NATIONAL INSTITUTE OF OCEAN TECHNOLOGY	NOTICE INVITING TENDER (NIT)	
	Form No.	NIOT/S&P/NIT

निविदा संख्या /Tender No		NIOT/S&P/OA/5871/2024-25/
निविदा शीर्षक/ Tender Title		**COMSOL Multiphysics named Single User License (NSL) -Perpetual Type**
निविदा प्रणाली/Mode of Tender		**GeM (Custom Bid) – Single Tender Single Bid**
Important Note:		**M/s. COMSOL Multiphysics Pvt Ltd * (ONLY THE SPECIFIED BIDDER IS ALLOWED TO BID. THE OTHER BIDS SHALL BE TECHNICALLY NOT ACCEPTED)**
ईएमडी जमा करना/ Earnest Money Deposit (EMD)		**INR 79000/-** a) Scanned copy of the instrument of the EMD to be uploaded in NIC portal **b) Original EMD shall be submitted through courier/speed post or dropped in the tender box in person before the due date**
निविदा जारी करनेकी तारीख/ Tender Issue date		01.06.2024
निविदा समापन तिथि और समय/ Tender Closing Date and Time		25.06.2024@11.00Hr
निविदा खोलनेकी तिथि और समय/ Tender Opening Date and Time		25.06.2024@11.30Hr
निविदा दस्तावेज उपलब्ध स्थान/ Tender documents available place		Tender documents can be freely downloaded from eprocure@nic.in website www.niot.res.in till closing date and time of the Tender. The tender document fee is waived for downloading the Tender.
बोली लगानेका प्रकार और निविदा प्रस्तुत करना/ Bidding Type &Tender submission		Single Bid Tender comprising of Techno- commercial Bid and Price Bid should be submitted electronically through GeM portal gem@gov.in
ई-निविदा के लिए हेल्प मैनुअल/ Help manuals for e-Tender		0120-4001002,0120-40001005,0120-6277787support-eproc@nic.in
Send your queries to the email Id/ अपने प्रश्न ईमेल आईडी पर भेजें	Up to Tender finalisations/ टेंडर फाइनल होने तक	hvt@niot.res.in

1. INTRODUCTION

National Institute of Ocean Technology (NIOT) is the technical arm of the Ministry of Earth Sciences, Government of India and is involved in developing technology for utilizing ocean resources in an eco-friendly manner. Tender is invited to submit a proposal for the **"COMSOL Multiphysics named Single User License (NSL) -Perpetual Type".**

General Conditions of Contract (GCC)

National institute of Ocean invites E-bids for "COMSOL Multiphysics named Single User License (NSL) -Perpetual Type**" at NIOT Chennai** as per details given below.

1. **Submission of bids:** Bidders are requested to submit their Bid/quotation in single part containing Technical proposal and price bid (BOQ) should be submitted electronically through GeM Portal http://gem.gov.in The responsibility to ensure timely submission of bid lies with the bidder. **Bids submitted through FAX or e-mail will not be considered**. Bidders shall also attach scanned copies of all the requisite documents i.e. other certificates/documents specified in the tender documents. The bids are to be submitted (electronically) as per the bidding type indicated in the front page of the NIT. Bidders are advised to submit their quotation in single Part. **No manual tender is acceptable.**

2. This NIT shall form part of the Order.

3 INSTRUCTION TO BIDDERS:

3.1 Security: Any information / material / document supplied along with this tender or after placement order should not be disclosed or copied without written permission from NIOT.

3.2 Contacting NIOT: No correspondence / discussion / visits whatsoever will be entertained on the subject unless specifically called by this office after opening the tender or clarifications in writing. Any violation of this will render the quotation invalid and the firm is liable to be removed from our approved vendor list. However, if vendor requires any clarification on the bid, the query may be mailed to **hvt@niot.res.in**

3.3 Tender Opening: All the tenderers can participate in the e-tender opening with proper authorization letter from the respective Company.

3.4 Order Acceptance: The successful bidder should submit order acceptance within 7 days from the date of order, failing which it shall be presumed that the bidder is not interested and his bid security /EMD shall be forfeited.

3.5 Change of Name after award: Request / intimations with regard to change of name of the Contracting company or constitution of the contracting company after the tender opening or award of contract shall not be allowed as a matter of right. The bidders / contractors are required to submit all relevant documents with regard to change of name or/and change of constitution and the circumstances leading to such change beforehand. It shall be the discretion of NIOT to proceed with the contract after such changes and in case,

NIOT decides to proceed with the contract, it may require the bidder/contractor to execute further agreements with regard to execution/ implementation of the contract.

3.6 One Bid per Bidder: A firm shall submit only one bid either individually or as a consortium / joint venture. A firm that submits either individually or, as a member of a consortium/joint venture, more than one bid will result in rejection of all the bids.

BIDDING CONDITION

4. Deadline for Submission of Bids: e**-**Bids must be submitted only at the GEM portal specified in the Invitation for Bids cover page on or before the due date/extended due date thereof. All bidders are advised to take adequate care to plan for bid submission in GeM well ahead of closing date and time and avoid any last-minute submission.

