INDIAN INSTITUTE OF TECHNOLOGY, KANPUR

GT ROAD, KALYANPUR, KANPUR – 208016

UTTAR PRADESH, INDIA

Single Tender Enquiry

TENDER REFERENCE NO.: IITK/ME/KMD/2023/01

BID SUBMISSION END DATE- 24.02.2023

TENDER DOCUMENTS

For

“Purchase of Ansys Academic Research Software”

BID DOCUMENT

The Indian Institute of Technology Kanpur ("the IITK") invites Bids ("Bids") from eligible, qualified and capable companies for the supply and delivery of "the Goods" and provision of associated services ("Associated Services") according to the requirements as defined in the Tender document.

Name of Work	Purchase of Ansys Academic Research Software
Date of Publishing	17.02.2023 (17.30 hrs)
Clarification Start Date and Time	17.02.2023 (17.30 hrs)
Clarification End Date and Time	24.02.2023 (17.30 hrs)
Queries (if any)	No queries will be entertained after clarification end date and time
Bid Submission Start Date	17.02.2023 (17.30 hrs)
Last Date and time of uploading of Bids	24.02.2023 (17.30 hrs)
Last Date and time of **submitting**, EMD and other documents at IIT Kanpur (if any)	NA
Date and time of opening of Technical Bids	27.02.2023 (10:00 hrs)
Date and time of opening of Financial Bids	Will be separately notified for Technically shortlisted/qualified bidders

Interested parties may view and download the tender document containing the detailed terms & conditions from the website http://eprocure.gov.in/eprocure/app

(The bids must be submitted online in electronic form on www.eprocure.gov.in only. No physical bids will be accepted.)

(A)
INSTRUCTION FOR ONLINE BID SUBMISSION

The bidders are required to submit soft copies of their bids electronically on the Central Public Procurement (CPP) Portal iehttp://eprocure.gov.in/eprocure/app , using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal.

1. REGISTRATION

(i) Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL:https://eprocure.gov.in/eprocure/app)by clicking on the link "Online Bidder Enrolment" option available on the home page. **Enrolment on the CPP Portal is free of charge.**

(ii) During enrolment/ registration, the bidders should provide the correct/ true information including valid email-id & mobile no. All the correspondence shall be made directly with the contractors/ bidders through email-id provided.

(iii) As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.

(iv) For e-tendering possession of valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) is mandatory which can be obtained from SIFY /nCode/eMudra or any Certifying Authority recognized by CCA India on eToken/ SmartCard.

(v) Upon enrolment on CPP Portal for e-tendering, the bidders shall register their valid Digital Signature Certificate with their profile.

(vi) Only one valid DSC should be registered by a bidder. Bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse and should ensure safety of the same.

(vii) Bidders can than log into the site through the secured login by entering their userID/ password and the password of the DSC/ eToken.

2. SEARCHING FOR TENDER DOCUMENTS

(i) There are various search options built in the CPP Portal to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords, etc., to search for a tender published on the CPP Portal.

(ii) Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective 'My Tenders' folder. This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.

(iii) The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

3. PREPARATION OF BIDS:

(i) For preparation of bid Bidders shall search the tender from published tender list available on

site and download the complete tender document and should take into account corrigendum if any published before submitting their bids.

After selecting the tender document same shall be moved to the 'My favourite' folder of bidders account from where bidder can view all the details of the tender document.

(ii) Bidder shall go through the tender document carefully to understand the documents required to be submitted as part of the bid. Bidders shall note the number of covers in which the bid documents have to be submitted, the number of documents – including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.

(iii) Any pre-bid clarifications if required, then same may be obtained online through the tender site, or through the contact details given in the tender document.

(iv) Bidders should get ready in advance the bid documents in the required format (PDF/xls/rar/dwf/jpg formats) to be submitted as indicated in the tender document/schedule. **Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.**

(v) Bidders can update well in advance, the documents such as experience certificates, annual report, PAN, EPF & other details etc., under "My Space/ Other Important Document" option, which can be submitted as per tender requirements. This will facilitate the bid submission process faster by reducing upload time of bids.

4. SUBMISSION OF BIDS:

(i) Bidder should log into the site well in advance for bid submission so that he/ she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay.

(ii) Bidder should prepare the EMD as per the instructions specified in the NIT/ tender document. The details of the DD/BC/BG/ others physically sent, should tally with the details available in the scanned copy and the data entered during bid submission time. Otherwise the uploaded bid will be rejected.

(iii) While submitting the bids online, the bidder shall read the terms & conditions (of CPP portal) and accepts the same to proceed further to submit their bid.

(iv) Bidders shall select the payment option as offline to pay the EMD and enter details of the DD/BC/BG/others.

(v) Bidder shall digitally sign and upload the required bid documents one by one as indicated in the tender document.

(vi) Bidders shall note that the very act of using DSC for downloading the tender document and uploading their offers is deemed to be a confirmation that they have read all sections and pages of the tender document without any exception and have understood the complete tender document and are clear about the requirements of the tender document.

(vii) Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document. For the file size of less than 1 MB, the transaction uploading time will be very fast.

(viii) **If price quotes are required in XLS format, utmost care shall be taken for uploading Schedule of quantities & Prices and any change/ modification of the price schedule shall render it unfit for bidding.**

Bidders shall download the Schedule of Quantities & Prices i.e. Schedule-A, in XLS format and save it without changing the name of the file. Bidder shall quote their rate in figures in

the appropriate cells, thereafter, save and upload the file in financial bid cover (Price bid) only.

(ix) Bidders shall submit their bids through online e-tendering system to the Tender Inviting Authority (TIA) well before the bid submission end date & time (as per Server System Clock). **The TIA will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders at the eleventh hour**.

(x) After the bid submission **(i.e. after Clicking "Freeze Bid Submission" i**n the portal), the bidders shall **take print out of system generated acknowledgement** number and keep it as a record of evidence for online submission of bid, which will also act as an entry pass to participate in the bid opening.

(xi) Bidders should follow the server time being displayed on bidder's dashboard at the top of the tender site, which shall be considered valid for all actions of requesting, bid submission, bid opening etc., in the e-tender system.

(xii) All the documents being submitted by the bidders would be encrypted using PKI (Public Key Infrastructure) encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology.

(xiii) Bidder will get all benefits under Rule 153 GFR-2017.

5. ASSISTANCE TO BIDDERS:

(i) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender. The contact number of end user is 0512-259-7928. Please call between 10:30 hrs to 17:00 hrs .

