loan was sought by the customer.*
 - (B) *Concentration of credit in particular geographical locations or business segments.*

- (C) *Fluctuation in Interest Rates.*
- (D) *Excessive lending to particular industry is subject to cyclical fluctuations.*
- (viii) *The Manager came across "Expropriation Risk", while analysing various risk scenarios. It refers to :*
 - (A) *Unanticipated increase of tax rates applicable for MNCs in the host country*
 - (B) *Business of MNCs takeover by host country without or with inadequate compensation*
 - (C) *Prevention of repatriation of earnings of MNCs to their countries*
 - (D) *High level of red tapism and corruption in host country*
- (ix) *Risk measures are expected to correctly reflect diversification effects and facilitate effective decision making. This is achieved in*
 - (A) *Stress testing measures*
 - (B) *Coherent risk measures*
 - (C) *Full revaluation methods*
 - (D) *VaR conversion methods*
- (x) *In the context of credit risk for banking business, the trade-off between risk and return does NOT involve taking the following decision :*
 - (A) *Placing of credit cap or limit for each customer*
 - (B) *Acceptance or rejection of customer's request*
 - (C) *How much compensation should be added while pricing the product.*
 - (D) *How much credit risk should be accepted in return of decrease in business.*
- (xi) *According to RBI guidelines issued with respect to CDS, the credit events specified in the CDS contract may NOT cover*
 - (A) *Obligation deceleration*
 - (B) *Repudiation/moratorium*
 - (C) *Bankruptcy*
 - (D) *Failure to pay*
- (xii) *The Manager is looking for a long-term secure technology to help in settlement of contracts which ensures proper validation. Which of the following would you suggest him to implement?*
 - (A) *Big Data Technology*
 - (B) *An ERP with built-in validation rules and Access Control Technologies*

- (C) *Artificial Intelligence*
- (D) *Distributed Ledger Technology*
- (xiii) *The manager has decided to employ stress testing. Recently, it has gained the attention of the senior management of the company CHIEFLY because of*
 - (A) *governance requirements demanded by regulators*
 - (B) *measuring and monitoring usage of risk limits*
 - (C) *transaction level pricing and decision support*
 - (D) *communication of risk exposure across the organisation*
- (xiv) *Co-variance is*
 - (A) *the square root of Variance.*
 - (B) *the weighted average of possible values.*
 - (C) *basically the deviation from the mean.*
 - (D) *the relationship between deviations of two variables.*
- (xv) *Which one of the following is NOT a way to calculate the credit risk component as prescribed by Basel II ?*
 - (A) *Credit Risk Mitigation*
 - (B) *Control Risk Mitigation*
 - (C) *Standardised Approach*
 - (D) *Internal Rating based approach*
- (xvi) *The manager likes to place more importance to recent observations and provide geometrically declining weights on past observations. For this purpose, he WOULD most like use*
 - (A) *Loss Given Default model*
 - (B) *Exponentially Weighted Moving Averages model*
 - (C) *Altman Z Score model*
 - (D) *Generalized Autoregressive Conditional Heteroskedastic model*
- (xvii) *Credit scoring models are mainly used by the credit rating agency to determine the credit worthiness of an individual. Which of the following is NOT a credit scoring model?*
 - (A) *FAKO credit score*
 - (B) *MICRO Score*
 - (C) *PLUS Score*
 - (D) *FICO Score*

- (xviii) Which method under a machine learning program would MOST primarily deal with variables that are quantitative in nature.?
- (A) Regression methods
 (B) Bayesian methods
 (C) Analytical methods
 (D) Inferential methods
- (xix) In the context of credit risk management techniques, conditions imposed by the lender on the borrower that certain activities will or will not be carried out and which can be affirmative or negative in nature are called
- (A) Letter of Credit
 (B) Due Diligence
 (C) Well defined credit approval matrix
 (D) Covenants
- (xx) The banks while considering the proposal for a wholesale credit, the detailed appraisal would NOT include
- (A) Risk identification, risk allocation and risk mitigation
 (B) Covenants/conditions to be stipulated
 (C) Internal credit rating model
 (D) Nature of Security and its enforceability

(b) **Descriptive Questions**

- (i) There is a 30% probability of increase in a particular share price on Monday. If that share price increased on Monday, there is a 20% probability that it will increase on Tuesday. If the price did not increase on Monday, there is a 70% probability that it will increase on Tuesday. Give your workings.