5. Due date Extension, Corrigendum to NIT: Any corrigendum including due date extension for NIT, Pre-bid minutes of meeting will be notified in GeM portal of NIOT website. Hence bidders are requested to watch our website for such due date extension and corrigendum if any.

6. In case of the unscheduled holiday in Chennai being declared on the prescribed closing / opening day of the tender, the next working day will be treated as the scheduled prescribed day of closing/opening of the tender.

7.Unsolicited correspondences: NIOT will not entertain any unsolicited correspondence or queries on the status of offer against this tender.

8. Non-Receipt of Tender: NIOT will not be responsible for the non-submission/receipt of the tender due to any network problem or technical issues with bidder.

9. Submission of tender by a tenderer implies that he has read the Notice Inviting Tender and has made himself aware of the scope and specifications of the services/work to be done; local conditions and other factors bearing on the execution of the works.

10. Bid Validity: Bids shall remain valid and open for acceptance for a **minimum period of 90 days** from the date of opening.

11. Bid validity extension: While NIOT will finalize the tender within the bid validity sought as per this NIT, due to circumstances beyond the control of NIOT, prior to expiry of the original Bid validity period; NIOT may request the Bidder for a specified extension of the bid validity without modifying RFP or Price. The request and the responses thereto shall be made in writing. A Bidder agreeing to the request will extend the validity of his Bid and Bid Security (EMD) correspondingly. When bid validity is extended EMD BG also deemed to have been extended automatically for which necessary action would be taken by the bidder to submit

the extended BG well before the expiry of the current validity.

12. EMD / Bid security: The EMD/Bid security is mandatory as indicated in the cover page and should be submitted along with the technical bid for the value indicated in the front page of this tender document. The EMD / Bid Security shall be in the form of a Bank demand draft drawn in favour of "NIOT OTHER RECEIPT ACCOUNT" in INR or in equivalent foreign currency or a guarantee from a public sector bank or foreign bank acceptable to NIOT.

The format of the guarantee shall be in accordance with the sample form of Bid Security available at NIOT website. The format can be downloaded from the website **https://www.niot.res.in/index.php/vendor/login.**

a) By Demand Draft/Banker's Cheque drawn in favour of "NIOT OTHER RECEIPT ACCOUNT", NIOT, payable at Chennai (or)

b) Bank Guarantee as per prescribed format issued by an Indian nationalized bank or indicate in stamp paper of appropriate value and valid for 60 days beyond the validity of the bid. (or)

c) Insurance Security Bond. (or)

d) Fixed Deposit Receipt. (or)

e) Online payment in an acceptable form.

If the EMD (scanned copy of the EMD) is not submitted along with Techno-commercial (Part-I). The bid will be summarily rejected. The original EMD should be submitted (or) reach NIOT on or before closing date the time of the tender.

EMD may be forfeited:

(a)If a bidder withdraws, modifies and provides for unsolicited offer involuntarily revising the price in whatsoever aspect, its bid during the period of bid validity specified by the bidder on the bid form; or

(b) In case of a successful bidder, fails to furnish order acceptance within 15days of the order and/or fails to furnish Performance Security.

EMD for a successful contractor shall be adjusted against performance security payable if submitted in DD/refunded if performance security is paid in full /performance security is submitted

13. Conditions for EMD / Bid Security: EMD shall be returned / discharged to unsuccessful bidders within 15 days after the expiration of the period of bid validity or placement of order whichever is later. EMD may be forfeited:

a. If a bidder withdraws, modifies for provided unsolicited offer voluntarily revising the price in whatsoever aspect its bid during the period of bid validity specified by the bidder on the bid form or

b. In case of a successful bidder, fails to furnish order acceptance within 7 days of the order and / or fails to furnish Performance Security.

EMD for a successful contractor shall be adjusted against performance security payable if submitted in DD / refunded if / performance security is submitted.

14. **Bid Validity**: Bids shall remain valid and open for acceptance for a **minimum period of 90 days** from the date of opening of Un-priced Techno-commercial Bids when fully compliant tender is submitted by the bidder without any requirement for NIOT to seek additional documents towards evaluation of pre-qualification and/or in ensuring conformance to the specification/ requirements of the tender. In the event of any delay in evaluation attributable to the vendor, vendor shall extend the tender by such a time taken by them in addition to above minimum tender validity period. A Bid valid for shorter validity period will be considered as a conditional tender and treated as invalid tender.

15. Bid validity extension: In exceptional circumstances, prior to expiry of the original Bid validity period, NIOT may request the Bidder for a specified extension in the period of validity. The request and the responses thereto shall be made in writing. A Bidder agreeing to the request will not be required nor permitted to modify his bid, and will be required to extend the validity of his Bid Security correspondingly. When bid validity is extended EMD BG also deemed to have been extended automatically.

16. Signing of bids: Each page of the tender and tender document shall be digitally signed and uploaded by the bidder in e-procurement Portal.