(ii) Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24X7 CPP Portal Helpdesk. The 24 x 7 Help Desk Number 0120-4200462, 0120-4001002 and 0120-4001005. The helpdesk email id is **support-eproc@nic.in**

(B)

INSTRUCTION FOR e-PROCUREMENT

1. PREPARATION AND SUBMISSION OF BIDS:

a. The detailed tender documents may be downloaded from http://eprocure.gov.in/eprocure/app till the last date of submission of tender. The Tender may be submitted online through CPP Portal http://eprocure.gov.in/eprocure/app

b. The bidder should submit the bid online in two parts viz. Technical Bid and Financial Bid. Technical Bid should be upload online in cover 1 and Financial Bid in ".Xls" should also be uploaded online in cover-1

2. SUBMISSION OF THE BID :

All interested eligible bidders are requested to submit their bids online on CPP Portal: http://eprocure.gov.in/eprocure/appas per the criteria given in this document:

a. Technical Bid should be upload online in cover-1.

b. Financial Bid should be upload online in cover-1

Both Technical and Financial Bid covers should be placed online on the CPP Portal (http://eprocure.gov.in/eprocure/app).

3. TECHNICAL BID:

Signed and Scanned copies of the Technical bid documents as under must be submitted online on CPP Portal: http://eprocure.gov.in/eprocure/app .

a. List of Documents to be scanned and uploaded (Under Cover-1) within the period of bid submission:-

i. Scanned copy of Bank details.

ii. Scanned copy of work experience.

iii. Scanned copy of certificate of GST.

iv. Scanned copy of specifications/brochures & tender acceptance letter on Appendix 1-3.

v. Scanned copy of another document mentioned in tender document (if any)

vi. Declaration for local content, Country of Origin of goods and Bid Security on Appendix 4-5.

1. For The tender value upto Rs. 10 Crores - Self-Certificate for local content from the bidder.
2. For the tender value above Rs. 10 Crores - Certificate for local content from Statutory Auditor/Cost Auditor/Cost Accountant/CA.

b. For Import Shipments – Shipping Terms Ex-Works/FOB are preferred.

NOTE - no indication of the rates/amounts be made in any of the documents submitted with the TC-BID.

4. FINANCIAL BID

a. The currency of all quoted rates shall be Indian Rupees. All payment shall be made in Indian Rupees.

b. In preparing the financial bids, bidders are expected to take into account the requirements

and conditions laid down in this Tender document. The financial bids should be uploaded online as per the specified **".Xls"** format i.e. Price Bid Excel sheet attached as **'.Xls'** with the tender and based on the scope of work, service conditions and other terms of the Tender document. It should include all costs associated with the Terms of Reference/Scope of Work of the assignment.

c. The Financial Proposal should be inclusive of all applicable taxes, duties, fees, levies, and other charges imposed under the applicable laws. The rates quoted in the Tender are inclusive of all applicable taxes, duties etc. **except service tax.** The service tax component shall be re-immersible by the department after receipt of paid challans etc. if applicable.

5. LAST DATE FOR SUBMISSION OF TENDER:

a. Online bids complete in all respects, must be submitted on or before the last date and time specified in the schedule of events.

b. The IIT, Kanpur may, at its own discretion, alter/extend the last date for submission of tenders.

6. BID VALIDITY

a. All the Bids must be valid for a period of 90 days from the last date of submission of the tender for execution of Contract. However, the quoted rates should be valid for the initial/ extended period of the Contract from the effective date of the Contract. No request will be considered for price revision during the original Contract period.

b. A bid valid for a shorter period shall be declared as non-responsive.

c. In exceptional circumstances, prior to expiry of the original time limit, the IIT may request the bidders to extend the period of validity for a specified additional period beyond the original validity of 90 days. The request and the bidders' responses shall be made in writing. The bidders, not agreeing for such extensions will be allowed to withdraw their bids without forfeiture of their Bid Security.

7. MODIFICATION / SUBSTITUTION/ WITHDRAWAL OF BIDS:

a. No Bid shall be modified, substituted or withdrawn by the Bidder after the Bid's due Date.

b. Any alteration/ modification in the Bid or additional information supplied subsequent to the Bid's due Date, unless the same has been expressly sought for by the Authority, shall be disregarded.

8. REJECTION OF THE BID:

The bid submitted shall become invalid and tender fee shall not be refunded if:-

a. The bidder is found ineligible.
b. The bidder does not upload all the documents as stipulated in the bid document.

9. SELECTION CRITERIA:

Phase-I: Technical Evaluation & Sample Approval

Technical evaluation will be done on the basis of information given by technical bid submitted by the bidders. Bid containing partial, incomplete, uncleared and superfluous and unwanted information will be summarily rejected.

Technical declaration must be supported with relevant document. Discrepancy in relevant supporting document and technical compliance sheet shall lead to rejection of technical bids.

Sample Approval:

Bidders should have to display their samples (if asked) on DD.MM.YYYY at the Central Store & Purchase Section of IIT Kanpur. Non-display of sample shall be considered as non-responsive technical bids.

Phase-II

- **a.** Financial bids of technically qualified and approve samples bidders shall be opened.
- **b.** Financial evaluation is purely done on the total financial implication.
- **c.** Any superfluous, unreasonable assets rate quotes will be summarily rejected.

10. Late Delivery:

Delivery must be completed within the period mentioned in tender document from the date of receipt of the order. Penalty @ 1% per week or part thereof subject to a maximum of 10% of the delivery price will be deducted from the balance payment if supply is not completed within stipulated period.

11. Instruction to the bidder of countries which share land border with India (Rule 144(xi) GFRs)

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Department for Promotion of Industry and Internal Trade (DPIIT).

II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company , including any member of a consortium or joint venture (that is an association of several persons, or firms or companies) , every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this Order means: -

- **a.** An entity incorporated, established, or registered in such a country; or
- **b.** A subsidiary of an entity incorporated, established, or registered in such a country; or
- **c.** An entity substantially controlled through entities incorporated, established, or registered in such a country; or
- **d.** An entity whose beneficial owner is situated in such a country; or
- **e.** An Indian (or other) agent of such an entity; or
- **f.** A natural person who is a citizen of such a country; or

g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

IV. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership , the beneficial owner is the natural person(s), who , whether acting alone or together , or through one or more juridical person, has a controlling ownership interest or who exercises control through other means .

Explanation-

a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company.

b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements.

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who , whether acting alone or together , or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals ;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official.

5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee , the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership .

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. In case of tenders for Works contracts, including Turnkey contracts, The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority .

12. As per the Ministry of Commerce and Industry Order No. P-45021/2/2017-PP(BE-II) dated 04.06.2020 preference shall be given to Make in India products for which it is mandatory for bidders to declare Country of Origin of goods and percentage of Local contents in the product.

Definitions:

"Local Content" means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

“Class-I local supplier” means a supplier or service provider, whose goods, services or works offered for procurement, has local content to or more than 50%, as defined under this order.

“Class-II local supplier” means a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%, as defined under this order.

