

Annexure 31 – Functional Requirements

i. Functional Requirements for Credit Risk:

The Bank aims to migrate to the Basel III guidelines for Credit risk Capital Calculation as issued by RBI. The solution should support estimation of all risk components and capital calculations as per the guidelines issued by RBI and Basel. The solution should be able to meet the Pillar I, II, III and stress testing requirements as per the RBI guidelines. The solution should be capable of supporting all the required statistical, analytical, risk modelling, pricing and reporting requirements.

Sl. No	Credit risk Functional requirement
A	Standardized Approach
1	Bank data to Basel III Data Mapping*
	The solution should be able to capture all the Bank Customer Types and Bank Product Types and should be able to reclassify/categorize them as Basel asset class wise.
1.1	The system should provide graphical user interfaces (GUI) to map bank data/codes to Basel II/III data. The following activities should be supported (but not limited to):
	· map Bank customer types to Basel II/III customer types
	· map Bank product types to Basel II/III product types
	· map Bank security/collateral types to Basel II/III collateral types
	· map Bank asset type/guarantor type to Basel II/III asset/guarantor type
1.2	The software should be flexible for the business user to use multiple factors such as customer constitution code, product type, exposure amount, legal status etc. to perform Basel II/III asset classification. Bidder should have the capability to refine/redevelop the asset re-classification logic and implement the same in the system.
1.3	The user should be able to view the entire asset classification schema and it should be printable to be submitted for regulatory inspections and audits.
	*The mapping should be done with respect to the Basel III Guidelines as issued by RBI
	The system should be able to compute the capital charge as per the standardized approach.
	System should have the capability to compute credit risk capital charge on daily basis.
2	External credit ratings
2.1	The system should have the ability to map and capture the domestic and international rating to the corresponding risk weight for all the asset class as specified under RBI Guidelines.
2.2	The system should be able to capture multiple rating details for the obligors/exposures and risk weight assignment should happen as per RBI

	Guidelines (i.e. If two ratings are available then the one with higher risk weight should be used, and if more than two ratings are available then the lowest of higher two risk weights should be used).
2.3	The system should support a user configurable interface with which multiple ratings can be assigned for obligors/exposures.
2.4	The system should capture external rating details such as Rating Agency, Rating, Type of Rating (Long or Short Term, Issue or Issuer Rating), and Rating Date etc. The system should determine the eligibility of external rating for use in capital computations based on the rules specified in the RBI guidelines. If external rating details are not present in CRS, the system should permit the direct keying in of data.
3	Credit Risk Mitigation
3.1	The system should have the ability to map the Collateral/Security Types (which the bank uses for internal reporting) into collaterals types as per RBI Guidelines (Cash, Gold, KVP, Life Insurance, Debt Securities, and Mutual Funds etc.).
3.2	Provide a GUI to define the haircuts for various collateral types as defined in RBI guidelines.
3.3	The system should be able to apply supervisory haircut on exposures and mitigants, and compute capital after applying Credit Risk Mitigation techniques as per RBI Guidelines.
3.4	The system should have the ability to assign the risk weights for Guarantors as per RBI Guidelines.
3.5	The system should be able to capture the relevant data fields for Currency and Maturity Mismatch calculations and should also be able to apply the haircuts as per RBI Guidelines.
3.6	The system should be able to capture collateral which is a basket of collaterals and should also be able to calculate the haircut on the basket of collateral. Haircuts applicable on the basket of assets should be taken into account while calculating the capital as per RBI Guidelines.
3.7	The system should be able to perform on balance sheet netting and capital calculation based on the net credit exposure
3.8	The system should be able to apply haircut scaling formula (based on holding period and frequency of /revaluation period) as prescribed by RBI/BASEL III Guidelines.
3.9	The system should be able to capture guarantee, counter guarantee and credit derivative details
3.10	The system should have the ability to perform optimal allocation of collateral when one or more collateral/guarantee is mapped to multiple exposure (many to many relationship). The user should be able to view the objective equation and the constraints
4	CRAR computation
4.1	The system should have a user interface to capture the minimum Capital to Risk Weighted Assets Ratio (CRAR) prescribed by the RBI.
4.2	The system should be able to capture and classify all exposures based on the qualifying criteria's such as Granularity, Orientation, Product and Low

	Value of Exposure and the risk based should be assigned as per RBI Guidelines
4.3	The system should be able to capture and classify the aggregate exposure for Corporate, and the risk weight should be assigned as per RBI Guidelines
4.4	The system should provide GUI based screens to define the capital computation rules for the following areas based on RBI guidelines:
	Corporate, Banks, Domestic Sovereigns, Foreign Sovereigns, Public sector entities, Multilateral development banks, BIS, IMF, Indian Banks, Foreign Banks, Primary dealers, Corporate, Retail (Regulatory Retail, Home Loans, Consumer loans), Corporates, SPVs, Small Finance Banks, NBFC,, NBFC-AFC, Federations, Commercial Real estate, Venture Capital, Other assets, Off-balance sheet assets and any other asset classification which RBI may come up from time to time
	Assign Credit Conversion Factor's(CCF's) for off-balance sheet items, undrawn portion of revolving loans as per RBI Guidelines
	The system should be able to capture Failed Trades ('Delivery versus Payment' and 'Non Delivery versus Payment', i.e. unsettled securities and foreign exchange transactions) and should be able to calculate capital as per RBI Guidelines/ BASEL II/III guidelines.
4.5	The system should compute CRAR under standardized approach
4.6	The system should compute and report the gross exposure, value of risk mitigants, net exposure, risk weight and minimum capital charge under Basel-II/Basel- III for each account.
4.7	The system should report the risk weighted assets and capital charge under each asset category as defined in Basel- III norms and at account level.
B.	Internal Rating System (applicable to all types of credit and investment exposures)
1.1	The proposed software solution should have the functionality for the deployment of models and scorecards with the following functionalities: <ul style="list-style-type: none"> • Selection of the model based on certain criteria • Set up factors, factor descriptions, scoring bins and rules for each factor • Score based on the setup scoring bins and rules • Consolidation of the scores based on pre-defined factor weights • Mapping between scores and rating
1.2	The proposed software solution should have flexible user interface, capable of interfacing with existing and future credit rating systems / score cards of the bank.
1.3	The proposed software solution should have flexibility to add any number of rating models and scorecards in future. The system should have the capability to host expert defined models/ scorecards/statistically developed model/hybrid models and incorporate the same in the existing data flow. The solution enable the users to input the required details for scorecard and compute the score.
1.4	Definition of default to be incorporated including for the borrowers having unwillingness to pay existing debt.

1.5	<p>Support access of data via multiple data sources, databases and support diverse file types. Access and integrate structured and unstructured data sources.</p> <p>Ability to read data in any format, from any kind of file, including variable-length records, binary files, free-formatted data and even files with messy or missing data.</p> <p>The solution should have capability to import text files (delimited and fixed width), Excels, MS Access and other standard data format. Support Structured Query Language (SQL).</p> <p>Support export of data in multiple formats for use or update into different tools and system – delimited text files, Excel, MS Access, XML, SAS, SPSS Statistics, etc. Exports results to other applications such as Adobe Acrobat, Microsoft Excel, HTML or Microsoft Word.</p> <p>Support implementation of process that continuously and/or on demand provides up-to-date de-normalized tables with customer data from multiple sources.</p> <p>Support consolidation of customer and account information from a multitude of systems and tables</p>
1.6	The system should have capability and statistical tools to create expert judgment, statistical and hybrid type of rating models/ score cards.
1.7	The system should have capability to generate reports pertaining to any kind of model
2	Corporate, Sovereign and Bank Asset Class Models (Non-Retail Rating Models)
2.1	System should have ability to track and store account-wise /customer-wise previous credit ratings/ scores. The system should also capture date of rating, type of rating, rating model and other related information.
2.2	System should enable the user to define multiple portfolios or asset classes based on multiple dimensions (such as borrower constitution, industry, product type, loan amount etc. but not limited to) and associate borrower rating model and facility rating models to the user defined portfolios.
2.3	Deployment of Facility Risk Rating Models along with the work flow
2.4	The system should able to extract data from core banking solution, other source system and from other structured and unstructured data.
2.5	System should have a capability to take data related to balance sheet, profit & loss and cash flow statements from pre-defined Excel sheets and other data formats (viz. .txt, .XBRL, .CSV, .XML)
2.6	The system should be able to capture and receive the required data (Data entry, File uploads, direct transfers, batch processes, etc) from various source systems like Core Banking Solutions, Internal Rating models in various formats (viz. .txt, .XBRL, .CSV, .XML, excel, PDF etc)
3	Reporting
3.1	The system should be capable of generating various Bank- defined reports like: (System should have the capability to generate back dated reports)
	• Borrower Information report
3.2	• Industry/Sector Analysis report
3.3	• Monitoring (Account-wise report to cover rating transition & trend in critical identified parameters)