Using Baye's Theorem, calculate the probability of increase in that share price on Monday, if the price increased on Tuesday. (4 Marks)

- (ii) Briefly explain how big data analytics help in improve the existing processes in Anti-Money Laundering operations. (4 Marks)
- (iii) Calculate the compounded Geometric Mean rate of return for the previous two year-period. The stock had a return for the three years as follows:

Year	2016	2017	2018
Return	8%	-5%	15%

(2 Marks)

- (c) (i) *The risk manager would like to have your opinion in deciding between VaR and Expected short fall method as a risk measure. Give your advice explaining the reasons thereof.* (3 Marks)
- (ii) *What are the advantages of Monte Carlo Simulation?* (3 Marks)
- (iii) *If investment proposal is ₹ 50,00,000/- and risk-free rate is 6% p.a., calculate Net Present Value under certainty equivalent technique, given the following information:*

Year	Expected Cash Flow (in ₹)	Certainty Equivalent Coefficient
1	12,00,000	0.87
2	14,00,000	0.84
3	18,00,000	0.93
4	27,00,000	0.82

(4 Marks)

- (d) (i) *The Manager is looking at the viability of Credit Default Swap contracts. He learnt that it has similarities with credit insurance. Discuss the differences between CDS and credit insurance.* (6 Marks)
- (ii) *In the present days, banks face a lot of problems in collections from customers resulting in increase of NPAs. Hence the banks make attempts to mitigate the risks of lending to unworthy borrowers by reviewing their five C's of Credit. Briefly explain them.* (4 Marks)

Answer**(a) Multiple Choice Questions (MCQs)**

- (i) (D) The Bootstrap Simulation is an extension of historical simulation. It draws a sample from the dataset and records its VaR.
- (ii) (C) Sharpe Ratio, is a measure of an investment's excess return, above the risk-free return, per unit of standard deviation.
- (iii) (C) Option A, B and D are the properties of correlation coefficient, while C is a distractor.
- (iv) (C) One of the limitations of VaR is that it can discourage diversification.
- (v) (C) As per Capital Adequacy Rules, banks should operate with a holding period of two weeks.
- (vi) (A) or (B) In the well cited example of real-time risk in the US market, where millions of dollars were lost in a matter of just 30 minutes, the chief reason was a poorly-tested algorithm. Further, as mentioned in the question itself, malicious activity done by a hacker on a computer belonging to a financial services company

would also be a cause of real-time risk.

- (vii) (C) Options A, B and D are internal factors affecting the credit risk of a bank, while Option C i.e. fluctuation in interest rate is an external factor.
- (viii) (B) “Expropriation Risk” refers to business of MNCs taken over by host country without or with inadequate compensation.
- (ix) (B) We want risk measures to correctly reflect diversification effects and should facilitate effective decision making. The answer to this will be found in the theory of coherent risk measures.
- (x) (D) The trade-off between risk and return in the context of Credit Risk calls for decision “How much Credit Risk should be accepted in return from increase in sale or business in case of banking?”
- (xi) (A) Obligation acceleration is one of the credit events specified in the CDS and not “Obligation deceleration”.
- (xii) (B) An ERP with built in validation rules and Access Control Technologies, if implemented, will help in settlement of contracts which ensures proper validation.
- (xiii) (B) Stress testing has gained the attention of the senior management chiefly because of measuring and monitoring usage of risk limits.
- (xiv) (D) Covariance is the relationship between deviations of two variables.
- (xv) (B) Option A, C and D are prescribed by Basel II, while Option B is a distractor.
- (xvi) (B) Exponentially Weighted Moving Averages model (EWMA) model place more importance to recent observations and provide geometrically declining weights on past observations.
- (xvii) (B) Options A, C and D are credit scoring models, while option B is a distractor. (Experian’s National Equivalency Score (ENES) is also called FAKO credit.
- (xviii) (A) Machine Learning Methods can also be categorized on the basis of the nature of the variables handled. Regression methods primarily deal with variables that are quantitative in nature.
- (xix) (D) In the context of credit risk management techniques, conditions imposed by the lender on the borrower that certain activities will or will not be carried out and which can be affirmative or negative in nature are called Covenants.
- (xx) (C) For whole sale credits, the detailed appraisal would inter alia cover Options A, B and D. Option C is a distractor.