“Margin of purchase preference” means the maximum extent to which the price quoted by a Class-I local supplier may be above the L1 for the purpose of purchase preference. (shall be 20%)

Purchase Preference:

(a) Subject to the provisions of this Order and to any specific instructions issued by the Nodal Ministry or in pursuance of this Order, purchase preference shall be given to ‘Class-I local supplier’ in procurements undertaken by procuring entities in the manner specified here under.

(b) In the procurements of goods or works, which are covered by para 3(b) above and which are divisible in nature, the Class-l local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is Class local supplier', the contract for full quantity will be awarded to L1.

ii. If L1 bid is not a 'Class-l local supplier', 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the 'Class-l local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class-l local supplier's quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such 'Class-l local supplier' subject to matching the L1 price. In case such lowest eligible 'Class-l local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-l local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class-l local suppliers, then such balance quantity may also be ordered on the L1 bidder.

(c) In the procurements of goods or works, which are covered by para 3(b) above and which are not divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-1 local supplier' shall get purchase preference over 'Class-ul local supplier' as well as 'Non-local supplier', as per following procedure:

i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-1 local supplier', the contract will be awarded to L1.

ii. If L1 is not 'Class-1 local supplier', the lowest bidder among the 'Class-l local supplier', will be invited to match the L1 price subject to Class-l local supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such 'Class-l local supplier' subject to matching the L1 price.

iii. In case such lowest eligible 'Class-1 local supplier' fails to match the L1 price, the 'Class-1 local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-1 local supplier' within the margin of purchase preference matches the L1 price, the contract may be awarded to the L1 bidder.

(d) "Class-Il local supplier" will not get purchase preference in any procurement, undertaken by procuring entities.

(C)
COMMERCIAL TERMS AND CONDITIONS

1. DEFINITIONS

These Commercial Terms and Conditions shall constitute the General Conditions of Contract, where no separate contract is signed with the selected Bidder(s), and, the Bidders by putting their signature and stamp on each page of this Section V are binding themselves to these Terms and Conditions. In the Commercial Terms and Conditions as defined below, words and expressions shall have the following meanings assigned to them:

a. "Contract" means the agreement of the Parties relating to the procurement of Goods and / or the IITK Purchase Order (PO), and all attachments incorporated by reference, which shall form an integral part of the Contract. In the event of any discrepancy, the documents to prevail shall be given precedence in the following order: (i) the Contract (where separately signed), (ii) the IITK Purchase Order, (iii) its attachments, and (iv) these Commercial Terms and Conditions;

b. "Contractor" means the person or entity named in the 'CONTRACTOR' named field of the IITK Purchase Order and any agreed in writing by the IITK legal successor(s) in title;

c. "Day" means any calendar day;

d. "Delivery Date" means the latest possible date by which the Goods shall be delivered by the Contractor to the IITK, as specified in the 'DELIVERY DATE' named field of the IITK Purchase Order;

e. "Force Majeure" shall mean any unforeseeable exceptional situation or event beyond the Parties' control which prevents either of them from fulfilling any of their obligations under the Contract, was not attributable to error or negligence on their part (or of their partners, contractors, agents or employees), and could not have been avoided by the exercise of due diligence. Defects in equipment or material or delays in making them available, labour disputes, strikes or financial problems cannot be invoked as Force Majeure by the defaulting Party. Neither of the Parties shall be held liable for breach of its obligations under the Contract if it is prevented from fulfilling them by Force Majeure. The Party invoking Force Majeure shall notify the other without delay, stating the nature, likely duration and foreseeable effect, and take any measure to minimise possible damage;

f. "Goods" means all of the goods to be supplied to the IITK by the Contractor under the Contract;

g. "IITK" means the Indian Institute of Technology Kanpur;

h. "IITK Purchase Order" means the IITK's official Purchase Order document;
(i) "Party" means the IITK or the Contractor and "Parties" means the IITK and the Contractor; and
(ii) "Place(s) of Delivery" means the location(s) or place(s) where the Goods are to be delivered, as specified in the 'SHIP TO' named field of the IITK Purchase Order.

2. CONCLUSION OF THE CONTRACT

2.1. The Contract is made between the IITK and the Contractor. The Contractor is engaged as an independent contractor for the sole purpose of delivering the Goods.

2.2. The Contract shall be concluded upon the Contractor duly following the countersigning

procedure as stated in the IITK Letter of Intent (LOI).

3. FUNDING

This Contract shall become and remain effective only on the condition that an official Purchase Order is issued by IITK following the conclusion of tender exercise. In the event this is not or no longer shall the case, the IITK without unreasonable delay notify the Contractor thereof.

Any continuation of the Contractor's performance under this Contract after being notified by the IITK shall be at the Contractor's risk and expense.

4. DELIVERY AND TAKE-OVER OF GOODS

The Contractor shall deliver the Goods at the Place(s) of Delivery. On behalf of the IITK, a duly authorised representative(s), shall take-over the Goods upon delivery. Take-over of the Goods by the IITK shall not be deemed acceptance of the Goods by the IITK. The time of delivery as specified in the Contract / PO shall be strictly adhered to, and time shall be of the essence.

5. QUALITY OF GOODS

5.1. The Contractor shall deliver Goods that are:

- **a.** of the quality, quantity and description as required by the Contract / PO; and
- **b.** free from any right or claim of a third party, including rights based on industrial property or other intellectual property.

5.2. Should the Goods be of the type "homogeneously defined" or disposable, the Contractor shall provide a sample and undertake, certify, and guarantee that all Goods delivered shall be of the same quality and characteristics as the sample(s) provided.

6. INSPECTION AND ACCEPTANCE

6.1. The duly authorised representative(s) of the IITK shall have the right, before payment, to inspect the Goods either at the Contractor's stores, during manufacture, at the ports and/or in places of shipment, or at the Place(s) of Delivery. The Contractor shall provide all facilities for such inspection. The IITK may issue a written waiver of inspection. Any inspection carried out by representative(s) of the IITK or any waiver thereof shall be without prejudice to other provisions of the Contract concerning obligations assumed by the Contractor, including specifications of the Goods.

6.2. Upon delivery and inspection of the Goods, the IITK shall inspect the goods as soon as possible and complete the Goods Receiving Document. Should any Goods fail to conform to the technical specifications, codes and standards under the Contract, the IITK may reject the Goods. The Contractor shall, at no cost to the IITK, replace the rejected Goods or, alternatively, rectify the non-conformity.

6.3. In the case of Goods ordered on the basis of specifications or samples, the IITK shall have the right to reject the Goods or any part thereof and terminate the Contract if the Goods do not conform to the specifications and/or samples. Nothing in this clause shall in any way release the Contractor from any warranty or other obligations under the Contract.

7. SHIPPING AND INSURANCE

For overseas orders, shipping arrangements shall be co-ordinated by IITK. Original shipping documents including the packing list shall be airmailed/emailed by the Contractor to the (Assistant Registrar (S&P), IIT, Kanpur – 208 016, UP, India).