17. The broad configuration / specification of the proposed purchase / work are given. Bidders are required to keep their proposal strictly as per the specification prescribed in this NIT.

18. The compliance sheet with reference to the specifications should be furnished against each parameter while submitting the quotation, which is absolutely necessary. THE TENDERER SHALL SUBMIT TECHNICAL & COMMERCIAL COMPLIANCE SHEETS and BOQ (Price bid) separately ALONG WITH THEIR OFFER. TENDERS WITHOUT COMPLIANCE SHEETS WILL NOT BE EVALUATED. The Price bid should be unconditional.

19. Canvassing: Exerting pressure and/or offering inducement in any form by the bidder or any other person on behalf of the bidder shall disqualify the bid and lead to its rejection.

20. Commercial compliance as per NIT commercial compliance shall be furnished along with the bid.

21. Unrealistic bids with either cost which is impossible to achieve or for bidders who show that they are completely inexperienced or have completely inappropriate equipment will be rejected.

22.**Conditional Offer**/quotation will not be accepted.

23. Discounts: Bidders are advised not to indicate separate discounts. Discounts, if any, should be merged in the rates against the quoted items.

24.Authorisation: The bidder is qualified only if they are the OEM/dealer authorized by the OEM for the particular product or an Indian agent bidding on behalf of the OEM. For

dealer/Indian agent, authorization letter from OEM is mandatory. In case of agent, the agency agreement should be provided along with the roles and responsibility. Indian Agent consideration shall be in conformance with Govt. of India directives

25.Default in Performance: If any Vendor is not successfully discharging their contractual obligations against the order/contract placed on them by NIOT within the agreed time limit, (OR) if there is any deficiency in performing such obligations, NIOT reserves the right to suspend such Vendor from their participation in future tenders of NIOT for a minimum period of one year. Even after revoking the suspension period the Vendor's performances till continues to be the same without any improvement, NIOT reserves right to BAN such Vendor permanently from participation in all the tenders of NIOT and organizations of MOES.

TERMS AND CONDITIONS GOVERNING THE CONTRACT

26. Price: The price shall include but not limited to
a. Taxes and duties

27. Taxes and duties:
GST will be paid as per the applicable HSN Code at applicable rate for the quote received in INR. Any revision in the rate by Government of India the same shall be applicable at the time of Invoicing.

28.Guaranteed time of delivery – The license to be sent through online/e-mail **within 2 weeks** from the date of purchase order. The contractor should also send the license in dongle.

29. Extension of delivery period: If the completion of systems / components is delayed for reasons of force majeure such as acts of God, Acts of Public enemy, acts of Government, fires, floods, epidemics, quarantine restrictions, illegal strikes and freight embargoes, the Contractor shall within 3 days from the date of such occurrence, give notice to NIOT in writing of his claim for extension of delivery period. NIOT on receipt of such notice may agree to extend the Contract delivery date as may be reasonable but without prejudice to other terms and conditions of the contract. Unless the extended delivery period is agreed by NIOT in writing, contractor cannot claim the extension of delivery time as a matter of right. NIOT shall have the right to either cancel/extend the order validity/ levy LD as appropriate.

30. Delay in Completion / Liquidated Damage (LD):
if the contractor fails to deliver any or all of the Goods or fails to perform the incidental Works/ Services (e.g. installation, commissioning or operator training) within the time frame(s) incorporated in the contract, the Procuring Entity shall, without prejudice where the delivery of stores or any instalment thereof is accepted after expiry of the original delivery period, the CA may recover from the contractor as agreed, the LD a sum equivalent to 0.5 (half) percent of the pries of any portion of stores delivered late, for each week or part thereof delay. The total damages shall not exceed 10 (ten) percent of the value of delayed goods.

31. Performance Security: The successful bidders shall deposit 5% of the order value as Performance Security within two weeks from the date of issue of order. The performance security shall be in one of the following forms:
1. By Demand Draft/Banker's Cheque drawn in favour of "Director, NIOT" payable at Chennai (or)
2. Bank Guarantee as per prescribed format issued by a nationalized bank and valid for 60 days beyond the scheduled delivery/completion period as per order. (or)

3. Insurance Security Bond. (or)
4. Fixed Deposit Receipt. (or)
5. Online payment in an acceptable form.

This format can be downloaded from the link https://www.niot.res.in/index.php/vendor/login. Performance security shall be forfeited in the event of breach of order by the supplier in terms of the order. If Performance Security is not paid within the specified time, NIOT reserves its right to cancel the order and EMD will be forfeited. It will be returned after the completion of the hire period.

32. Payment: The payment will be released after receipt of the six license through mail and in Dongle accepted by NIOT and made active after installation and training within 30days.

33.Performance Guarantee/ Warranty Bank Guarantee: As per the MoFS guidelines 10% of the order value to be retained towards warranty to ensure the performance of the license to avoid any malfunctioning and not working ,to rectify/resolve the same during the warranty period. If performance bank guarantee for 10% of the order value is submitted and valid till completion of the warranty period and acceptance then 100% payment will be released. The warranty Bank Guarantee will be discharged after completion of the standard warranty period.