(b) Descriptive Questions

- (i) Bayes Theorem shows how a conditional probability of the form $P(B|A)$ may be combined with the initial probability $P(A)$ to obtain the final probability $P(A|B)$:

$$P[A|B] = \frac{P(B|A) * P(A)}{P(B)}$$

$$= \frac{P(B|A) * P(A)}{P(B|A) * P(A) + P(B|A') * P(A')}$$

Accordingly let us assume

Prob. of increasing price on Monday = A

Prob. of increasing price on Tuesday = B

$$P[\text{Increase on Monday if price increased on Tuesday}] = \frac{0.20 \times 0.30}{0.30 \times 0.20 + 0.70 \times 0.70}$$

$$= \frac{0.06}{0.55} = 0.1091 \text{ or } 10.91\%$$

- (ii) The high cost of money laundering cases has prompted banks to seek new ways to address the severe limitations in current anti-money laundering risk management. Traditional approaches to anti money laundering remain dependent on rule-based, descriptive analytics to process structured data. This system clearly has limitations - without automated algorithms, detecting information within the wealth of data requires laborious keyword searches and manual sifting through reports.

Big Data analytics can improve the existing processes in AML operations. Its approaches allow for the advanced statistical analysis of structured data, and advanced visualization and statistical text mining of unstructured data. These approaches can provide a means to quickly draw out hidden links between transactions and accounts, and uncover suspicious transaction patterns.

Advanced analytics can generate real-time actionable insights, stopping potential money laundering in its tracks, whilst still allowing fund transfers for crucial economic and human aid to troubled regions. Big data technologies can identify incidents, help draw a wider picture, and allow a bank to raise the alarm before it's too late.

(iii) $1 + R_G = \sqrt[n]{(1+R_1) \times (1+R_2) \times \dots \times (1+R_n)}$

$$= \sqrt{(1-0.05)(1+0.15)} - 1 = 0.04522 \text{ i.e. } 4.52\%$$

- (c) (i) Despite the VaR measure being better known than the expected shortfall, the latter has more advantages:
- Expected shortfall is sensitive to the entire tail of the distribution, whereas VaR will not change even if there are large increases in some of the losses beyond the cut-off percentile at which the VaR is being measured.

- Expected Shortfall is a more stable measure than VaR in showing less sensitivity to data errors and less day to day movement due to irrelevant changes in the input data.
 - With VaR, negative diversification effects can arise whereas expected shortfall never displays negative diversification effects.
- (ii) The main advantage of the use of Monte Carlo simulation is that we can generate correlated scenarios based on a statistical distribution. Due to which it models multiple risk factors.

Moreover, we can specifically focus on the tails of extreme loss scenarios. So, Monte Carlo Simulation method can be used both to calculate VaR as well as to complement it. Also, it can work both for linear and non linear risks. As unlimited number of scenarios is generated, this helps in creating correct distributions.

(iii) Calculation of NPV

Year	Expected Cash Flow (₹)	Certainty Equi. Cash Flow (₹)	Certain Cash Flow (₹)	PVF	PV of Cash Flow (₹)
1	12,00,000	0.87	10,44,000	0.943	9,84,492
2	14,00,000	0.84	11,76,000	0.890	10,46,640
3	18,00,000	0.93	16,74,000	0.840	14,06,160
4	27,00,000	0.82	22,14,000	0.792	17,53,488
					51,90,780
0	Cash Outflow				(50,00,000)
					1,90,780

Alternative Presentation

$$\begin{aligned}
 NPV &= \sum_{t=0}^n \frac{\alpha_t \times NCF_t}{(1+r_f)^t} - I \\
 &= \frac{12,00,000 \times 0.87}{(1.06)} + \frac{14,00,000 \times 0.84}{(1.06)^2} + \frac{18,00,000 \times 0.93}{(1.06)^3} + \frac{27,00,000 \times 0.82}{(1.06)^4} - 50,00,000 \\
 &= 51,90,760 - 50,00,000 \\
 &= 1,90,760
 \end{aligned}$$

- (d) (i) CDS contracts have obvious similarities with insurance, because the buyer pays a premium and, in return, receives a sum of money if an adverse event occurs.