8. OBSERVANCE OF LAW AND EXPORT LICENCES

The Contractor shall comply with all laws, ordinance, rules and regulations bearing upon the performance of its obligations under the terms of the Contract. If an export licence or any

other governmental authorisation is required for the Goods, it shall be the obligation of the Contractor to obtain such licence or governmental authorisation. In the event of the Contractor's failure to obtain such licence or authorisation within a reasonable time, the IITK may immediately terminate the Contract. Where the award procedure or execution of the Contract is vitiated by substantial errors or irregularities or by fraud, the IITK shall suspend execution of the Contract.

Where such errors, irregularities or fraud are attributable to the Contractor, the IITK may also refuse to make payments or may recover monies already paid, in proportion to the seriousness of the errors, irregularities or fraud. The purpose of suspending the Contract shall be to verify whether presumed substantial errors and irregularities or fraud have actually occurred. If they are not confirmed, execution of the Contract shall resume as soon as possible. A substantial error or irregularity shall be any infringement of a contract or regulatory provision of India, resulting from an act or an omission that causes or might cause a financial loss.

9. PRICE

The price of the Goods shall be as stated in the Purchase Order and may not be increased.

10. PAYMENT

10.1. Unless otherwise stipulated in the Purchase Order, the IITK shall make payment within thirty (30) Days of the later of:

- **a.** Successful delivery of the goods to IITK as confirmed by the consignee (Assistant Registrar, Store & Purchase, IIT-Kanpur), endorsed by the indenter and approved by the indenters' Head of Department / Section;
- **b.** Receipt of customary shipping documents and any other documents specified in the Contract; and (c) Receipt of the original invoice issued by the Contractor.

10.2. All invoices shall be in original and shall contain the IITK Purchase Order number, and a description, the quantities, unit and total price(s) of the Goods delivered. The currency of invoice and payment shall be as specified in the Purchase Order. Unless otherwise authorised by the IITK, a separate invoice shall be submitted for each shipment under the Contract / PO. Subject to Clause 11 below ('Tax Exemption'), if applicable, the GST amount shall be separately identified in the invoice.

10.3. Payments shall be made in the currency stated in the Contract / PO, on the basis of the equivalent value of INR on the day of payment and paid directly into the nominated bank account.

10.4. The IITK shall not pay any charge for late payments.

11. TAX EXEMPTION

The Contractor's price shall reflect any tax exemption to which the IITK is entitled. If it is subsequently determined that any taxes that have been included in the price are not required to be paid or if, having been paid, any such taxes are subject to refunding, the IITK shall deduct the amount from the Contract price. Payment of such adjusted amount shall constitute full payment by the IITK. In the event that any taxing authority refuses to recognize the IITK's exemption from taxes, the Contractor shall immediately consult with the IITK to determine a mutually acceptable procedure for settling the applicable amount.

12. WARRANTY

12.1. The Contractor warrants that the Goods furnished under the Contract conform to the technical specifications, description and standards specified in the Contract, and are new and unused, and free from defects in design, workmanship and/or materials.

12.2. The Contractor shall provide a warranty for the Goods for a period of one year from the date of acceptance of the Goods by the IITK, unless the standard manufacturer's warranty period is longer in which case the longer period shall apply.

12.3. In the case of "homogeneously defined" or disposable goods, should any portion of the Goods, at any time, not comply with clause 5.1 or 5.2 herein or otherwise prove to be defective, the Contractor shall, upon written notification from the IITK, replace that portion of the Goods and bear all costs associated with the replacement of same.

13. PACKING

13.1. The Goods shall be packed and marked in a proper manner and in accordance with the Contract and any statutory requirements and any requirements of the carrier(s). In particular, the Goods shall be marked with the IITK Purchase Order number and the net, gross and tare weights, the name of the contents shall be clearly marked on each container and all containers of hazardous goods (and all documents relating thereto) shall bear prominent and adequate warnings.

13.2. The Contractor shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination. The packing shall be sufficient to withstand, without limitation, rough handling during transit. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the final destination and the absence of appropriate handling facilities at all points in transit.

13.3. All packaging materials shall be non-returnable.

14. DEFAULT AND DAMAGES

14.1. If due to reasons attributable to the Contractor, the Contractor fails or refuses to:

- **a.** deliver any or all of the Goods under the Purchase Order;
- **b.** comply with any or all of the terms and conditions set out in the Purchase Order; or
- **c.** deliver any or all of the Goods under the Purchase Order on or before the Delivery Date; the IITK may hold the Contractor in default under the Purchase Order.

14.2. When the Contractor is thus in default, the IITK may, by written notice to the Contractor, immediately terminate the Purchase Order in whole or in such part or parts thereof in respect of which the Contractor is in default.

14.3. Alternatively, to clause 14 above when the Contractor is thus in default, the IITK may, at its own discretion, set a reasonable period of time for the Contractor to remedy its default. Any new Delivery Date shall be specified in a written amendment to the Purchase Order, duly countersigned by the Contractor.

14.4. The IITK may, at its discretion, impose penalties upon the Contractor calculated in accordance with clause 15 for each Day the Contractor is late in delivering the Goods past the Delivery Date initially specified in the Purchase Order.

14.5. If the Contractor does not remedy its default within the period of time accorded under clause 16, the IITK may, by written notice to the Contractor, terminate the Purchase Order with immediate effect.

14.6. Upon any termination of the Purchase Order, in whole or such part(s) thereof in respect of which the Contractor is in default, the IITK may engage another contractor to deliver the Goods and recover any difference in price and any additional costs from the Contractor.

14.7. The Contractor shall indemnify the IITK for all losses, charges, costs and expenses, which the IITK may suffer or incur as a result the Contractor's default, including those resulting from engaging another contractor pursuant to this clause 14.

15. PENALTIES

If, in accordance with clause 15, the IITK imposes penalties on the Contractor, such penalties shall amount to One percent (1%) of the total Purchase Order price for each week following

the initial Delivery Date specified in the Purchase Order but shall not amount to more than Ten percent (10%) of the total Purchase Order value. The penalties for the delay may be deducted by IITK from any sum(s) due, or to become due, by the IITK to the Contractor.

16. DELAY NOT ATTRIBUTABLE TO THE CONTRACTOR

If the Contractor is delayed at any time in the delivery of the Goods or fulfilment of any other of the Contractor's obligations by any act or omission of the IITK, or by any of its officials, or by any separate contractor(s) contracted by the IITK, or by changes ordered in the type and/or quantity of the ordered Goods, or the Place(s) of Delivery, or any causes beyond the Contractor's reasonable control, or by any other cause, which the IITK determines may reasonably justify the delay, the Delivery Date of the Goods, or fulfilment of any other of the Contractor's applicable obligations shall be extended for such reasonable period of time as the IITK and the Contractor mutually determine. The set reasonable period of time and any amended delivery date shall be specified in a written amendment to the Contract / PO, duly countersigned by the Contractor.