34. Warranty: The license supplied should be warranted for 12 months from the date of installation and made active. All upgradation and support as when required /available should be provided and supported till completion of warranty period. The warranty certificate should be furnished in the prescribed format of NIOT on your letterhead.

35.Arbitration/Disputes:
In the event of any dispute, difference, interpretation or application relating to this agreement arises, the same shall be settled amicably by the parties. In case the dispute or differences could not be settled amicably, the same shall be referred for adjudication through Arbitration by an Arbitrator to be appointed by the Director, NIOT. The Indian Arbitration shall be concluded in accordance with the provisions of Arbitration & Conciliation Act, 1996 or any statutory modifications or reenactment thereof and the rules made there under and for the time being tin force shall apply to the arbitration proceedings. Venue of such arbitration shall be at Chennai in India. The language of arbitration proceedings shall be English. The Arbitration shall make a reasoned award (the "award"), which shall be final and binding on the parties. The cost of the arbitration shall be shared equally by the parties to the contract. However, expenses incurred by each party in connection with the preparation, presentation etc., shall be borne by each party.

36. Termination: a) The purchase order shall become effective from the date of purchase order and shall automatically get terminated after successful completion of all contractual obligation and warranty obligation as per the terms of the order.
b) (i) Termination of the order due to breach of order by the supplier
(ii) Termination of order due to default,
(iii) Termination of the order due to insolvency,
(iv) Termination of the order for convenience.

If the termination of the order happens due to the above factors, [(i), (ii) &(iv)] initially the written notice will be issued within 30 days to settle the issue on mutually agreed terms with mutual consent.

37. Force Majeure: For purposes of this Clause, "Force Majeure" means an event beyond the control of the Contractor and not involving the Contractor's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of NIOT either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes. If a Force Majeure situation arises, the Contractor shall promptly notify NIOT in writing of such conditions and the cause thereof. Unless otherwise directed by NIOT in writing, the Contractor shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

38. INDEMNITIES: The Work Order hereby agrees to indemnify and hold harmless NIOT and its Director, officers and employees, from and against any and all suits, losses, liabilities, damages, claims, settlements, costs and expenses, including reasonable attorneys' fees, based on or arising, directly or indirectly, from:

i. breach of this Agreement by the Work Order

ii. Not performing the Scope of Work or any other obligation under this Agreement or Tender in accordance with the provisions and schedules of this Agreement or the Tender iii. Violation or contravention of any Legislation on the part of the Work Order

iv. Any negligence or wilful misconduct of Work Order, which violates any provision of this Agreement

v. Infringement of any intellectual property belonging to any third party by the Work Order

vi. Any breach of an agreement or understanding between Work Order and any and all Third Parties due to which a liability arises on NIOT.

vii. Any claim that any representations or warranties contained herein are not true or Any breach thereof

viii. Any loss or damage caused by the Work Order to NIOT, its personnel or property

ix. Any loss or damage caused by the Work Order to any and all Third Parties for which a claim against NIOT has arisen

x. Breach, expiry, cancellation, revocation or invalidity of any and all licenses, permits, authorizations and registrations which the Work Order is required to obtain, keep valid and comply with under any Legislation in order to perform its obligations hereunder xi. Any obligation of the Work Order performed by NIOT under this Agreement or under any Legislation.

Section I Commercial Terms Compliance sheet (To be filled by bidder)

Sl. No	Particulars	Yes	No	Page Ref
1	Whether EMD for **INR 79,000/-** scanned copy and uploaded along with the technical document?			
2	Whether every page of the tender document is digitally signed and uploaded in the GeM portal along with the other documents.			
3	Whether Taxes and duties are shown separately in the quote. (Registration numbers for claiming the same to be strictly indicated and the copy of the certificates enclosed)			
4	Whether accepted to submit the purchase order acceptance within 7 days from the date of receipt of the purchase order?			
5	Whether submission of 5% of the contract value as Performance Security is acceptable?			
6	Whether submission of 10% of the supply value as Performance Bank Guarantee is acceptable?			
7	Whether quote is valid for 90 days from the date of tender opening or time specified in the tender document whichever is later?			
8	Whether payment terms of the tender is complied with?			
9	Whether INCOTERM DAP NIOT Chennai is complied with?			
10	Whether the tender is fully complying with tender specification/Adjustment if no, list out deviations very clearly along with the appropriate reason for the deviation?			
11	Whether item-wise price is quoted as per price bid and quoted price is realistic?			
12	Whether liquidated damage as specified in the NIT accepted unconditionally?			
13	Whether the delivery period is acceptable as per the tender.			
14	Whether the warranty period (minimum 12 months) is acceptable as per the tender.			
15	Bidder is responsible for all performance benchmarks and the quote should contain an undertaking certifying the same.			
16	Whether list of deliverables attached and comply as per tender?			