3.4	• Rating wise reports
3.5	• Portfolio reports
3.6	• Borrower-wise risk score report
3.7	• Borrower-wise risk grade report
3.8	• Borrower-wise year wise risk score report
3.9	• Borrower-wise year wise risk grade report
3.10	• Industry/Sector Concentration Report
3.11	• Industry- wise/Sector-wise risk score report
3.12	• Industry- wise/Sector-wise risk grade report
3.13	• Region wise Concentration Report
3.14	• Region wise risk score report
3.15	• Region – wise risk grade report
3.16	• Quick mortality Report
3.17	• Facility Risk Rating Reports
3.18	• Defaulted Account Report (Grade wise/ Industry wise/ year wise/ ownership wise/ size wise/ on-balance sheet/ off-balance sheet exposure wise for a date range etc)
3.19	• Capital Charge-credit risk (Regulatory)
3.20	Exposure Reports:- Such reports generally include
	The breakup of total exposure based on Sector, industry, credit rating, Client, Loan Size, Maturity, country, currency, on-balance sheet off-balance sheet exposure, interest rate wise, floating rate wise, internal and external benchmark, fixed rate wise etc. The system should able to generate trigger/alert in case of breach of specified limits
3.21	The report giving NPA position separately under each of above-mentioned categories along with reports on accounts which have been upgraded from NPA and which have slipped to NPA from standard,
3.22	The report showing position of restructured accounts under each of abovementioned categories along with reports on accounts which have been upgraded from restructured and which have slipped to NPA from restructured status etc.
3.23	Report on restructured exposures, repeated restructured accounts and drill down options like industry-wise, rating-grade wise, curing-wise, tenor wise, sacrifice wise, product-wise, region-wise, asset class-wise.
3.24	The reports should be able to cut across asset classes and give combined reports, if needed, while analysing industry-wise, product-wise, sector-wise reports (e.g.: exposure to agri industry report should combined and render a consolidated report on all exposures under various asset classes)
3.25	Collateral Reports (Collateral wise exposure report (total exposure after netting that is covered by 1. Eligible financial collateral 2. Other eligible collateral 3. Guarantees etc.). including current market value of collateral wherever applicable as per policy of the Bank
	Generate Reports on SMA0/SMA1/SMA2 accounts as per RBI definition.
Exception reporting:	

3.26	<ul style="list-style-type: none"> • System should provide ability to monitor post facto limit exceptions, System should be able to generate a list of accounts which are due for rating (i.e. pending list of accounts which are not rated in accordance with Bank's policy)
	<ul style="list-style-type: none"> • System should be able to track and indicate loans contract expiring but still unsettled
	<ul style="list-style-type: none"> • System should be able to track exceptions for loans in which collateral coverage falls below the required level
	<ul style="list-style-type: none"> • System should be able to track exceptions for exposure exceeding the limit at facility level
	<ul style="list-style-type: none"> • System should be able to track exceptions for overdue for e.g. overdue for principal, interest amount etc
	<ul style="list-style-type: none"> • System should support tracking and breach generation of loans pending for renewal
Others	
3.27	Any other report which the Bank considers as relevant including modification of earlier report
	System should facilitate capital computation and computation of Leverage Ratio as per Basel II & III guidelines
	The system should support portfolio-based calculation like Limits Management: Bank may define a limit cap (may be absolute or % terms) to an industry, borrower, individual exposure, and bank, sovereign, rating. The system would check the same and generate reports. What if/Incremental risk analysis by addition of individual loan portfolio for decision making purpose. Portfolio based calculation should take into account industry correlation to arrive at capital requirement.
4	Collateral Management
	The solution should have facilities for extracting, displaying and exporting the following details, but not limited to, from the source systems (or enterprise data warehouse as and when functional) vide user defined reports or system triggered alerts as outlined in the sections below.
4.1	Collateral and Guarantor details
	<ul style="list-style-type: none"> • Nature/description of collateral securities
	<ul style="list-style-type: none"> • Data points to enable classification of collateral into eligible collateral as per:
	<ul style="list-style-type: none"> • regulatory considerations along with classification outcome
	<ul style="list-style-type: none"> • Collateral(s) and the list of related facilities
	<ul style="list-style-type: none"> • Legal relationship between collateral provider and borrower
	<ul style="list-style-type: none"> • Personal / Corporate guarantor information including means/net worth of guarantor
4.2	Collateral Valuation
	Valuation details including date of valuation, name of valuer, next valuation due
	Date, frequency of valuation based on type of collateral and margin details
4.3	Guarantees accepted /credit default swaps purchased by the Bank:

	<ul style="list-style-type: none"> Data points to assess eligibility of the same as means of credit protection along with existing status of eligibility for capital relief under regulatory guidelines prescribed.
	<ul style="list-style-type: none"> Details of the guarantee taken as part of the loan including comprehensive details of the guarantor(s), counter guarantee.
	<ul style="list-style-type: none"> Value of the guarantee/CDS including the % of facility covered and exclusions in guarantee/CDS agreement.
	<ul style="list-style-type: none"> Linkage between the guarantees and its facilities.
4.4	Collateral documentation and storage:
	<ul style="list-style-type: none"> Details of documents to be collected as per the legal opinion, name of the empanelled lawyer providing opinion, etc. along with details of those already collected- list of documents to be given by Legal Department
	<ul style="list-style-type: none"> Details of the legal documents actually collected for each product type.
	<ul style="list-style-type: none"> Storage/despatch details of the documents of title to securities.
	<ul style="list-style-type: none"> Work flow Status for monitoring of the movement of the security documents from the storage till the final release to the customer.
Legal aspects of collateral:	
4.5	<ul style="list-style-type: none"> Details of legal documentation collected pertaining to the facility including deviations if any.
	<ul style="list-style-type: none"> Information from external sources like Ministry of Corporate Affairs, central registry of properties.
4.6	Insurance:
	<ul style="list-style-type: none"> Details of the security- insurance company, validity of the policy, exclusions from the policy, insured amount etc.
	<ul style="list-style-type: none"> Providing alerts when insurance pertaining to a collateral falls due for expiry
4.7	Expiry reports on collateral (Due for expiry/expired)- bank/region/account wise
4.8	Others:
	<ul style="list-style-type: none"> Details for treatment of pools of collateral, maturity and currency mismatches.
	<ul style="list-style-type: none"> Details of the actual realisation value during sale/auction of securities when they are classified as NPA.
	<ul style="list-style-type: none"> Associated costs related to sale and recovery such as but not limited to legal costs, administrative costs, haircuts and other disposal costs and related time for completing sale of assets
4.9	The solution should have the ability to compute, make estimates, and apply haircuts (standard supervisory & own estimated) on collaterals. The system should be capable of applying a weighted average of haircut if the collateral is basket of assets.
4.10	The solution should make adjustments for different holding periods based on the quality of collaterals and non-daily mark to market or re-margining.
4.11	The solution should provide exposure adjustment by segmenting it into portions covered by different collateral and guarantee types and portion remaining unsecured as per Basel-II/III/RBI guidelines.
5	Credit Risk Stress Testing and Event Identification
5.1	The system should have the ability to execute stress tests at a portfolio (or exposures at a bank level) or a sub-portfolio or transaction level and should provide ability to capture supporting information such as:

	<ul style="list-style-type: none"> • Scenario description and key assumptions.
	<ul style="list-style-type: none"> • Macroeconomic and industry specific data for specific stress testing themes based on particular business groups and pre-defined scenarios.
5.2	The credit risk stress testing module should support quantifying the impact of stress scenarios on the following performance measures at the Bank level and for sub portfolios (e.g. Corporate loans, Sovereign, Commercial Banks, etc.):
	<ul style="list-style-type: none"> • Increase in NPA;
	<ul style="list-style-type: none"> • Increase in NPA in Top Five Industries;
	<ul style="list-style-type: none"> • Increase in NPA in Specific Sectors;
	<ul style="list-style-type: none"> • Slippage of Restructured Standard Assets;
	<ul style="list-style-type: none"> • Depletion in Collateral;
	<ul style="list-style-type: none"> • Downgrade in counter party rating;
	<ul style="list-style-type: none"> • Concentration Risk – Individual Borrowers
	<ul style="list-style-type: none"> • Concentration Risk – Group Borrowers
	<ul style="list-style-type: none"> • Concentration Risk – Industries/Sectors
	<ul style="list-style-type: none"> • Impact on direct and indirect exposure to agriculture sector, of drought
	<ul style="list-style-type: none"> • Impact on resource base of NABARD of fall in the contributions to various funds arising from the banks meeting the Priority Sector Lending targets by financing such loans themselves.
	<ul style="list-style-type: none"> • Impact on liquidity and profitability of NABARD due to a banking crisis.
	<ul style="list-style-type: none"> • Any other scenario/stress prescribed by the bank.
5.3	The system should support client by client, facility by facility, geography by geography and/or higher level portfolio or geography level stress testing to exposures and credit risk parameters, as part of overall stress testing scenario.
5.4	System should capture the management action recommended for the scenarios based on the severity of the results of the scenarios.
5.5	The system should provide ability to compare the following measures for base and stressed conditions: exposures, credit risk parameters and resulting capital and loss estimates.
5.6	System should provide ability to apply stress test scenarios for the current as well as simulated portfolios of the Bank.
5.7	System should have the ability to connect with authentic external sources to extract information on economic factors, industry trends etc.
6	Exposure Calculation, Aggregation and Concentration Risk
6.1	The system should be able to extract borrower-wise, sector-wise, geography-wise exposure data and monitor the same and trigger alerts for both on balance and off sheet exposure
	Non-Fund Based Market Related Off balance sheet items

	The system should be able to estimate exposure for different purposes:
	Regulatory Capital calculations
	Credit Risk Control purposes (e.g. Limit setting, Concentration monitoring)
6.2	Non Fund Based Non Market Related
	The system should be able to estimate exposure for different purposes through CCF estimation:
	Regulatory Capital calculations
Based on extraction of data, the solution should be able to:	
6.3	Aggregate credit exposure and credit equivalents for non-funded products including derivatives and other market based product exposures based on rules
6.4	Ability to measure and distinguish direct, indirect and contingent exposure for various portfolios and sub portfolios (e.g. borrower, borrower groups, industry, etc.).
6.5	Maintain different rules for credit exposure aggregation for different purposes (for e.g. regulatory capital purposes) and utilisation vis-à- vis risk based limits.
6.6	Ability to aggregate and consolidate credit exposures across locations as per prudential norms set out by the regulator(s).
6.7	The system should be able to Support measurement of concentration risk across different categories of exposures, for e.g. Top 20 single borrowers, Top 10 group borrowers, etc.
6.8	Exposure Norms of the clients of the bank – The system should be able to extract the exposure of the client and generate trigger
6.9	Integration with loan proposal and review systems for monitoring concentration prior to sanction.
6.10	Provide workflow for approval of limit breaches with adequate audit trails.
6.11	Provide alerts on dynamic basis before exposure is sanctioned to identify breaches
7	Early Warning Signal System
	System should be capable enough to collect data from existing structured /un-structured reports /formats available in bank like Balance Sheet/Process Note/Monthly Select Operational Data (MSOD)/P & L statement/IT Returns/CIBIL Reports etc.
	System should allow for uploading default forecasting templates for the purpose of data collection.
	System should be capable of uploading the existing data from the internal system.
	System should be capable of classifying the borrower's account/accounts as SMA0/SMA1/SMA2 as per RBI definition considering both fund based and non-fund based limits.
	System should be capable of analysing the annual financial statements and other information of the customer and provide desired information.
	System should have the functionality to set up EWS rules, categorization in buckets and triggers, Generation of RAG Reports

	Automation of EWS Tool of the bank
	System should be able to consolidate the scores across different rules and triggers and alerts
	System should be able to provide a view across borrowers and segments of borrowers
	Default Forecasting Reports
8	Others
	The bidder is expected to conduct trainings as per Bank requirement and in phases.
9	Overall Functionality
	The solution should have the functionality to extract computed Credit Risk capital numbers from the respective systems / applications and compute the CRAR (Capital to Risk Weighted Assets Ratio) of the Bank for regulatory, comprehensive credit risk management system, Risk Dash Board and Internal Reporting

ii. Functional Requirements for Market Risk:

The Bank aims to migrate to Basel III for market risk capital computation. Market risk capital charge is proposed to be computed under Standardized Measurement Method (SMM) for market risk as per Basel II, Basel III and RBI guidelines applicable on AIFI. The solution should support estimation of all risk components and capital calculations (regulatory & economic) as per the guidelines issued by RBI and Basel under the Standardised Measurement Method (SMM). The solution should be able to meet the Pillar I, II, III and stress testing requirements as per Basel-III / RBI guidelines.

Sl. No	Market Risk Functional Requirement
1	Preparation of capital charge computation report under SMM for market risk
1.1	The system should interface with external market information systems such as Reuters, Bloomberg, Cogencies, Ticker Plant NSE, BSE, FBIL, NSDL, CSDL, RBI e-kuber, CRISIL Bond valuer, CCIL, AMFI, FEDAI and NDS or with internal system TALMS to obtain pricing feeds.
1.2	The system should extract position data from the treasury system (TALMS) by interfacing without manual intervention to perform valuations for equity, debt instruments, whenever required by the user.
1.3	The system should be capable of validating data at the interface level to enable perform of key reconciliation checks between position data in the treasury system and market risk system
1.4	The system should segregate position data obtained from the treasury system in line with the risk classifications prescribed for SMM i.e. equity, forex, interest rate risk and derivatives
1.5	The system should be able to interface with the TALMS-ALM system to capture the Modified Duration being calculated by the system and use the same for analysis and calculating PVO1 values.
1.6	The system should apply horizontal and vertical disallowances based on prevalent RBI guidelines
1.7	The system should be able to apply the relevant market risk capital charge depending upon the portfolio classification as defined in RBI guidelines on SMM for Market Risk
1.8	The system should be in a position to compute capital charges for the AFS portfolio in the following manner:
1.9	- Compute general and specific charge as for HFT
1.10	- Compute alternative total capital charge for specific risk
1.11	- Compute the higher of the two to determine capital charge
1.12	The system should be able to compute specific charge based on rating criteria provided by the user and updated from time to time
1.13	The system should be able to differentiate specific charge for both rating criteria and category of issuer
1.14	The system should aggregate capital charge across all risk categories