17. FORCE MAJEURE

As soon as possible after the occurrence of any event constituting Force Majeure, but no later than three (3) Days, the Contractor shall give notice and full particulars in writing to the IITK of the Force Majeure. If the Contractor is thereby rendered unable, wholly or in part, to meet its obligations under the Contract, the IITK may terminate the Contract / PO with immediate effect by providing written notice to the Contractor.

18. INDEMNITY

18.1. The Contractor shall indemnify, hold and save harmless and defend at its own expense the IITK, and all of the foregoing's officials, agents, servants and employees from and against all suits, claims, demands and liability of any nature or kind, including costs and expenses, arising out of acts or omissions of the Contractor or its employees, agents or subcontractors in the performance of the Contract.

18.2. Clause 18 shall include, without limitation, claims and liabilities in the nature of workmen's compensation and claims and liabilities arising out of the use of patented inventions or devices.

19. ASSIGNMENT

19.1. The Contractor shall not assign, transfer, pledge or make other disposition of the Purchase Order or any part thereof or of any of the Contractor's rights, claims or obligations under the Purchase Order except with the express written consent of the IITK. Any assignment made without such consent shall be void and of no effect.

19.2. The Contractor shall not subcontract any of its obligations under the Contract / PO without the express written consent of the IITK. The IITK may require the Contractor to furnish particulars of the proposed subcontract as the IITK deems necessary.

19.3. The IITK's approval of any subcontracting shall not relieve the Contractor from any liability or obligation under the Contract. In any subcontract, the Contractor agrees to bind the subcontractor by the same terms and conditions by which the Contractor is bound under the Contract / PO.

20. INSOLVENCY AND BANKRUPTCY

20.1. Should the Contractor become insolvent or should control of the Contractor change by virtue of insolvency, the IITK may with immediate effect and without prejudice to any other right or remedy available to it, suspend the performance of the Contractor's obligations or terminate

the Purchase Order with immediate effect, by providing the Contractor with written notice thereof.

20.2. Should the Contractor be adjudged bankrupt, or should the Contractor make a general assignment for the benefit of its creditors, or should a receiver be appointed on account of the Contractor's insolvency, the IITK may, without prejudice to any other right or remedy available to it, terminate the Purchase Order with immediate effect by providing the Contractor with written notice thereof.

21. TERMINATION

21.1. The IITK shall have the right to terminate the Purchase Order or any of the provisions thereof at any time by serving a three days' notice to the Contractor.

22. WAIVER

A waiver of any breach of or default under the Contract / PO shall not constitute a waiver of any other breach or default and shall not affect the other terms of the Contract / PO. The rights and remedies provided by the Purchase Order are cumulative and are not exclusive of any other rights or remedies.

23. ADVERTISING

The Contractor shall not advertise or otherwise make public the fact that it is a contractor to the IITK. The Contractor shall not in any way use the name, emblem, logo, official seal, or any abbreviation of the IITK.

24. DISCRETION AND CONFIDENTIALITY

The Contractor is required to exercise the utmost discretion in all matters relating to the Contract / Purchase Order. Unless required in connection with the performance of the Purchase Order or expressly authorised in writing by the IITK, the Contractor shall not disclose at any time to any third party any information which has not been made public and which is known to the Contractor by reason of its association with the IITK. The Contractor shall not, at any time, use such information to any private advantage. These obligations do not lapse upon any completion, expiration, cancellation or termination of the Contract / PO.

25. NOTICES

Any notice given in connection with the Contract shall be given in English and in writing and shall be deemed to be validly given if sent by registered mail or by fax or by email to the other Party at the following:

- **a.** for the IITK: the contact details set out in the 'IITK BUYER' name field of the Purchase Order; and
- **b.** for the Contractor: the contact details set out in the 'CONTRACTOR' named field of the IITK Contract/Purchase Order.

26. STAFF MEMBERS NOT TO BENEFIT

The Contractor shall not grant to any official of the IITK any direct or indirect benefit or preferential treatment on the basis of the Purchase Order or the award thereof. Any breach of this provision shall constitute a fundamental breach of the Purchase Order.

27. GOVERNING LAW

The Contract shall be governed by and construed in accordance with the substantive laws of the Republic of India.

28. SETTLEMENT OF DISPUTES

28.1. The Parties shall use their best efforts to negotiate and amicably settle any disputes, controversies or claims arising out of, or in connection with, the Contract / Purchase Order or its interpretation.

28.2. If the Parties fail to settle the dispute amicably within thirty (30) Days of commencement of the negotiations, the dispute shall be settled through arbitration. One (1) sole arbitrator shall be appointed by the Director of IITK who shall have full powers to make final and binding decisions subject to prevailing laws of India. The appointing authority shall be the Director of IITK. The place of arbitration shall be Kanpur and the language used in the arbitration proceedings shall be English.

29. PRIVILEGES AND IMMUNITIES

No provision of the Contract / Purchase Order shall be deemed, or interpreted as, a waiver of the privileges and immunities enjoyed by the IITK.

30. AMENDMENTS

No modification, amendment or change to the Contract/Purchase Order, or waiver of any of its provisions, or any additional contractual relationship with the Contractor shall be valid unless approved in the form of a written amendment to the Contract/Purchase Order, signed by a fully authorised representative of each Party.

31. VALIDITY

The invalidity in whole or part of any condition of the Contract / Purchase Order or clause thereof shall not affect the validity of the remainder of such condition or clause.

32. ENTIRE AGREEMENT

The Contract / Purchase Order constitute the entire agreement and understanding of the Parties and supersede any previous agreement, whether orally or in writing, between the Parties relating to the subject matter of the Contract.

33. GOVERNING LANGUAGE

The Contract / Purchase Order shall be executed in the English language which shall be the binding and controlling language for all matters relating to the meaning and interpretation of the Contract / Purchase Order.

Tender document

Department of Mechanical Engineering
Indian Institute of Technology Kanpur
Kanpur (UP) 208016 India

Enquiry date: 17.02.2023 Enquiry No: IITK/ME/KMD/2023/01

Online quotations are invited for Ansys Academic Research Software. The detailed specification is described below.