Section III Technical Compliance Sheet (To be filled by bidder)

Sl No	Specification	Description	Yes/No
1	Design and simulation capability	The software should be capable of: 1. Simulate the multi-physical phenomena like thermal, electrical, structural, AC/DC, Acoustics, Electromagnetic, etc. on single software platform with appropriate physics interfaces and modules for coupled and uncoupled physical analysis. 2. Fully integrated software with comprehensive visualization package and extensive database of examples. 3. COMSOL Multiphysics simulation software should be capable of simulating all kinds of underwater acoustics simulation 4. The software license should be Named Single user License (NSL)-perpetual license. 5. The installation of software under a named user should be done in two computers with individual Host IDs.	
2	COMSOL Multiphysics Base module	The software should be capable of: 1. Appropriate CAD tools for geometry modeling (1D/2D/3D) OR compatible to import from standard modeling tools like AutoCAD, Pro-E, Solid Edge, Solid Works, Creo, etc. 2. Appropriate Meshing techniques providing flexibility to consider automated meshing and customized meshing (with mesh elements such as triangular, quad, tetrahedral, prismatic, etc.) for less time consumption 3. Simplify meshing operation on relatively thin or thick regions and complex geometries using features such as swept mesh, mapped mesh and boundary layer mesh. 4. Equation based modeling for solving ordinary differential equation (for volume, surfaces, edges, and points), partial differential equations (with general, coefficient and weak forms), Algebraic equations, sensitivity analysis and classical PDEs etc. 5. Numerical Solvers & discretization schemes like Finite element method, Finite volume method. 6. Simplify meshing operation on relatively thin or thick regions and complex geometries using features such as swept mesh, mapped mesh and boundary layer mesh. 7. Appropriate CAD tools for geometry modeling (1D/2D/3D) OR compatible to import from standard modeling tools like AutoCAD, Pro-E, Solid Edge, Solid Works, Creo, etc.	
3	Structural Mechanics module	This module should be capable of: 1. Modeling strain levels, deformations, stiffness. 2. Modeling of static and dynamic contact with additional functionalities to account for friction, adhesion and cohesion, wear etc.	

		3. Analyzing material models that depend on stress, strain, spatial coordinates, time, or fields coming from another physics including deformed geometry to study effects of shape changes in geometry. 4. Simulating thermally generated strain and stress in thin structures like thin films and membranes. 5. Analyzing shell elements for thin and thick structures, thin films & membrane elements formulations including wrinkling. 6. Evaluating thermal stresses and strains for shell elements. 7. Providing a bidirectional coupling between the structural and thermal effects for modeling thermal control devices. 8. Performing Stationary study, Transient study, Eigenfrequency, Frequency response analysis, and Random vibration study. 9. Performing 2D and 3D device simulation.	
4	Acoustics Module	This module should be capable of: 1. Modelling acoustics effects, such as the scattering, diffraction, emission, radiation, and transmission of sound. 2. FEM, BEM as well as hybrid FEM-BEM modelling. In the time domain, time implicit (FEM) as well as time explicit (dG-FEM) formulations. 3. Modelling pipe acoustics, computing the acoustic pressure and velocity in flexible pipe systems, examples include HVAC systems, large piping systems 4. Modelling Acoustic-structure interaction, Fully two-way coupling. For miniature transducer systems, like mobile devices, condenser microphones, damping due to the thermoviscous boundary layer losses to be included. Extensive functionality for modeling piezoelectric transducers of all kinds. 5. Thermo-viscous Acoustics: Accurate micro acoustic analysis of acoustic propagation in geometries with small dimensions; losses associated with viscosity and thermal conduction; particularly, the losses in the viscous and thermal boundary layers. 6. Modelling Elastic Waves and Ultrasound in Solids. Model the propagation of elastic waves in solids and porous materials, for single-physics or Multiphysics applications. 7. Elastic wave propagation over large domains containing many wavelengths using a higher-order dG-FEM time explicit method, and Multiphysics enabled for couplings with fluids as well as piezoelectric materials. Account for the effects of shear waves as well as pressure waves. 8. In built Multiphysics Coupling essential for modelling underwater acoustics, modelling transducer, modelling hydrophone, target stealth, UAV modelling, Torpedo modelling and sea bed mapping simulation using ray tracing	