1.15	The system should report the market risk capital charge computation in the format prescribed by RBI
1.16	The system should generate the quantitative disclosure report for market risk as required by RBI
1.17	The system should be in a position to simulate the impact of incremental positions on the market risk capital charge
	The system should be able to compute risk positions in different currencies and perform required capital charge computations by currency
1.18	The system should allow for adjusting valuations for analysis
1.19	The system should be in a position to adjust valuation decrease
1.20	The system should be in a position to compute capital charge for delayed settlements based on the multipliers prescribed by RBI
2	Limit Monitoring
2.1	The system should allow the user to set the limits based on the notional principal, VaR, risk sensitivity factors, MTM, book value, daily P&L and cumulative P&L for individual script as well as the aggregated portfolios
2.2	The system should have the capability of setting and monitoring the following type of product wise real time limits at the frequency defined along with it:
2.2.1	Fixed Income
	Product wise and Overall Investment Limit
2.2.2	Limits on the size of the proprietary Trading book
2.2.3	Dealer-wise limit
2.2.4	M-duration / PVO1 based limits for Investment (under AFS + HFT)
2.2.5	Deal size limits
2.2.6	Maturity wise limits
2.2.7	Rating-wise limits for rated instruments
2.2.8	Industry / sector wise limits
2.2.9	Portfolio as well as security level stop loss limit
2.2.10	Portfolio as well as security level Cumulative stop loss limit
2.2.11	VaR limit (at a batch process level)
2.2.12	Equity Overall Investment limit
2.2.13	Deal size limit
2.2.14	Scrip-wise limits for Equity
2.2.15	Portfolio as well as scrip level stop loss limit
2.2.16	Portfolio as well as scrip level Cumulative stop loss limit
2.2.17	VaR limit (at a batch process level).End of day Limit is preferable.
2.2.18	Tolerance Limit
2.2.19	Dealer-wise Open Position Limits
2.2.20	Aggregate and Individual gap limit (End of the day)
2.2.21	Deal size limits(for different products)
2.2.22	Portfolio as well as currency level stop loss limit
2.2.23	Portfolio as well as currency level Cumulative stop loss limit

2.2.24	VaR limit
2.2.25	Currency Swaps – Foreign Currency : Exposure Limits (Gross Open Position)
2.2.26	Counter party limits
2.2.27	Liquid mutual fund;-Regulatory limit, external minimum rating for MF Per Fund house limit Portfolio as well as scrip limit VaR limit etc
2.2.28	Convexity
2.2.29	PV01
2.2.30	Exposure at different levels
2.2.31	Net Overnight open positions
2.2.32	Day light and Overnight positions
2.2.33	Any other parameter desired by the Bank
2.2.34	Limits can be defined at the following levels: Trader, Desk, Asset class, Portfolio or any other level as desired by the Bank.
2.2.35	The system should have the functionality where dealers are able to view the current limit utilization as well as the impact on limit utilization of a deal on a pre-deal basis of Various Risk parameters including Deal wise VaR
2.2.36	The system should have the facility of setting trigger levels for the limit breaches (soft limits) where the system will generate alerts once the trigger level is reached to pre-defined users.
2.2.37	The system should have a process flow built-in for authorization of limit enhancements.
2.2.38	The System should be able to generate limit breach report as and when the limit breach happens and send the notification to the pre-defined set of people. All major limits like, AGL, VaR, Stop loss and dealer wise positions should be included in the report.
2.2.39	The system should be able to generate limit utilization report at the end of the day and also for a historical period including any breaches.
2.2.40	The system should maintain audit trails for any changes in configuration of limits.
2.2.41	The system should be capable of monitoring VaR based stop loss limits.
2.2.42	The system should be capable of generating consolidated reports showing exception if any under different risk parameters after making a comparison of actual and limits as defined by the Mid office from time to time
2.2.43	The system should be capable of monitoring compliance with limits laid down in Policy in respect of liquid investments
2.2.44	The system should be capable of computing the Beta in respect of different portfolios
2.2.45	The system should be capable of monitoring compliance with Portfolio Beta Limits and M-duration limits
2.3	The system should be capable of monitoring investments in capital instruments of Financial institutions and Banking sector daily basis as required under Basel III norms

3	VaR Calculation and Back testing
3.1	The system should be able to use the extracted position data and market data
3.2	The system should give the user the flexibility to choose the risk factors applicable to compute VaR
3.3	The system should be able to retrieve historical data of the risk factors based on the user-defined holding period.
3.4	The system should be able to calculate VaR using parametric approach (Variance-Covariance method), and Historical simulation methods.
3.5	The system should be able to calculate parametric VaR using industry standard Risk Metrics methodology.
3.6	The system should be able to calculate volatilities using relative price changes, absolute price changes and logarithmic price changes
3.7	The system should have the ability to calculate correlation using historical data and have the flexibility to set parameters to incorporate volatilities and correlation data from external source.
3.8	The system should allow user-defined confidence intervals and holding periods as well as decay factor for historical valuation method
3.9	The system should calculate Undiversified / Diversified / Partially Diversified VaR to allow for risk factors correlations contribution.
3.10	The system should perform calculations in "Near Real Time" and batch basis
3.11	The system should calculate and store the various components of VaR for further drill down reporting capacity
3.12	For historical simulation, the system should support variants of Full Valuation for performance issue enhancements
3.13	The system should include standard processing methodologies for run time performance enhancement, (e.g. Distributed / parallel processing) – This is technical requirement
3.14	The system should provide variance reduction techniques
3.15	For incremental VaR, there is a need for a system that approximates VaR in an additive form without recalculation of the complete firm-wide portfolio. (for intraday calculation)
	The system should have the functionality to compute transaction level (Component) VaR
3.16	The system should have functionality to aggregate VaR at any hierarchy level
3.17	The system should perform incremental calculations as and when required
3.18	The system should have open architecture to allow link to external proprietary VaR engines.
3.19	The system should allow user-defined scenarios to override-adjust historical pattern assumptions (e.g. special events)
3.20	The system should select interval periods for comparing P&L and VaR (at least for 250 trading days)

3.21	The system should test parameters by simulating VaR on historical portfolios and/or rates
3.22	The system should be able to generate exception reports.
3.23	The system should be able to classify the number of exceptions in green, yellow and red zones as defined by the RBI and generate a report on that.
3.24	The system should be capable of computing VaR in respect of all financial instruments dealt by bank presently and in future
3.25	The system should be capable of defining VaR reporting hierarchy like Treasury VaR, Asset Class VaR, Portfolio VaR, Portfolio Asset class VaR, Instrument VaR and Component VaR
3.26	The system should be capable of computing VaR in respect of equity positions and interest rate sensitive positions
3.27	The VAR models in the system should be capable of combined VaR in respect of specific and general market risks for equity positions. Further it should be able to isolate the VaR for each component so as to enable its back testing and day to day risk management
	The system should be capable of computing and displaying the VaR measures which are denominated in INR.
3.28	The system should be flexible in choosing the historical observation period and different methodologies for computation of VaR
3.29	The system should facilitate frequent update of data sets in a flexible and convenient manner
3.30	The system should have sufficient statistical tools to test the accuracy of VaR models using measures like Back testing, Behaviour and Scenario analysis
3.31	The system should accommodate the application/usage of different VaR models for different asset classes.
3.32	In case of non- linear portfolio, which do not have identical and independent normally distributed returns, VaR models should not use square root rule to scale up VaR numbers
3.33	The system should be capable of incorporating risk factors used in pricing model into the VaR Model
3.34	The VaR models should capture the Basis risk and correlation risk
3.35	The system should facilitate the risk adjusted performance measurement based on VaR
3.36	The system should have utilities to mitigate model risks that may surface subsequently or incorrect application
3.37	Functionality to compute Incremental VaR, Marginal VaR and Component VaR for each instrument for bank's internal analysis
3.38	Provide flexibility of setting the confidence interval parameter (95, 97, 99 etc.)
	Provide flexibility of setting the holding period parameters (1 day, 10 day, etc.)
	System should have the capability to compute VaR for each instrument, asset class, mix portfolios (for example, bond and equity)