However, there are also many differences, the most important being that an insurance contract provides an indemnity against the losses actually suffered by the policy holder on an asset in which it holds an insurable interest. By contrast a CDS provides

an equal payout to all holders, calculated using an agreed, market-wide method. The holder does not need to own the underlying security and does not even have to suffer a loss from the default event. The CDS can therefore be used to speculate on debt objects. The other differences include:

- The seller might in principle not be a regulated entity (though in practice most are banks);
 - The seller is not required to maintain reserves to cover the protection sold (this was a principal cause of AIG's financial distress in 2008; it had insufficient reserves to meet the "run" of expected payouts caused by the collapse of the housing bubble);
 - Insurance requires the buyer to disclose all known risks, while CDSs do not (the CDS seller can in many cases still determine potential risk, as the debt instrument being "insured" is a market commodity available for inspection, but in the case of certain instruments like CDOs made up of "slices" of debt packages, it can be difficult to tell exactly what is being insured);
 - Insurers manage risk primarily by setting loss reserves based on the Law of large numbers and actuarial analysis. Dealers in CDSs manage risk primarily by means of hedging with other CDS deals and in the underlying bond markets;
 - CDS contracts are generally subject to mark-to-market accounting, introducing income statement and balance sheet volatility while insurance contracts are not;
 - To cancel the insurance contract the buyer can typically stop paying premiums, while for CDS the contract needs to be unwound.
- (ii) Five C's of Credit that reviewed by banks in an attempt to mitigate the risk of lending to unworthy borrowers:
- (a) **Capacity** – This refers to the borrower's ability to repay the loan. The lenders / banks will consider the cash flows generated from the underlying business, timing of repayment and the probability of successful payment of the loan under various stressed scenarios.
 - (b) **Capital** – It is the promoters / borrower money invested in the business and is an indicator of how much of promoters / borrowers money is at risk if the business fails. Fls / banks will generally consider the borrowers debt to equity ratio to understand how much money the lender is being asked to lend as against the money invested by the promoters / borrower in the business. High debt to equity ratio indicates that the promoters / borrower already have high levels of debt / loans and could be having a higher financial risk.
 - (c) **Character** – It is the obligation that the borrower feels to repay the loan. Emphasis is given on the past loan repayment track record, credit history, credit bureau score. This analysis pertains to the softer aspect of the borrower's intent to pay rather emphasis on financials, ratios and cash flows.

- (d) **Collateral** – It is a form of security for the lender in case there is default on the loan. In case of default, the lender will take possession of the collateral in place of debt. Collateral can be in the form of tangible assets like land, building, plant, machinery, cash flows, receivables, project assets etc. and also in the form of intangible assets like patents, trademarks etc. The loan agreement should be suitably drafted to include all the relevant details of the collateral. The lender would ideally want the term of the loan to match the useful life of the collateral.
- (e) **Conditions** – Additionally, apart from the borrower specific criteria's, lenders may also consider external factors which may affect borrower's financials, cash flows and its underlying ability to repay the loan obligations. End use of the loan/ purpose for taking the loan / debt will also be carefully assessed and the transaction will be suitably structured.

QUESTION NUMBER - III

- (1) *You have been recently appointed as Chief Risk Officer of a company which is in Steel Castings business. Name of the Company is ABC Electro Steel Castings Ltd. [in short, ABC].*

You have been told that ABC is fully committed to strengthen its risk management capability on continuous basis in order to protect and enhance shareholder value. You have been told that the risk management framework ensures compliance with the requirements of amended Clause 49 of the Listing Agreement. The framework establishes risk management processes across all businesses and functions of the Company. These processes are periodically reviewed to ensure that the Management controls risks through properly defined framework.