		approach. Modelling of acoustics absorption material. 9. Modelling Ultrasound in Fluids (transient linear acoustics in a simulation that contains many wavelengths in a stationary background flow) and Modelling Aeroacoustics.	
5	AC/DC Module	This module should be capable of: 1. Analyze resistive and conductive devices efficiently by modeling DC, transient, or AC currents. 2. Calculating quantities such as resistance, conductance, electric field, current density, and power dissipation. 3. Running stationary, frequency-domain, and time-domain analyses, as well as small-signal analysis. 4. Analyze resistive and conductive devices efficiently by modeling DC, transient, or AC currents. 5. Calculating quantities such as resistance, conductance, electric field, current density, and power dissipation. 6. Analyzing capacitive devices and electrical insulators using electrostatics computations. 7. Solve for the electric potential using either finite element method (FEM) or boundary element method (BEM) or combined hybrid finite element-boundary element method. 8. Computation of capacitance matrices, electric field, charge density, and electrostatic energy etc. 9. Computation of magnetostatics fields, parasitic inductances, and forces on coils, conductors, and magnets. 10. Providing an extensive material database that includes a wide range of nonlinear magnetic materials, or modeling user defined nonlinear materials. 11. Magnetostatics analysis in the absence of currents, using both FEM and BEM or a combination of a hybrid finite element-boundary element method. 12. Electromagnetic analysis using vector-field formulation allowing the defining of electric potential and input currents, in presence of both current flow and magnetic materials. 13. Frequency-domain, small-signal analysis, and time-domain modeling supported in 2D and 3D simulation. 14. Model lumped systems to analyze currents and voltages in circuits including voltage and current sources, resistors, capacitors, inductors, and semiconductor devices. 15. Connect electrical circuit models to distributed field models in 2D and 3D.	
6	CAD Import module	This module should be capable of: 1. CAD Import Module Supports Both Import and Export of CAD Files. 2. The CAD Import Module supports the import of a variety of different file formats including the Parasolid and ACIS formats, and standard formats like STEP and IGES. 3. These file formats are supported by basically all CAD packages, and you can readily import your files into COMSOL	

		Multiphysics by saving in any of these formats. On top of that, the CAD Import Module allows you to import the native file formats of a number of CAD systems, such as Inventor, PTC Creo Parametric, and SOLIDWORKS. 4. The optional File Import for CATIA V5 provides support for importing the native file format for this system. 5. When you have installed the CAD Import Module, all CAD files are automatically converted to a Parasolid geometry, using the Parasolid geometry engine that is included with the module. These geometries can subsequently be changed by a number of tools within COMSOL Multiphysics and the CAD Import Module. This can include geometry repair or defeaturing or a conscious change to the geometry. An example of this is creating a model domain around a CAD design. 6. The CAD Import Module should be able to export in the Parasolid or ACIS file formats for import into other tools. STEP and IGES format export from geometry is also possible. 7. Encapsulate geometries to model phenomena in the surrounding domains 8. Export geometry files to the Parasolid and ACIS file formats 9. Geometry repair through identification of geometric inconsistencies and knitting surfaces to create solids 10. De-featuring through the finding and deletion of fillets, short edges, sliver faces, small faces, spikes, and faces 11. Manually deleting faces and healing the resulting gaps through filling (creating a new face) or patching (shrinking or expanding adjacent faces) 12. Detaching faces from a solid object to create a new solid object 13. Cap holes or empty spaces to fill the space and create modelling domains 14. Patch removed faces by growing or shrinking the surrounding surfaces to cover the removed face 15. Encapsulate geometries to model phenomena in the surrounding domains 16. Export geometry files to the Parasolid and ACIS file formats	
7	Material Library Module	This module should be capable of: 1. Having the material properties data which can be used in any other physics simulation couplings that also depend on the property function variable in your Multiphysics modeling. 2. Should have Fe & Ni Alloys, Al & Cu Alloys, Mg & Ti Alloys, Oxides, Carbides, Cermets, & Tool Steels, Carbons & Thermal Insulation, Intermetallics, tbc & Refractory Metals, Polyamides & Polyesters, Acetal, pvdf, & eva, Elastomers &	

		Epoxies, Misc. Polymers & Polymer Composites, Minerals, Rock, Soil & Woods, Polypropylenes & pet, Controlled Expansion & Thermocouple Alloys, Semi-conductors, Optical, & Other Materials, Solders, Dental & Co Alloys, Resistance & Magnetic Alloys, Metal Matrix & Ceramic Matrix Composites, Salts, Fuel Cell, Battery & Electroceramics, Silicides & Borides, Glasses, Metallic Glasses, Nitrides, & Beryllides and Cast Irons & Mold Materials.	
8	License	Named Single User License - perpetual type should be supplied for all products. The new license includes 12 months subscription which should cover technical support and product upgrades. The offered software should be of latest version. The same should clearly be mentioned in detail.	
9	Installation and Training	Software shall be installed at NIOT-Chennai via online Mode by developers or their qualified representatives and all main and sub modules shall be installed as per specifications/ Purchase order. Training for all the modules should be given to NIOT officials	
10	Warranty	All the supplies to be warranted for twelve months from the date of supply and acceptance. Warranty certificate should be provided as per the prescribed format of NIOT. Supplier shall provide software upgradation support as and when available within the warranty period without any additional charges.	