	and at different portfolio levels. (Along with the suitable adjustment based upon correlation)
	Allow user-defined scenarios to override-adjust historical pattern assumptions (e.g. special events)
	Capability to use proxies for securities for which historical data is not available
	Allow combination of analytical and simulation methods based on product type for performance enhancement
	System should calculate and store the various components of VaR for further drill down reporting
	For equity transactions, corporate actions should be taken into account such as stock dividend, cash dividend, stock split, merger, etc.
	Model should be able to capture “Event” risk for debt positions. Inclusion of migration risk.
3.39	Back testing: specific risk
	The system should have the capability to run the goodness of fit test for fitting distribution as suggested by RBI and industry practices.
3.40	The model should be able to capture concentrations (magnitude and changes in composition) in specific sectors and counterparties.
	System should be capable of back testing based on hypothetical as well as actual profit & Loss data
	Back testing should be conducted at transaction level as well as portfolio level as desired by the bank
	System should be capable of attributing the difference between actual P&L and hypothetical P&L on account of fees, intra-day trading, etc.
	System should have the capability to back test VaR based on various confidence intervals, different holding periods and historical data samples
	Back testing results should be statistically tested by the system to validate the VaR model using Basel multiplier based approach and any other approach as desired by the bank
	The system should Back-Test the portfolio value change excluding / including new, voided, amended trades
4	Stress Testing
4.1	System should be capable of stress testing as per RBI requirement at firm level, portfolio level and trade level based on historical, real as well as hypothetical user definable scenarios.
4.2	Shift in Market structures including parallel and non-parallel shifts in yield curves, volatility curves, forex spot and forward structure, forex volatility, equity indices, equity prices, spreads, rating migration and any other parameter as desired by the bank.
4.3	Shift in other calculation parameters, including but not limited to: Horizon (evaluation date), spreads over benchmark curves and between market curves, volatilities and correlations, etc.
4.4	Shifts can be expressed as Percentage, Absolute or Custom formula
4.5	Display results using drill down capabilities

4.6	Display graphic representation of scenarios results
4.7	Name and save sets of standard scenarios for easy retrieval
4.8	Scenarios will be categorized under – Historic (period of 12 months, as occurred), anticipatory (Bank specific- Hypothetical) & Worst Case (As defined by user/leading Industry approaches like EVT).
4.9	Stress testing need to incorporate the details as mentioned in the RBI guideline dated April 07, 2010 on IMA for “Market Risk” w.r.t to Stress Testing. Requirement of different Stress VaR model from Normal VaR model to capture certain detailed aspects in IMA guidelines viz. concentration risk, Illiquidity of markets, jumps to default, skewness risk etc.
4.10	The system should be having capability to do reverse stress testing.
4.11	The system should allow the user to define multiple portfolios and assign exposures to each portfolio.
4.12	The user should be able to define multiple stress testing scenarios for each portfolio
4.13	The system should allow users to save the stress testing scenarios defined.
4.14	The user should have the entire list of scenarios defined available for him to select the desired scenario for each portfolio at run-time.
4.15	The system should allow the user to define multiple risk factors for each stress test scenario, depending on the nature of the portfolio.
4.16	The system should be able to upload multiple scenarios directly from excel/csv files
4.17	The system should have the ability to determine the correlation between risk factors based on historic data
4.18	The system should have the ability to accept correlation information as user defined parameters
4.19	The system should have the ability to conduct stress testing covering General scenarios (for entire trading book) and Portfolio specific scenarios using single or combination of risk factors.
4.20	The system should be capable of accepting risk factor shifts on:
4.21	At a minimum, the system should support stress testing based on shifts in the following risk factors:
	Yield curves (Parallel Shifts, Non Parallel Shifts, Changes in the convexity of the curves & Changes in Basis)
	Equity Indices
	Change in correlation and change in Distribution shall also be included.
4.22	The system should be capable of accepting the following calculation parameters from the user:
	Spreads over benchmark curves and between market curves.
	Correlations
4.23	The system should have the capability to execute multiple scenarios together and determine the combined effects on the portfolio.

4.24	The system should have the capability to accept stress test limits at the following granularities:
	Complete trading book level
	Portfolio/Instrument level
4.25	The system should have the ability to raise exceptions in the event of a breach of stress testing limits
4.26	The system should have the ability to create reports in a web-based dashboard formats to enable senior management to access such reports remotely.
4.27	The system should accommodate testing of probabilistic , historical as well as hypothetical scenarios(including macro-economic scenarios)
4.28	The system should be flexible to input and use historical data for specified period and specified multiple sets of data for e.g. 2007-2008 for computing stressed VaR
4.29	The stress testing utility of system should be capable of addressing recovery rate uncertainty implied correlation and skew risk and other risk factors that are not captured in VaR model.
4.30	The model should be capable of assessing and applying shocks of the magnitude experienced elsewhere although the bank was not exposed to such scenario; provide the information on such scenarios are previously fed into the system
5	Internal and Regulatory Reporting
5.1	The system should produce screen and print level reports within flexible user defined hierarchies and business unit aggregation rules
	At a minimum the following reports should be produced
5.2	Control Reports
	Transaction inventory reports
	Open Position reports based on any hierarchy level and any transaction/computed values
5.3	Risk Reports
	Produce position reports for various parameters based on internal hierarchy or sub-portfolios/trades.
	Product limits and gaps reports based on risk parameters.
	VaR reports disaggregated into various risk components
	Simulation/stress testing reports (with drill-down capability)
	Portfolio Analysis
5.4	The system should generate reports using any stored historical data
5.5	The system should have a report writer where user may define the content and format of any new reports.
5.6	Drill Down Functionality
	The system should aggregate / breakdown information at any level based on static information (i.e. trades attributes). Including but not limited to:
	Currency
	Instrument type
	Portfolio

	Trader
5.7	The system should aggregate / breakdown information at any level based on dynamic Information (results categories) including but not limited to:
	NPV /MTM
	VaR
5.8	The system should aggregate / breakdown any combination of static and dynamic information.
5.9	The system should display results in a Multi-dimensional format (e.g. Excel Pivot Tables)
5.10	High, mean and low VaR values over the reporting period and period – end;
5.11	High, mean and low stressed VaR values over the reporting period and period – end;
5.12	The System should provide Back Testing Exception reports
5.13	Reporting Requirements - Internal
	The system should generate reports on:
	Duration, M-Duration, Convexity, VaR, PVo1, PVBP
	Investment Operations
	Summary of Banks aggregate exposures like Duration, Modified Duration/VaR, Mismatches, Forex VaR etc.
	Mark to Market Reports of Investment Portfolio, Foreign Currency Portfolio, Derivatives Position
	In addition to the above the system should generate following reports
	Stress testing Reports
5.14	Limit Exceptions Reports
5.15	Market Risk Report
5.16	Mark to Market Reports (Investments/Forex)
5.17	Report on Duration, M-Duration, VaR (Investment Portfolio-wise)
5.18	Market Analysis Report (Volatility/Trends and other risk indicators)
5.19	Market Scenario/Strategy (Based on volatilities, correlations)
5.20	Risk Limit Tracking
5.21	VaR Reports (/Domestic Treasury/)
5.22	System should be capable of generating all the regulatory reports for market risk at a required frequency as desired by the bank, including but not limited to:
	· Pillar III disclosures for market risk in trading book
	· Back testing reports
5.23	System should be capable of generating all the internal reports for market risk at a required frequency as desired by the bank, including but not limited to:
	· Report on risk measures like Duration, Modified Duration, Convexity, PVo1, VaR, etc.
	· Report on VaR number at various levels of portfolio drilled down to instrument level, maximum, minimum and average VaR numbers, Marginal VaR and Incremental VaR, Stressed VaR