Sr. No.	Product Description	Modules Details
1	Ansys Academic Research Mech & CFD	Ansys Mechanical Enterprises (Autodyne,Fatique,ASAS,Aqua & more)
		Ansys CFD Enterprise (CFX, Fluent, FENSAP-ICE, Forte, Polyflow, Chemkin, & more)
		Ansys Ensight Enterprise
		Ansys Blademodeler
		Ansys Forming
		Ansys Additive Suite & Print
		Ansys Discovery Modeling & Simulation
		Ansys Motion (Motion, Drivetrain, Links, Easy Flex, STEP Translator, Parasolid Translator, Catia Importer)
		Ansys Sound Pro
		Ansys Sherlock
		Ansys optiSLang Enterprise
2	Ansys Academic Research HF	Ansys Electronics Premium HFSS
		Ansys Electronics Premium Icepak
		Ansys Electronics Premium Siwave
		Ansys Electronics Premium Q3D Extractor
		Ansys EMA3D Cable & Charge
		Ansys NuHertz FilterSolutions
		Ansys Medini Analyze Enterprise
3	Ansys Academic Research EM	Ansys Electronics Premium Q3D Extractor
		Ansys Electronics Premium Maxwell
		Ansys Motor-CAD Enterprise
4	Ansys Academic Lumerical Research	FDTD + MODE + Multiphysics + Interconnect + CML Compiler

Sl. No	Specifications
1.	The FEA software shall have provision of extensive element library to model multi-physics problems including solid elements, structural elements like shells, beams, trusses, membrane elements, rigid and mpc elements, special elements like springs, dashpots etc. It shall also have the provision for creating user defined elements. **Software Should have capabilities in following geometric Idealization** 1. Spring 2. Mass 3. Damper 4. Spar 5. Beam 6. Pipe/Elbow 7. Shell - Thin 8. Layered Shell - Thin (Composite) 9. Shell - Thick (Solid Shell) 10. Layered Shell - Thick (Solid Shell) 11. 2D Plane / Axisymmetric 12. 3D Solids / Cyclic symmetric/ Periodic boundary condition 13. Layered 3D Solids (Composite) 14. Infinite Domain 15. Reinforced 16. Substructuring / Matrix
3.	**FEA Software Should have following Modeling Capabilities** • Contact - Linear • Contact - Nonlinear • Thermal conductivity for Contact • Joints • Spot Welds • Element Birth and Death • Gaskets • Rezoning and Adaptive Remeshing (NLAD) • Inverse Analysis
4.	**FEA Software should support following types of Materials** • Basic Linear Materials (Linear, Anisotropic, Temperature Dependent). • Basic Nonlinear Materials (Hyper, Plasticity, Rate Independent, Isotropic, Concrete). • Advanced Nonlinear Materials (Rate dependent, Anisotropic, Damage Models, Geomechanics Materials, and Multiphysics). • Reactive Materials • Fracture Mechanics and crack growth • User-Defined material model

	FEA Software should have capabilities in modeling of Composite Materials • Material Definitions • Layers Definitions • Interface Plies • Advanced Modeling Features • Variable Material data • Solid Extrusion • Lay Up Mapping • Advanced Failure Criteria Library • First-ply Failure • Last-Ply failure • Delamination • Draping
	FEA Software should have following capabilities with structural solver • Linear Static • Nonlinear Static • Pre-Stress effects, Linear perturbation • Nonlinear Geometry • Buckling - Linear Eigenvalue • Buckling - Nonlinear Post Buckling • Steady State Analysis applied to a Transient Condition • Advanced Wave Loading
	FEA Software should have capability for topology Optimization • Structural Optimization • Modal Optimization • Thermal Loads • Inertial Loads • Optimized Design • Validation • Manufacturing Constraints • Stress constraints • Symmetry
	FEA Software should have capabilities for multi Analysis types • Submodeling • Fluid structure interaction (1way & 2 way) • Multiphysics Data Mapping (fluid/thermal to structure etc) • Advanced Multi-Stage 2-D to 3-D Analysis • Fluid and FEA solver should be launched from a single Platform and should have two ways coupled simulation option between them.

	FEA Software should have following types of vibrations analysis capabilities • Modal • Modal - Pre-Stressed • Modal - Damped/Unsymmetric • Transient - Mode-Superposition • Harmonic - Mode-Superposition • Harmonic - Full • Spectrum/ Seismic • Random Vibration • Mistuning • Rotordynamics • Modal Acoustic • Harmonic Acoustic
	FEA Software Should have Nonlinear Transient Dynamics capabilities • Rigid Body Mechanisms & Multi body dynamics • Rigid Body Dynamics with flexible bodies • Full method of Transient analysis • Component mode synthesis with Substructuring analysis
	FEA Software should have below Explicit Dynamics capabilities • FE (Lagrange) Solver • Meshless Solvers • Implicit-Explicit Deformations • Implicit-Explicit Material States • Mass Scaling • Natural Fragmentation • Erosion Based on Multiple Criteria • Fluid and Structural Interaction (FSI)
	FEA Software should have below Durability/Fatigue analysis • Stress-Life (SN) • Strain-Life (EN) • Safety Factor
	FEA Software should have below Wave Hydrodynamics capabilities • Diffraction and Radiation • Frequency & Time Domain Motions Analysis • Moorings, Joints & Tethers • Load Transfer to Structural Analysis
	FEA Software should have below Thermal analysis capabilities • Steady State Thermal

	• Transient Thermal • Conduction • Convection • Radiation to Space • Radiation - Surface to Surface • Phase Change • Thermal Analysis of Layered Shells and Solids
	FEA Software Should also support following additional Physics • Piezoelectric • Piezoresistive • Electroelastic • Electromagnetic • Diffusion-Thermal • Structural-Electric • Structural-Thermal- • Electric-Magnetic
	FEA Software Should have dedicated module for following ways of optimization analysis Capabilities • Parameters • Design Point Studies • Correlation Analysis • Design of Experiments • Sensitivity Analysis • Goal Driven Optimization • Six Sigma Analysis • Adjoint Solver for Shape Optimization • Adjoint solver supports rotating reference frames & conjugate heat transfer • Multi-objective-constrained optimization
	FEA Software should Include following modules • Customization option • Batch run capability • Parallel Solving on Local PC Option (4 Cores HPC included) • CDB and 3rd party FE • Model Import
	FEA Software Should have following CAD geometry modeling and Meshing feature ➢ **Photo realistic rendering in Pre- & Post-Processing** ➢ **CAD-Cleaning or Model Preparation for CAE** • Direct Modeling Technology • Feature Based Modeling Technology • Open Data from All Major CAD Systems • Export Data to Neutral File Formats • Modify Imported Geometry

- Defeaturing and Simplification Tools
- Model Repair
- Add Parameters for Design Exploration
- Extract Mid-Surfaces/Shells and Beams
- Extract Volumes & Create Inner Fluid Domains
- Extract Outer Air Enclosures
- Shared Topology for Conformal Meshing
- Booleans and Slicing
- Create Weld Bodies
- Boundary Condition Mapping
- Scripting
- Sketching and Editing Tools
- 3D Comparison Tools
- Repair and Edit Faceted Data
- Icepak Integration
- Reverse Engineering
- Faceted Data

➢ **General Purpose & Unified Meshing Solution**

- Physics-aware meshing
- Auto Meshing
- Hexahedral default
- Tetrahedral mesh alternate
- Automated size controls
- Automated inflation
- Automated part repeat
- Auto update with parameters
- Patch conforming mesh
- Patch independent mesh
- Defeaturing based on CAD
- Defeaturing based on mesh
- Mesh matching
- Mapped mesh control
- Mesh control - move, merge, edit
- Assembly meshing

➢ **Dedicated Structured/Block Meshing**

- Hexamesher - Multi-block structured volume meshes
- Hexamesher - Unstructured hexahedral volume meshes
- Conversion free blocks to mapped blocks
- O-Grid generation
- "Patch independent" meshing methods to work with dirty cad and does not require that surfaces be formed into solids or that flow volumes be extracted
- Generate mesh from a range of sources including CAD data, faceted data, scan data or even combinations of CAD, facets and mesh.