Section IV Priced Bid format

Sl.No.	Description	Quantity (Nos.)	Unit Rate (Rs,)	Amount (Rs.)
1	COMSOL Multiphysics software base package, Named Single User Perpetual License	1 Number		
2	COMSOL Acoustics module for use with COMSOL Multiphysics, Named Single User Perpetual License	1 Number		
3	COMSOL Structural Mechanics module for use with COMSOL Multiphysics, Named Single User Perpetual License	1 Number		
4	COMSOL Material Library for use with COMSOL Multiphysics, Named Single User Perpetual License	1 Number		
5	COMSOL AC/DC module for use with COMSOL Multiphysics, Named Single User Perpetual License	1 Number		
6	COMSOL CAD Import module for use with COMSOL Multiphysics, Named Single User Perpetual License	1 Number		

Note: The basic price should be inclusive of all taxes and other levies. Since GEM excel format does not have the provision to quote separately

Annexure I Technical Specification of COMSOL-Multiphysics software as required by NIOT

Sl No	Specification	Description
1	Design and simulation capability	The software should be capable of: 1. Simulate the multi-physical phenomena like thermal, electrical, structural, AC/DC, Acoustics, Electromagnetic, etc. on single software platform with appropriate physics interfaces and modules for coupled and uncoupled physical analysis. 2. Fully integrated software with comprehensive visualization package and extensive database of examples. 3. COMSOL Multiphysics simulation software should be capable of simulating all kinds of underwater acoustics simulation 4. The software license should be Named Single user License (NSL)-perpetual license. 5. The installation of software under a named user should be done in two computers with individual Host IDs.
2	COMSOL Multiphysics Base module	The software should be capable of: 1. Appropriate CAD tools for geometry modeling (1D/2D/3D) OR compatible to import from standard modeling tools like AutoCAD, Pro-E, Solid Edge, Solid Works, Creo, etc. 2. Appropriate Meshing techniques providing flexibility to consider automated meshing and customized meshing (with mesh elements such as triangular, quad, tetrahedral, prismatic, etc.) for less time consumption 3. Simplify meshing operation on relatively thin or thick regions and complex geometries using features such as swept mesh, mapped mesh and boundary layer mesh. 4. Equation based modeling for solving ordinary differential equation (for volume, surfaces, edges, and points), partial differential equations (with general, coefficient and weak forms), Algebraic equations, sensitivity analysis and classical PDEs etc. 5. Numerical Solvers & discretization schemes like Finite element method, Finite volume method. 6. Simplify meshing operation on relatively thin or thick regions and complex geometries using features such as swept mesh, mapped mesh and boundary layer mesh. 7. Appropriate CAD tools for geometry modeling (1D/2D/3D) OR compatible to import from standard modeling tools like AutoCAD, Pro-E, Solid Edge, Solid Works, Creo, etc.
3	Structural Mechanics module	This module should be capable of: 1. Modeling strain levels, deformations, stiffness. 2. Modeling of static and dynamic contact with additional

		functionalities to account for friction, adhesion and cohesion, wear etc. 3. Analyzing material models that depend on stress, strain, spatial coordinates, time, or fields coming from another physics including deformed geometry to study effects of shape changes in geometry. 4. Simulating thermally generated strain and stress in thin structures like thin films and membranes. 5. Analyzing shell elements for thin and thick structures, thin films & membrane elements formulations including wrinkling. 6. Evaluating thermal stresses and strains for shell elements. 7. Providing a bidirectional coupling between the structural and thermal effects for modeling thermal control devices. 8. Performing Stationary study, Transient study, Eigenfrequency, Frequency response analysis, and Random vibration study. 9. Performing 2D and 3D device simulation.
4	Acoustics Module	This module should be capable of: 1. Modelling acoustics effects, such as the scattering, diffraction, emission, radiation, and transmission of sound. 2. FEM, BEM as well as hybrid FEM-BEM modelling. In the time domain, time implicit (FEM) as well as time explicit (dG-FEM) formulations. 3. Modelling pipe acoustics, computing the acoustic pressure and velocity in flexible pipe systems, examples include HVAC systems, large piping systems 4. Modelling Acoustic-structure interaction, Fully two-way coupling. For miniature transducer systems, like mobile devices, condenser microphones, damping due to the thermoviscous boundary layer losses to be included. Extensive functionality for modeling piezoelectric transducers of all kinds. 5. Thermo-viscous Acoustics: Accurate micro acoustic analysis of acoustic propagation in geometries with small dimensions; losses associated with viscosity and thermal conduction; particularly, the losses in the viscous and thermal boundary layers. 6. Modelling Elastic Waves and Ultrasound in Solids. Model the propagation of elastic waves in solids and porous materials, for single-physics or Multiphysics applications. 7. Elastic wave propagation over large domains containing many wavelengths using a higher-order dG-FEM time explicit method, and Multiphysics enabled for couplings with fluids as well as piezoelectric materials. Account for the effects of shear waves as well as pressure waves. 8. In built Multiphysics Coupling essential for modelling underwater acoustics, modelling transducer, modelling