You are also made aware that the Company has already undertaken an extensive Risk Management effort that includes introducing Risk Management Manual, compiling a comprehensive profile of the key risks to the Company, identifying key gaps in managing those risks and developing preliminary action plans to address those risks. This effort accomplishes the following goals:

- *responds to the Board's need for enhanced risk information and improved mitigation plan;*
- *provides the ability to prioritize, manage and monitor the risk in the business; and*
- *formalizes the explicit requirements for assessing risks on an ongoing basis, including an effective internal control and management reporting system.*

You are also given information that the Company uses raw materials to manufacture the steel castings. It is faced with the threat of pressure on margins on sales. To counter the threat, the Company has taken various steps which include backward integration which comprises coal mines and iron mines, and brownfield expansions, e.g. sinter plant, sponge

iron plant, coke oven plant, power plant from waste head recovery. It also set up an R & D to expand its manufacturing capacities with a view to control costs.

You came to know that the Company is ISO-14001-2004 certified and is adhering strictly to the emission norms applicable for industry.

You are also told that with the thrust given by Government of India on water and water related projects and with the estimated growth in water requirement, the demand of DI Pipes is expected to grow substantially and the Company is confident of retaining its market share.

Labour relations have been excellent throughout the year in spite of number of unions. It is the result of such cordial and harmonious relations that not a single man-day has been lost in the last 8 years. The Company believes that labour relations will continue to remain excellent.

The Company has also Credit insurance policy.

Now, you have been asked to give a report to the Company's Management, which should contain the key risks affecting the Company, and the measure that can be taken to mitigate such risks. (30 Marks)

Multiple Choice Questions (2) to (6): **Briefly explain the reasoning for your choice which is mandatory**

- (2) An excess payment made to a vendor, which is accounted correctly, would be categorized under which of the following risks?
 (A) Financial Reporting risk
 (B) Legal risk
 (C) Reputation risk
 (D) Financial risk (2 Marks)
- (3) In Information Technology General Controls, under change management, the risk of incorrect change is NOT mainly due to
 (A) Change being wrongly conceived by the user groups
 (B) Change control audit trail not maintained
 (C) Change is wrongly executed
 (D) Change being carried out without approvals (2 Marks)
- (4) Annual Report of the Board of Directors must include a statement indicating the development and implementation of a risk management policy for a company. This is mandated by
 (A) SEBI through 'Issue of Capital and Disclosure Requirements Regulations'
 (B) Information Technology (Amendment) Act, 2008

- (C) *Companies Act, 2013*
- (D) *Prevention of Money Laundering Act, 2002.* (2 Marks)
- (5) *While taking a decision, the category risk profile bucket that would most likely to escape attention of the Management is*
- (A) *High Impact-Low Probability*
- (B) *Low Impact-Low Probability*
- (C) *High Impact-High Probability*
- (D) *Low Impact-High Probability* (2 Marks)
- (6) *Governance risks mean significant deficiencies that can impact the reputation, existence and continuity of the organization. Such deficiencies would NOT occur because of*
- (A) *Inappropriate practices adopted by the Board*
- (B) *Inability of the Board to identify trivial risk facts that can impact business continuity*
- (C) *Failure of the Board to direct and control the organization*
- (D) *Collusion of management to override significant internal control mechanism causing financial losses* (2 Marks)
- (7) *List at least ten tasks in respect of the role of the risk manager.* (5 Marks)
- (8) *Describe the usefulness of 'Artificial Intelligence'* (5 Marks)

Answer

- (1) Some of the key risks affecting the Company are illustrated below:
- (a) **Economic Risk:** Due to increase in the cost of number of inputs and raw materials used by the Company, it is faced with the threat of pressure on margins on sales. To counter this, the Company has taken various steps including backward integration which comprises own coal mines and iron mines and brownfield expansions e.g. sinter plant, setting up sponge iron plant, coke oven plant, power plant from waste heat recovery, upgrading and expanding manufacturing capacities and increasing efforts on R&D. In addition, cost control measures are an ongoing process.
- To avoid price volatility for critical items, the company can attempt to enter into long term contracts.
- (b) **Competitor Risk:** The Company is exposed to the risk of competition, as the market is highly competitive with the elimination of physical barriers and entry of new players.
- The Company continues to focus on increasing its market share and taking marketing initiative that help customers in taking better-informed decisions.
- The quality improvement efforts have established the brand image of the product as the most preferred brand with the customers. With the thrust given by Government of

India on water and water related projects and with the estimated growth in water requirement, the demand of DI pipes is expected to grow substantially, and the company is confident of retaining its market share.