	• Tetra mesher with prism mesh generation • Journal for batch execution ➢ **Dedicated Tetrahedral Meshing** • Embedded in the Solver Interface • Generate mesh from a range of sources including CAD data, faceted/STL data, scan data or even combinations of CAD, facets and mesh. • Variety of Surface mesh repair (quality & connectivity) tools • Surface wrapping and remeshing • Volume Mesh Generation Methods – Tetrahedral, Hexcore, CutCell, Thin Volume, Prisms, Poly, poly-hexcore • Scriptable for batch execution ➢ **Dedicated Meshing for Blades** • Fully Automatic Topology and Meshing • Tailored for Turbomachinery • Automated Tip Clearance Meshing • Rapid Mesh Quality Feedback ➢ **Post-Processing** • Read and visualize data from most popular simulation programs • Data Visualization (Iso-surfaces, contour lines, streamlines, volume rendering, deformation of parts, etc.) • Visualize Fluid–Structure Interaction and Multiphysics simulations • Query data and make plots • Variables and Calculator – for deriving other results & build own variables • Automate Post-Processing with Python scripting • Animation with CAE data. Compare experimental data with simulation by playing both simultaneously. • Compare multiple runs, datasets, physics, graphs in a single window
	FEA Software should have following Capabilities in Model Preparation for CAE • Open data from any CAD system • Edit designs and prepare them for simulation • Simplify geometry by removing features (e.g. rounds and holes) • Clean up and repair dirty geometry to create watertight solids • Create parameters on imported geometry to enable optimization of designs through analysis • Extract mid-surfaces/shells and beams solid models for efficient meshing and solving • Extract volumes/create inner fluid domains and outer air enclosures for CFD • Create shared topology among bodies to generate conformal meshes • Slicing of models into hex meshable bodies • Create weld bodies to simulate welds between shells • Define regions of symmetry for symmetric analysis • Define named selections to aid in scoping of loads and boundary conditions • Define general CAD attributes • 2D drawing and editing tools • 2D dimensioning and constraints

	• Supply 3D markups and compare models to document changes to design teams • Repair and edit faceted files for further FEA topological optimization and CFD analysis • Early Concept Design (bid modeling/ brainstorming/concepting) • Create new concepts quickly and easily with four tools: Pull, Move, Fill, Combine • Use Cut, Copy, Paste, etc for fast ideation from existing designs • Enable 2d and 3D communication and collaboration with 3D Markup, Dimensions, and Drawing tools • Create BOM to evaluate weights and lengths for cost calculations • Use automated tools to repair dirty geometry • Use top down or bottom up modeling • Create 2D drawings Import and edit large assemblies
	CFD Software should have following General CFD Solver Capabilities • Comprehensive inlet and outlet Conditions • Steady-State Flow • Transient Flow • 2-D and 3-D Flow • Reduced Order Models (ROM) • Time Dependent Boundary Conditions • Customizable Materials Library • Fan Model • Periodic domains • Flow-driven solid motion (6DOF) • Pressure-based coupled solver • Density-based coupled solver • Dynamic/moving-deforming mesh • Overset mesh • Immersed-solid/MST method for moving parts • Automatic on-the-fly mesh generation with dynamic refinement • Dynamic Solution-Adaptive Mesh refinement • Polyhedral unstructured solution- adaptive mesh refinement
21	**Software should have following Single Phase, non-reacting flows capabilities with CFD Solver** • Incompressible Flow • Compressible Flow • Porous Media • Non-Newtonian Viscosity • Turbulence – Isotropic • Turbulence – Anisotropic (RSM) • Turbulence – Unsteady (LES/SAS/DES) • Turbulence – Laminar/Turbulent Transition • Flow pathlines (Massless)

	• Acoustics (Source Export) • Acoustics (Noise Prediction)
22	**CFD Software should have following capabilities for Heat transfer analysis** • Natural Convection • Conduction & Conjugate Heat Transfer • Shell Conduction (including multi-layer model) • Internal Radiation - Participating Media • Internal Radiation - Transparent Media • External Radiation • Solar Radiation & Load • Auto calculation of View factor in 2D & 3D • Simplified Heat Exchanger Model • Non-equilibrium Thermal Model • Porous Media
23	**CFD Software should have following capabilities for particle flow (Multiphase) analysis** • Coupled Discrete Phase Modeling including Thin Wall Films • Macroscopic Particle Model • Inert Particle Tracking (With Mass) • Liquid Droplet (Incl. Evaporation) • Combusting Particles • Multicomponent Droplets • Discrete Element Model (DEM) • Break-Up and Coalescence • Erosion

24	**CFD Solver should have capability for Free Surface Flows (Multiphase)** • Implicit VOF • Explicit VOF • Coupled Level Set/VOF • Complex Multiphase Regime Transitions (AIAD Model) • VOF to DPM spray model • Open Channel Flow and Wave • Surface Tension • Phase Change • Cavitation • Cavitation where multiple fluids and non-condensing gases are present
25	**Solver should have capability for Dispersed Multiphase Flows (Multiphase)** • Mixture Fraction • Eulerian Model including Thin Wall Films • Boiling Model

	• Surface Tension • Phase Change • Drag and Lift • Wall Lubrication • Heat and Mass Transfer • Population Balance • Reactions Between Phases • Granular Model for Dense Bed of Solids • Dense Particulate Coupling (DDPM)
26	**CFD Solver should have following capability for Reacting Flows** • Species Transport • Non-Premixed Combustion • Premixed Combustion • Partially Premixed Combustion • Composition PDF Transport • Finite Rate Chemistry • Pollutants and Soot Modeling • Sparse chemistry solver with dynamic cell clustering and dynamic adaptive chemistry • Ability to use Model Fuel Library mechanisms • Flame-speed from Fuel-component Library • DPIK Spark ignition model • Flame propagation using level set method (G-equation) • Internal Combustion Engine Specific Solution • Comprehensive surface-kinetics • Chemical and phase equilibrium • Flamelet table generation • Detailed Electrochemistry Model for Li-Ion Batteries