	<ul style="list-style-type: none"> · Mark to Market Reports of Investment Portfolio, Foreign Currency Portfolio, Derivatives Position
	<ul style="list-style-type: none"> · Stress testing Reports
	<ul style="list-style-type: none"> · Backtesting reports for tracking the number of exceptions
	<ul style="list-style-type: none"> · Limit tracking & Exceptions Reports
	<ul style="list-style-type: none"> · Market risk capital charge aggregation report as per SMM
	<ul style="list-style-type: none"> · Portfolio profit and loss analysis reports
	<ul style="list-style-type: none"> · Any of the above reports using any stored historical data
	<ul style="list-style-type: none"> · User defined reports on parameters computed by the system
	The system should have the capability to carry out the Exploratory Data Analysis (EDA)
	The system should have the functionality of report creation using drag and drop.
6	Capital Computation
6.1	The System should be able to calculate market risk regulatory capital under Standardised Measurement Method (SMM) as defined in RBI guidelines for AIFI and commercial banks on a daily basis.
	System should have the functionality to calculate m-duration and convexity for the capital computation under standardized measurement method (SMM).
	The system should apply horizontal and vertical disallowances based on prevalent RBI guidelines
	Securities for which capital charge computation is guided by SMM (Mutual Funds, Venture Funds, Receipts, specified Illiquid security etc.) to be flag marked in the Market risk measurement system and should form the part of total capital charge for Market risk in the Bank wide report.
	Segregate capital based on different risk factors - interest rate risk, equity price risk, foreign exchange risk, options risk, etc.
	Segregate general and specific risk capital. The system may give a combined figure incorporating the GMR & SR for Normal VaR as well for Stressed VaR however, it must explicitly show the GMR & SR components of VaR separately up-to instrument level.
	The system should be able to compute the expected shortfall.
6.2	The user should be able to define certain portfolios where capital will be entered manually. However entry of capital manually should be an exception rather than a rule.
6.3	The system should be able to calculate capital for different asset classes as defined by the user as well as for the aggregate Bank portfolio.
	The system should be able to attribute the movement in capital to a risk factor level.
6.4	The system should be able to decompose the capital and attribute it to various asset classes. It should be able to perform simulation where by changing the composition of the portfolio, change in capital should be calculated.
6.5	The system should be able to generate a report as per RBI format for reporting of the Capital.
7	Control specification for the system

7.1	The system should have interface level controls for data extracted from the treasury/ market risk system
7.2	The system should allow for three levels of access:
7.3	- User administration access to parameterize the model
7.4	- IT administrator access to configure screen level rights
7.5	- GUI to review and view output from the system
7.6	The system should maintain an audit trail for data override functions used
7.7	Deviations in output from VaR models resulting from changing default configurations should be logged by the system
7.8	In case of plug and play models used for VaR computation, the system should allow for the same level of operational control as in-built models
7.9	Limits parameterized within the system should have auto-triggers and auto-mailers to inform people specified within the user hierarchy
7.10	Pre-limit warning functions should be embedded with the system
7.11	Report on reconciliation showing difference in valuation between treasury and market risk system if any should be generated in the market risk system
7.12	Access to data tables within the system should be possible only from pre-defined interfaces or user entry screens. Ability to write to data tables by manual input at an interface level is not acceptable.
7.13	Where RBI permits for reports to be uploaded to OSMOS, the system be able to provide such an upload functionality
8	Profit and Loss Attribution
8.1	System should decompose P&L into the constituent risk factors responsible for the net portfolio value change
8.2	System should display and report Profit & Loss attribution using drill down capabilities
	System should display and report Profit & Loss attribution using graphic capabilities
9	Portfolio Capabilities
	System should define portfolio composition at the following levels: Fixed Income portfolio, Equity portfolio, Forex portfolio, Derivatives portfolio, Interest rate derivatives portfolio, Forex derivatives portfolio, Commodities portfolio if any, HFT, AFS and HTM portfolio, Trading book investment portfolio, Banking book investment portfolio and any other portfolio as defined by the bank.
	System should specify basic or complex selection criteria based on static trade information including but not limited to:
	· Instrument type
	· Trader
	· Currency
	· Counterparty
	· Desk
	· Book

	· Data source (e.g. external systems)
	· Exchange
	System should create, name and save selection criteria for any portfolio and portfolio views based on the selection criteria
	System should compose a portfolio with one or more created selection criteria
	System should update portfolios if new, amended or voided deals are detected
	System should have the flexibility to define how recalculation of portfolio is to be done: Full revaluation, Partial revaluation, No recalculation, manual or timed (i.e. every minutes, batch).
	System should specify if portfolio should be loaded as of a specific date in the past
	System should value a portfolio as of any date - historic or future dates
	System should have netting functionality to offset positions or transactions within the same issue
	System should display dynamic information like mark to market, VaR, risk numbers at portfolio level
	The system shall have capacity to calculate Correlation estimates and its impact on instrument, asset class wise and portfolio wise including as well as sub-portfolio level. There needs to be a detailed specific report on correlation matrix.
	System should have the option to make the updates in the calendar at user level in case some updating the same on annual basis and if any update required during the year.
	System should produce quality charts on displayed/selected information and print them
	Pricing Engine Functionality
	System should have the capability to:
	· Capture market quoted prices of all market traded instruments on a daily basis for the HFT and AFS portfolio consisting of equities, bonds, forex and derivatives positions
	· Compute model prices for illiquid securities on a daily basis
	· Make illiquidity adjustments in valuations as desired by the bank
	Product coverage for mark to market/ model should include the following:
	· Forex swaps
	· Currency futures
	· Forex options on futures
	· Repos
	· Treasury bills
	· Commercial paper
	· Certificates of Deposit
	· Short term notes
	· Fixed Coupon Bonds

	<ul style="list-style-type: none"> Other types of bonds - Callable / Putable bonds, Convertible bonds, dual currency, ex coupon, step-up/ step down bonds, amortizing, coupon stripping, zero coupon, floating rate notes, capped/ floored, inverse floaters, perpetual, etc.
	<ul style="list-style-type: none"> Equities
	<ul style="list-style-type: none"> Any other instrument as desired by the bank
	System should interface with external third party pricing systems that are most common in the market place
	System should display partial calculations results for reconciliation and model risk analysis
	System should have scalability to take care of any changes brought in by BASEL guidelines/local Regulator for pricing of products and their external sources
	Historic Information Management
	System should store on a daily basis the following information:
	<ul style="list-style-type: none"> Market structures (yield curves, volatility curves, Fx Spot-Forward , FX volatilities)
	<ul style="list-style-type: none"> Market prices (for quoted instruments)
	<ul style="list-style-type: none"> Net Present Values and Risk parameters at transaction level
	<ul style="list-style-type: none"> Value-at-Risk at transaction level
	<ul style="list-style-type: none"> Scenario Results at transaction level
	<ul style="list-style-type: none"> Profit & Loss results at transaction level
	<ul style="list-style-type: none"> Any other information as desired by the bank
	<ul style="list-style-type: none"> Position data for all the deals drawn from the treasury system
	System should import historical market prices files from external vendors for volatilities and correlations calculations for transactions on new markets
	System should be able to store historical market rates information through automatic End-Of-Day procedures
	Audit log of the changes made in assumptions, methodology, process, statistical model/ formulae used along with reasons/ logic for change should be available chronologically.
	Data flows (Data feeder in to Market Risk measurement system) and process (VaR calculations & associated volatilities, correlations, extrapolation/ interpolation, square root of time etc.) associated with the market risk measurement system to be transparent and provide easy access to the model specification and parameters to internal and external auditors.
10	Other functional requirements
10.1	The system should be capable to model the Yield curve using various risk factors to capture interest rate risk.
10.2	System should be able to divide the yield curves of, at a minimum, the major currencies and markets into a minimum of six maturity segments