		hydrophone, target stealth, UAV modelling, Torpedo modelling and sea bed mapping simulation using ray tracing approach. Modelling of acoustics absorption material. 9. Modelling Ultrasound in Fluids (transient linear acoustics in a simulation that contains many wavelengths in a stationary background flow) and Modelling Aeroacoustics.
5	AC/DC Module	This module should be capable of: 1. Analyze resistive and conductive devices efficiently by modeling DC, transient, or AC currents. 2. Calculating quantities such as resistance, conductance, electric field, current density, and power dissipation. 3. Running stationary, frequency-domain, and time-domain analyses, as well as small-signal analysis. 4. Analyze resistive and conductive devices efficiently by modeling DC, transient, or AC currents. 5. Calculating quantities such as resistance, conductance, electric field, current density, and power dissipation. 6. Analyzing capacitive devices and electrical insulators using electrostatics computations. 7. Solve for the electric potential using either finite element method (FEM) or boundary element method (BEM) or combined hybrid finite element-boundary element method. 8. Computation of capacitance matrices, electric field, charge density, and electrostatic energy etc. 9. Computation of magnetostatics fields, parasitic inductances, and forces on coils, conductors, and magnets. 10. Providing an extensive material database that includes a wide range of nonlinear magnetic materials, or modeling user defined nonlinear materials. 11. Magnetostatics analysis in the absence of currents, using both FEM and BEM or a combination of a hybrid finite element-boundary element method. 12. Electromagnetic analysis using vector-field formulation allowing the defining of electric potential and input currents, in presence of both current flow and magnetic materials. 13. Frequency-domain, small-signal analysis, and time-domain modeling supported in 2D and 3D simulation. 14. Model lumped systems to analyze currents and voltages in circuits including voltage and current sources, resistors, capacitors, inductors, and semiconductor devices. 15. Connect electrical circuit models to distributed field models in 2D and 3D.
6	CAD Import module	This module should be capable of: 1. CAD Import Module Supports Both Import and Export of CAD Files. 2. The CAD Import Module supports the import of a variety of different file formats including the Parasolid and ACIS formats, and standard formats like STEP and IGES.

		3. These file formats are supported by basically all CAD packages, and you can readily import your files into COMSOL Multiphysics by saving in any of these formats. On top of that, the CAD Import Module allows you to import the native file formats of a number of CAD systems, such as Inventor, PTC Creo Parametric, and SOLIDWORKS. 4. The optional File Import for CATIA V5 provides support for importing the native file format for this system. 5. When you have installed the CAD Import Module, all CAD files are automatically converted to a Parasolid geometry, using the Parasolid geometry engine that is included with the module. These geometries can subsequently be changed by a number of tools within COMSOL Multiphysics and the CAD Import Module. This can include geometry repair or defeaturing or a conscious change to the geometry. An example of this is creating a model domain around a CAD design. 6. The CAD Import Module should be able to export in the Parasolid or ACIS file formats for import into other tools. STEP and IGES format export from geometry is also possible. 7. Encapsulate geometries to model phenomena in the surrounding domains 8. Export geometry files to the Parasolid and ACIS file formats 9. Geometry repair through identification of geometric inconsistencies and knitting surfaces to create solids 10. De-featuring through the finding and deletion of fillets, short edges, sliver faces, small faces, spikes, and faces 11. Manually deleting faces and healing the resulting gaps through filling (creating a new face) or patching (shrinking or expanding adjacent faces) 12. Detaching faces from a solid object to create a new solid object 13. Cap holes or empty spaces to fill the space and create modelling domains 14. Patch removed faces by growing or shrinking the surrounding surfaces to cover the removed face 15. Encapsulate geometries to model phenomena in the surrounding domains 16. Export geometry files to the Parasolid and ACIS file formats
7	Material Library Module	This module should be capable of: 1. Having the material properties data which can be used in any other physics simulation couplings that also depend on the property function variable in your Multiphysics modeling. 2. Should have Fe & Ni Alloys, Al & Cu Alloys, Mg & Ti Alloys, Oxides, Carbides, Cermets, & Tool Steels, Carbons &

		Thermal Insulation, Intermetallics, tbc & Refractory Metals, Polyamides & Polyesters, Acetal, pvdf, & eva, Elastomers & Epoxies, Misc. Polymers & Polymer Composites, Minerals, Rock, Soil & Woods, Polypropylenes & pet, Controlled Expansion & Thermocouple Alloys, Semi-conductors, Optical, & Other Materials, Solders, Dental & Co Alloys, Resistance & Magnetic Alloys, Metal Matrix & Ceramic Matrix Composites, Salts, Fuel Cell, Battery & Electroceramics, Silicides & Borides, Glasses, Metallic Glasses, Nitrides, & Beryllides and Cast Irons & Mold Materials.	
8	License	Named Single User License - perpetual type should be supplied for all products. The new license includes 12 months subscription which should cover technical support and product upgrades. The offered software should be of latest version. The same should clearly be mentioned in detail.	
9	Installation and Training	Software shall be installed at NIOT-Chennai via online Mode by developers or their qualified representatives and all main and sub modules shall be installed as per specifications/ Purchase order. Training for all the modules should be given to NIOT officials	
10	Warranty	All the supplies to be warranted for twelve months from the date of supply and acceptance. Warranty certificate should be provided as per the prescribed format of NIOT. Supplier shall provide software upgradation support as and when available within the warranty period without any additional charges.	