- (c) **Foreign Exchange Risk:** Considering the large export and imports of raw material, the Company is exposed to the risk of fluctuation in the exchange rates.

The Company has adopted a comprehensive risk management review system wherein it actively hedges its foreign exchange exposures within defined parameters, through use of hedging instruments such as forward contracts, options and swaps. The company periodically reviews and audits its risk management initiatives through an independent expert.

- (d) **Industrial Risk:** The company is exposed to labour unrest risk, which may lead to production slowdown ultimately resulting in plant shutdown.

Labour relations have been excellent throughout the year in spite of number of unions. It is result of such cordial and harmonious relations that not a single man-day has been lost in the last 8 years. The Company believes that labour relations will continue to remain excellent.

- (e) **Environment Risk:** The company is exposed to the risk of Environment and Pollution Controls, which is associated with such types of industries.

The Company is committed to the conservation of the environment and has adopted the latest technology for pollution control. The Company is ISO-14001-2004 certified and is adhering strictly to the emission norms applicable for the industry.

- (e) **Payment Risk:** The company is exposed to the risk of defaults by the customers in payments.

Since major water infrastructure projects are government founded or foreign aided, the risk involved in payment defaults is minimum. Further, evaluation of the credit worthiness of the customers has minimized the risk of default by other segment customer. Besides, the risk of export receivables is covered under Credit Insurance.

Alternative Answer

Report to Company's Management

To: The Management

From: Chief Risk Officer

Date: 12 May 2018

Subject: Key risks affecting the company and its mitigation

Introduction

This report covers

- (i) Key risks affecting the company

(ii) Measures to be taken to mitigate such risks

(i) Key risks affecting the company

(a) *Strategic Risk*: It includes the current and prospective impact on earnings, capital, reputation or good standing of an organization arising from its poor business decisions, improper implementation of decisions or lack of response to industry, economic or technological changes. Failure of strategies will adversely impact the business objectives and attainment of the goals.

Few major strategies initiated by ABC include:

- (i) To reduce the threat of pressure on margin on sales, ABC has taken the step of backward integration.
- (ii) ABC has set up R & D to expand its manufacturing capacities with a view to control costs.
- (iii) The company has taken credit insurance policy.

So, ABC while implementing the above mentioned strategies, it is also facing the risk of failure of some of its strategies.

(b) *Operational Risk*: Operational Risk is the risk of loss resulting from inadequate or failed processes, people and systems and from external events.

As the company is in the manufacturing of steel castings, health and safety of the workers is a major issue for the management inspite of the fact that labour relations have been excellent. Further, the introduction of backward integration also needs continuous monitoring for it's smooth functioning.

(c) *Financial risk*: These risks are associated with the financial assets, structure and transactions of the particular industry. NASDAQ defines Financial Risks as the risk that the cash flow of an issuer will not be adequate to meet its financial obligations.

In generic terms finance risk is the possibility that the investment return on an investment will be different from the historical or expected return, and also takes into account the magnitude of the difference. This includes the possibility of losing some or all of the original investment.

In the present case, ABC is already facing threat of pressure on margin on sales. Further, with the introduction of backward integration with the likely involvement of huge costs, it has to devise strategies to ward off such threats.

(d) *Audit Risk*: Audit risk has traditionally been seen strictly as the risk of incorrect audit conclusions. Contemporary views however include big-picture audit risks; specifically, that the internal audit-function is not doing the right things or working in the best ways.

(e) *Political Risk*: It includes political factors as fall or change in the Government

resulting into changes in government policies and regulations, communal violence or riots, hostilities with the neighboring countries, etc.