10.3	System should have an option whereby regulator/internal auditor is able to see all the underlying data, trace its origins and understand how the risk models work with other systems within the bank
10.4	The system should have the pre-built templates and should also have the functionality for a business user to define and customize Market Risk MIS across all matrix dimensions such as:
	Counter-party
	Portfolio
	Product
	Geography – country/ state/
	Sectoral Concentrations
	Risk Profiles
	Rating wise
	Delinquency buckets
11	Data Requirements
11.1	Market Data Sourcing
i.	capture price/volatility/spread data relating to a broad range of products from different data providers, to allow the Bank to record its current and likely future treasury activities accurately, including, but not limited to, the following:
	Fixed Income Investments (Central Government Securities, State Government Securities, Other Approved Securities, Treasury Bills, Corporate Debt, Commercial Paper, Certificates of Deposit)
	Stock Investments (Equity, Preference Shares and Mutual Funds)
	Lending and Borrowing Operations (Repo Transactions, Reverse Repo Transactions, Interbank Lending Operations, Central Bank Lending Operations)
	Over-the-counter and Exchange traded Derivatives (Foreign Exchange Swaps)
ii.	Allow addition of new market data sources. E.g., configure the system to obtain equity price information from Bloomberg in addition to Reuters
iii.	source time stamped market data (e.g., Open/ High/ Low/ Close) across multiple markets, taking to account varying business hours
iv.	allow user to configure intraday timings for sourcing market data
v.	Obtain information from external sources on historic values of various risk factors (E.g., equity index and individual equity prices, forex prices, commodity prices, spreads over benchmark curves for Bank/PSU/FIs/Corporate rated bonds, etc.) relevant to market risk computations. Historic data for at least last 5years should be available.
vi.	allow modification of input price/curve data as required by the pricing model, e.g. transforming quarterly quotes into monthly prices
11.2	Static & Reference Data Sourcing
i.	source reference data from relevant sources including:

	Instrument reference data for (past, current and future) traded products. (E.g., Bloomberg/Reuters/FIMMDA ticker, Index constituents, etc.)
	Internal Desk/Book hierarchy data
	Product hierarchy data (e.g. relationship of asset classes, instruments and sub-products)
	Counterparty data including a standardized, organization-wide counterparty hierarchy
	Calendar / business day conventions
	Static data values (e.g. country codes, currency codes etc.)
ii.	allow definition of new reference data types and modification of pre-defined data types (E.g., addition of a new level in the product hierarchy)
iii.	allow sources of reference data to be changed, and the reference data should have an attribute identifying data source
iv.	support all types of day count basis including 30/360, Actual/360, Actual/365, Actual/Actual, 30E/360
vi.	Support user defined reprising to input changes in asset prices that do not flow from data feed.
11.3	Holiday Calendars
i.	load calendar schedules from external sources including but not limited to SWIFT, International Holiday schedule and Bloomberg holiday schedule etc.
ii.	allow users to set calendar schedules through interfaces/ patch updates
iii.	allow configuration of multiple holiday tables for each currency and country
iv.	allow users to input calendar schedules at least 7 years forward
v.	edit and override global calendar and holiday tables
vi.	flag trades executed on a global holiday through exception messages and exception reports
vii.	define settlement instructions based on emergency holidays
viii.	model cash flows and interest accruals based on holiday calendar and standard day roll conventions
11.4	Position Data
i.	retrieve position data from treasury system to perform valuations
ii.	allow user to create, save and load portfolios of bank's position in various instruments/ currencies
iii.	allow user, based on access rights, to create portfolios across all dimensions (E.g., Bank-wide, HFT/AFS/HTM, Trading Book, commodity, Risk factor, individual position, Trader, currency, delivery location, Trade type, Time bucket, etc.)
iv.	provide various options to value the Bank's investment portfolio: current market rates, freeze current market rates (snapshot), etc.
v.	facility to specify if portfolio should be loaded as of a specific date in the past

vi.	select Position / Price / Liquidation methodology for aggregated positions: Average Cost, LIFO, FIFO, Max Profit, Least Profit, User defined
vii.	display information at trade and portfolio levels
viii.	display valuation results using drill down capabilities such as instrument-wise
ix.	display portfolio results, where possible, by a user definable maturity grid
x.	create, name, save and load portfolio 'views' as result of the previous choices
xi.	Provide Hedge Effectiveness Testing and Portfolio Optimization functionalities. i.e., the system should be able to compute the effectiveness of hedges as well as to determine the optimal portfolio composition given various constraints (E.g., minimum/ maximum investments in certain assets)
11.5	Data Upload
i.	time stamp and record data source for each data upload
ii.	allow user to decide the frequency and mode of data upload, e.g., timed update or continuous update or full load or incremental load
iii.	upload position, rate and valuation information of the investment portfolios of local as well as overseas branches to allow consolidated reporting
11.6	Data Overrides and Adjustments
i.	allow users to apply adjustments to address erroneous values via single point changes or mass updates
ii.	maintain an audit trail of data changes made by users
iii.	allow reversal of changes made based on access rights given to different levels of users
11.7	Data Storage and Archival
i.	store on a daily basis the following information:
	Position and transaction data at a granular level present in the Bank's portfolio
	Market data (yield curves)
	Market prices (for quoted instruments) and book value for instruments that are not traded often
	Net Present Values (NPV), MTM at transaction and aggregated levels
	Value-at-Risk at transaction and aggregated levels
	Scenario Results at transaction and aggregated levels
	Profit & Loss results at transaction and aggregated levels
ii.	import historical market prices files from external vendors for volatilities and correlations calculations for transactions on new markets
iii.	import historical position information either directly from existing systems or in the form of data upload files to allow easy system migration, generation of historical results and also to mitigate the impact of incorrect data uploads
iv.	store historical market rates information through automatic end-of-day procedures and historical results for at least 10 years

v.	store the complete set of data used as input to calculations performed by the system
vi.	allow users to view complete data snapshot of any previous business day
vii.	support storage of all current and historical position, market and reference data on a daily basis, and allow users to view the complete set of data for any given day
viii.	support archiving of data that are beyond a specified time horizon
ix.	Support data retrieval from the specified archives. The archival and retrieval programs should facilitate easier analysis of old data.
x.	in-built Data warehousing capabilities or standard interface with Data warehousing solutions
12	System Documentation and Trainings
	System user manuals should be available to assist the users in implementing various modules
	Documentation and working of mathematical and statistical basis of the risk measurement models
	Documentation on assumptions and empirical data used to estimate the models and circumstances under which models will not work
	Besides the User Training to be provided for the software, conduct training workshops to familiarize the market risk staff regarding the relevant frameworks for Market Risk Management. The bidder is expected to conduct trainings as per Bank requirement and in phases.
	Data flows and process associated with the system to be transparent and provide easy access to the model specification and parameters to internal and external auditors.
13	Overall Functionality
	The solution should have the functionality to extract computed Market Risk capital numbers from the respective systems / applications and compute the overall CRAR (Capital to Risk Weighted Assets Ratio) of the Bank for regulatory, Comprehensive market risk system, market risk dash board and internal reporting.
	The functionality of testing should be present in the system.

iii. Functional Requirements in Respect of Pillar- II, Pillar- III & Basel III and Integrated Capital Computation Module

Sl. No	Pillar II, Pillar- III & Basel III & Integrated Capital Computation Module Functional requirement
1	Reporting
1.1	A reporting Tool with a presentation layer
1.2	An ETL tool for extraction of capital computed from the four respective systems (CRMS, ORMS, MRMS)
2	Data Model
2.1	The solution should provide a single data model to serve as a single repository for all the Market Risk, Credit Risk, and Operational Risk
2.2	Provide a Physical Data Model
2.3	Provide the ability to perform data transformation
2.4	Provide the ability to execute the calculation of each of the concerned applications directly from the Data Model
2.5	Provide a single framework for the definition of calculation runs across all applications (Market Risk, Credit Risk, and Operational Risk)
2.6	Provide a single mechanism for batch execution across applications
2.7	provide the ability to trace data calculations across the applications
3	Capital Planning
3.1	System should enable capture of requisite data and for user defined periods for development of the capital plan at the bank and at sub portfolio levels such as but not limited to:
	• Balance sheet and PL estimates
	• Anticipated growth in top line/revenue year on year, profitability margins, costs
	• Increase in risk weighted assets
	• Capital types, amounts, maturity (for non-equity), capital cost.
	• Risk Adjusted performance measures across various business lines and products
3.2	The system should have capital planning and budgeting modules for estimating bank-wide capital for future, stress testing by changing assumptions/ macroeconomic scenarios, allocation across business units, geographies, products etc., if needed.
4	Market Disclosure/Pillar-3 Report (as per RBI guidelines on disclosures for AIFIs dated Nov 2016)
4.1	The system should generate all reports necessary for complying with Pillar-III of Basel- II/Basel-III norms. These reports include but are not limited to:
	Residual Contractual Maturity Breakdown of the whole portfolio broken down by major type of Credit Exposures
4.2	Exposure -weighted average LGD/EAD for each borrower category.

4.3	Securitization disclosure (Total outstanding exposure securitized by bank broken down by type of securitization (traditional/Synthetic), exposure type).
4.4	Amount of NPA securitized broken down by exposure type.
4.5	Securitization exposure retained/purchased broken down by exposure type. (This report would be generated for user defined period and as of date).
4.6	Report on capital market exposure as required as per RBI requirement – account wise as per limit and outstanding exposure – on and off balance sheet
4.7	Report on exposure to Real Estate – commercial and residential – direct and indirect
4.8	Report on exposure to commodities
4.9	Report on Interest rate wise break up of advances – segment wise (Refinance loans, Direct loans and other loans)as per user defined range of rate of interest
4.10	Report on Interest rate wise break up of advances – segment wise - as per user defined range of rate of interest
4.11	Report on position of unsecured exposure – public sector/private sector/rating wise/interest rate wise/maturity wise
4.12	Report on break up of Refinance loans, Direct loans and other loans – as per residual maturity
4.13	Report on prepayment of total/ instalment of Refinance loans, Direct loans and other loans
4.14	Report on segment wise exposure –Report on future draw down schedule for Refinance loans, Direct Loans and other loans
4.15	Report on single borrower/group borrower exposure – user defined number of top exposure vis-à-vis prudential exposure limits fixed by bank/regulator
4.16	Rating Wise Distribution of Credit Portfolio Report
4.17	Audit log report
4.18	Overrides performance reports – performance of accounts where there is rating over-ride or downgrades (Regional Office wise /geography wise/level wise/approving user wise rating cases processed, approved, rejected and pending for user defined period.
4.19	The system should support portfolio-based calculation like Limits Management: Bank may define a limit cap (may be absolute or % terms) to an industry, borrower, individual exposure, and bank, sovereign, rating. The system would check the same and generate reports. What if/Incremental risk analysis by addition of individual loan portfolio for decision making purpose. Portfolio based calculation should take into account industry correlation to arrive at capital requirement.
	Export formats for MIS report –
	-.TXT
	-.XLSX
	-.PDF
	-.DOCX
	-.PPTX

	-.XML
	-.XBRL
	Overrides performance reports – performance of accounts where there is rating over-ride or downgrades (Branch wise / region wise /geography wise/level wise/approving user wise rating cases processed, approved, rejected and pending for user defined period.
4.20	The system should provide facility to generate customized report for user like Top Management, Risk Management Department, Regional Office, Chief General Manager/ Officer In Charge of Head Office Departments and Regional Offices, etc. Graphical representation of reports, wherever required. Access to certain reports would be restricted to certain groups.
4.21	The solution should have the flexibility of viewing the reports at an aggregated level or at granular level.
4.22	The system should be capable of capturing the distinct elements of Tier-1 and Tier-2 capital under Basel-II/Basel-III norms and it should be able to report total Tier-1 and Tier-II capital at any point of time.
4.23	The system should apply the discount factor in case of subordinated debt based on RBI guidelines and only eligible portion of subordinated debt should be taken as Tier- II capital
4.24	The system should facilitate the regulatory adjustments made to Common equity/ Tier-1/Tier-2 capital under Basel-II/Basel- III norms by appropriately linking with source systems/facilitating manual entry. Examples of such regulatory adjustments are reciprocal cross holdings, unamortized expenditure arising out of second pension option etc.
4.25	Report on credit, market and operational risk information required for compiling the risk profile template, which is furnished before RBI on a quarterly and annual basis or for bank's internal requirements.
5	ICAAP and Pillar 2 Requirements
5.1	The system should have a Pillar-II module which supports ICAAP analysis of all material Pillar-II risks of the Bank and do capital computation, for risks like concentration risk (RO wise, state wise, industry/ sector wise, product wise, vertical wise rating-grade wise, interest rate-wise, group-wise, borrower-wise etc), reputation risk, strategic risk, compliance risk, underestimation of risk under standardized approach, model risk, liquidity risk, interest rate risk, forex risk etc, as per relevant RBI/ Basel guidelines on Pillar-II.
5.2	The system should perform stress testing for each of the credit, market, interest rate, forex, liquidity, concentration risk on individual basis and aggregate the results of stress testing. The system should at the same time assist in reporting, back testing and assessment of capital for Pillar-II risks including impact on account of stress testing. Additionally, the system should also support aggregation of Pillar-II capital into Bank-wide capital (regulatory & Economic capital) assessed.
5.3	The System should be able to support and have the necessary statistical tools to validate the material risk estimation methodologies and stress testing methods under Pillar-2.

5.4	The system should have capital planning and budgeting modules for estimating bank-wide capital for future, stress testing by changing assumptions/ macroeconomic scenarios, allocation across business departments, geographies, products etc., if needed.
5.5	The system should be able to generate risk maps, risk charts, reports, trend analysis etc. for Pillar I and Pillar- II risks, various risk dashboards for the users and top management.
6	Basel-III Requirements
6.1	The system should have the capability for computation of non-risk based leverage ratio as per RBI/ Basel-III guidelines. The system should have the flexibility to enable reporting and estimation of each capital components like common equity, Additional Tier-1, Tier-2 etc as per prescribed guidelines of RBI under Basel-III. The Pillar-1, Pillar-2 and Pillar-3 modules should be compliant with RBI's Basel-III requirements also.
6.2	System should have the capability to compute CVA under Basel-III guidelines.
6.3	The system should be able to compute capital requirement for bank's exposure to central counter parties
7	Capital Computation Operational Risk – Basic Indicator Approach
7.1	The system should be configured to determine the components of income statement to be included in calculation of Gross Income
7.2	The system should be able to calculate Gross Income for the previous three years as per the RBI guidelines for BIA
7.3	The system should be able to calculate Operational Risk Capital
7.4	Capital Computation - Standardized Approach, Basic Indicator Approach and Business Indicator Approach
8	Overall Functionality
8.1	The solution should have the functionality to extract computed Credit Risk capital numbers, computed Operational Risk capital numbers, computed Market Risk capital numbers, Pillar-II capital numbers if any (e.g. for concentration risk), Pillar II stress testing capital and Pillar-III capital (if any) from the respective systems / applications and compute the overall CRAR (Capital to Risk Weighted Assets Ratio) of the Bank for regulatory and internal reporting.