In the present case, the thrust given by the Government of India on water and water related projects hopes to take ABC to huge success in future. However, if the Government changes and refuses to pursue with the policies of the previous government, it will create unnecessary pressure on ABC.

- (f) **Technology Risk:** Technological factors include unforeseen changes in the techniques of production or distribution resulting into technological obsolescence, etc.

In the present question, the machines or the techniques of production employed by ABC may become obsolete in future with the advent of new technology.

- (g) **Credit Risk:** This risk arises from outright default due to the inability or unwillingness of the customer or counterparty to meet their commitments. Credit risk is the probability of loss from a credit transaction. It is also called as default risk.

ABC may face such commitments problems from its customers.

- (h) **Process Risk:** It is the inability of the management to meet its process related objectives on account of failed activities in a business process. It is a risk of loss resulting from failure of internal processes, people and systems or from external events.

The backward integration process of ABC which includes coal mines and iron mines as well as brownfield expansions may face problems in the future if the management has not chalk out a full proof plan as to how to mitigate it.

- (i) **Compliance Risk:** It includes material financial loss or loss of reputation which may occur as result of its failure to comply with the laws includes regulations, rules, related self-regulatory organization, standards and code of conduct applicable to its business activities.

In the present case, ABC may face the risk of non-compliance of clause 49 and adherence to emission norms applicable for the industry.

- (j) **Governance Risk:** It refers to in-effective, un-ethical management of a company by its executives and managerial levels. The management of ABC has to be very careful in this respect.

(ii) Measures to be taken to mitigate such risks

A risk mitigation strategy is an organization's plan for 'how it will address its identified risks'. Mitigation and measurement techniques are applied according to the event's losses, and are measured and classified according to the loss type.

The primary objective of risk treatment is:-

- To contain the risks to a tolerable level within the risk appetite of the organization (i.e., how much risk the management is ready to accept).
- To give a response to risks (i.e., aspects of addressing risks).

Broadly, the risk responses are categorized into the following buckets:

Sr. No	Risk action	Description
1	Avoid	Exiting the activities which are increasing the risk of the organization. For instance, in case of ABC, risk avoidance may involve the company in exiting some of the activities initiated under backward integration which is causing problems and seeing as a potential threat in future. This way company's process risk can be mitigated to a great extent.
2	Reduce/ Manage/Treat	<p>Action is taken to reduce the risk likelihood or impact, or both or treat it altogether. This involves introducing internal control measures such as introducing internal audit which ensures the authenticity of the financial transactions and helps to treat financial risk as well as audit risk.</p> <p>The company already has credit insurance to manage credit risk which is a good thing. However, Insurance can be taken by ABC to mitigate operational risks such as risks arising out of fire, for instance. Depending on the cover available and opted for, other losses due to terrorist attacks, natural disasters etc. can also be covered. Cash transit insurance and fidelity insurance are off quoted examples.</p> <p>Further, implementation of occupational health and safety management for the health and safety of the workers shall be initiated by the management to treat such risks, if they occur in future. The reason is that the workers of the companies are engaging in such manufacturing process which may jeopardize their health and safety and consequently the organization may suffer because of this.</p> <p>Political Risks cannot be mitigated. The only way is to establish good relations and complying with all the legal requirements on a continuous basis.</p> <p>It seems from the question itself that the management is ethical and doing its tasks effectively and thereby reducing its Governance Risk.</p>

3	Transfer/ Share	Reducing the risk likelihood or impact by transferring or, otherwise, sharing a portion of the risk. Common techniques include purchasing insurance cover, outsourcing activities, engaging in hedging transactions.
4	Accept	No action is taken to affect the risk likelihood or impact. This is mainly in cases where the risk implications are lower than the Company's risk appetite levels. So, ABC has to see which potential risks it has to concentrate and focused upon.

In addition to the above, other risk mitigation measures to be employed by ABC (depending upon the likelihood of the risk) are as follows:-

- Control Self-assessments;
- Calculating reserves and capital requirements;
- Creating culture supportive of risk mitigation;
- Strengthening internal controls, including internal and external audit of systems, processes and controls, including IS audit and assurance;
- Setting up operational risks limits (so business will have to reduce one or more of frequency of loss, severity of loss or size of operations);
- Setting up independent operational risk management departments;
- Establishing a disaster recovery plan and backup systems;
- Insurance; and
- Outsourcing operations with strict service level agreements so operational risk is transferred.

Out of these aforementioned techniques, some of the common risk mitigation techniques are briefly discussed below:

- **Insurance:** As already discussed, an organization may buy insurance to mitigate such risk. Under the scheme of the insurance, the loss is transferred from the insured entity to the insurance company in exchange of a premium. However, while selecting such an insurance policy one has to look into the exclusion clause to assess the effective coverage of the policy.
- **Outsourcing:** The organization may transfer some of the functions to an outside agency and transfer some of the associated risks to the agency. For example, it may outsource the technological aspects to outside firm.
- **Service Level Agreements (SLAs):** Some of risks can be mitigated by designing the service level agreement. This may be entered into with the external suppliers as well as with the customers and users.

- (2) (D) The situation mentioned in the question would be categorised under Financial Risk because it would lead to possible financial loss to the organisation.
- (3) (B) Option A, C and D are the causes of the risk of incorrect change, while option B is a distractor.
- (4) (C) As per section 134(3)(n) of the Companies Act, 2013, Annual Report of the Board of Directors shall include a statement indicating development and implementation of a risk management policy for the company including identification therein of elements of risk, if any, which in the opinion of the Board may threaten the existence of the company.
- (5) (A) The high impact low probability often skips the management decision purely because these incidents are either not foreseen at all in reality or even if they are, they are so rare but with severe impact that putting a risk mitigation plan for them is very difficult.
- (6) (B) Governance risks include inability of the Board to identify principal risk factors that can impact business continuity. Therefore option (B) does not include among the deficiencies covered under governance risks.
- (7) Ten tasks in respect of the role of the risk manager are as follows:-
- (i) Manage the implementation of all aspects of the risk function, including implementation of processes, tools and systems to identify, assess, measure, manage, monitor and report risks.
 - (ii) Select the most suited risk identification techniques and approaches.
 - (iii) Manage the process for developing risk policies and procedures, risk limits and approval authorities.
 - (iv) Monitor major, critical and minor risk issues.
 - (v) Manage the process for elevating control risks to more senior levels when appropriate.
 - (vi) Management of risk reporting, including reporting to senior management.
 - (vii) Prepare high-level user requirements to assist in preparation of Project Initiation documents.
 - (viii) Liaison with Business users to prepare Functional risk specifications. Translate business requirements and functional needs into business / reporting and system specifications. Ensure technical specifications meet the stated needs of the business.
 - (ix) Generate project management documents.
 - (x) Provide User Training for in-house developed risk management systems.
 - (xi) Conduct compliance & risk assessments.
 - (xii) Conduct and document audits of risk related compliance to industry standards
 - (xiii) Define & develop risk policies, procedures, processes & other documentation as required.

- (xiv) Implement the risk management program and risk strategy. Ensure the risk management program is effectively integrated into product development and delivery methodology.
- (xv) Participate in local and global discussions to formulate new or enhance existing risk management processes, policies and standards.

(8) Usefulness of 'Artificial Intelligence'

Artificial Intelligence is the science that makes intelligent machines especially computer programs. It is a way of making a computer in a manner in which the intelligent humans think.

It works by studying how human brain thinks and how humans learn, decide and work while trying to solve a problem, and then the outcomes of this study is used in developing intelligent software and systems. It has been dominant in many fields such as:

Gaming – It plays a crucial role in strategic games such as chess, poker etc.

Natural Language Processing – It is possible to interact with the computer that understands natural language spoken by humans.

Expert Systems - There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users.

Vision Systems - These systems understand, interpret, and comprehend visual input on the computer.

For example,

- Doctors use clinical expert system to diagnose the patient.
- Police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.

AI is also used in Speech Recognition, Handwriting Recognition, and Intelligent Robots etc.

Artificial Intelligence is dependent on large amounts of data. So proper big data architecture needs to be set up for AI that involves architecture like Hadoop clusters, Spark Clusters etc. so that the processing of the data is faster and smooth.