27	**CFD Solver should have following capability for Turbomachinery application** • MRF/Frozen-Rotor • Sliding-Mesh/Stage • Transient Blade Row • Pitch Change • Time Transformation • Fourier Transformation • Harmonic Analysis • Blade Flutter Analysis • Forced Response Analysis • Flank milled blades • Performance Maps

28	**CFD Solver should have capability for In-Flight Icing** • Simulates Droplet Sizes • Inclusion of Vapor /Humidity Effects on Icing • Icing Environments of Appendices C, O (SLD), and D (Ice Crystals) • Various Pre-Defined Droplet Size Distributions • Simulation of Rime, Glaze, and Mixed Icing • Single-and Multi-Shot Icing Simulations with Mesh Deformation for Prediction of Ice Accretion and Aerodynamic Performance Degradation • Single-and Multi-Shot Icing Simulations with Automatic Re-Meshing for Prediction of Ice Accretion and Aerodynamic Performance Degradation • Conjugate Heat Transfer (CHT) for Anti-and De-Icing Simulations • Icing of Rotating Components of All Types: Rotors, Propellers, and Engines (Fan, Guide Vanes, and Any Number of Compressor Rows)
29	**CFD Software should have capability of High Rheology Material** • Viscoelasticity • Specialty Extrusion Models • Specialty Blow Molding Models • Specialty Fiber Spinning Models Optimization

30	**CFD Solver should have following HPC capability** • Parallel Solving on Local PC Option (4 Cores HPC included) • Parallel mesh generation
31	**Multi-Physics solution should support:** • Advanced, Automated Data Exchange • Accurate Data Interpolation Between Dissimilar Meshes • Drag-n-Drop Multiphysics • Direct Coupling Between Physics • Collaborative Workflows • Fully Managed Co-Simulation • Flexible Solver Coupling Options
32	**CFD Solver should have capability for 1 way & 2way Fluid-Structure Interaction** • Force Induced Motion/Deformation • Fluid Thermal Deformation
33	**CFD Solver should be able to solve Electro-Thermal Interaction** • Convection Cooled Electronics • Conduction Cooled Electronics • High Frequency Thermal Management • Electromechanical Thermal Management
34	**CFD Solver should have capability of following Coupled Interactions** • Aero-Vibro-Acoustics

	• Acoustics-Structural • Fluid Magnetohydrodynamics
35	**CFD Solver should have following Ease of use and productivity features** • Support ACT Extensions • Mosaic Enabled Meshing Technology • Task based workflows watertight geometries • Task based workflow watertight geometries • Directly enter expressions • Parallel solving with cloud launched from desktop • Streamlined multiphase setup • Blade Fin Cooling (CFX)

TECHNICAL SPECIFICATIONS

S.NO	Technical Specifications of Ansys Electronics Enterprice Simulation Pack
1	• The package have the capability to simulate any arbitrary 2D or 3D model for EM simulation from DC to THz frequency and can also extend the solution to Multiphysics Thermal Analysis. Moreover Circuit simulation tool allow user to integrate multiple electromagnetically analyzed models to carry out a system-level analysis.
2	Numerical Solver Technology: ▪ HFSS (High Frequency 3D Electromagnetic Field simulation) • 3D full-wave Frequency Domain-based electromagnetic field solver based on the Finite Element Method (FEM). • 3D full-wave Frequency Domain-based electromagnetic field solver based on Integral Equation Method (MoM). • 3D full-wave Time Domain-based electromagnetic field solver based on Discontinuous Galerkin (DG) and FEM Time Domain Methods. • 3D full-wave Frequency Domain-based Asymptotical electromagnetic field solver based on Shooting and Bouncing Ray + (SBR+) method. • 3D full-wave Frequency Domain, Eigen Mode Solver, based on FEM • 3D Full-wave Frequency Domain Characteristic Mode Analysis Solver based on MoM • 3D Multipaction solver for finding RF breakdown inside High Power RF components • 3D simulation tools support Hybridization FEM, IE and SBR+/PO solver in a single design. • SBR+ solver should automatically combine following asymptotic methods to arrive at an accurate solution o Physical Optic (PO), o Geometrical Optic (GO), o Physical Theory of Diffraction (PTD), o Uniform Theory of Diffraction (UTD),

	○ Creeping Wave (CW) ▪ Maxwell (Low-frequency electromagnetic field simulation for 3D/2D structures) • Transient - nonlinear analysis with: ○ Motion—rotation, translational, non-cylindrical rotation ○ External circuit coupling ○ Permanent magnet demagnetization analysis ○ Core loss computation ○ Lamination modelling for 3D • AC Electromagnetic—Analysis of devices influenced by skin/proximity effects, eddy/displacement currents • Magneto static—Nonlinear analysis with automated equivalent circuit model generation • Electric Field—Transient, Electrostatic/Current flow analysis with automated equivalent circuit model generation • 2D low-frequency electromagnetic solver should be able to ○ Extract Torque, Power, current variations ○ Capability to do the demagnetization study, help to extract Torque Speed characteristics ○ Inbuilt circuit solver to a model electronic circuit like inverters, rectifiers, etc and connect with 2D Electromagnetic model ○ Extract losses as output for CFD (Thermal) Analysis ▪ Q3D (Quasi-static electromagnetic field simulation for 2D/3D RLGC extraction) • 3D EM Solver for RLGC Extraction of Busbar, PCB, IC Packages • Quasi-static 3D electromagnetic field analysis using Method of Moments accelerated by Fast Multipole Method • DCRL, ACRL & CG Solver • Quasi-static 2D electromagnetic field analysis using Finite Element Method • There should be a capability to solve just the 2D cross-section of transmission lines to extract its characteristic impedance. ▪ AEDT ICEPAK (CFD - Thermal Analysis) • 3D CFD solver for Transient and Static Thermal Analysis • Capable to handle types of heat transfer: Conduction, Convention and radiation: Combination of all modes of heat transfer • 3D Static Solver for Transient and Static Thermal Analysis • 3D FEA solver Mechanical Stress Analysis ▪ SIwave(2.5D Electromagnetci solver for PCB, Planar structures) • 2.5D Hybrid (FEM + MOM) solver for PCB, Package • EMI Scanner - Capable • Able to model and simulate following SI and PI effects: • resonance frequencies of complete power and ground structures, ○ power and ground bounce, ○ simultaneous switching noise, ○ impedance discontinuities due to changes in signal layers or split supply planes, ○ noise coupling between signal lines and supply planes,

	○ time-domain effects such as propagation delay, rise and fall times, reflections and ringing, ○ frequency-domain phenomena such as resonant modes and S, Y, and Z-parameters. ○ DC IR analysis to compute DC voltage drop and current density • Near and far field analysis, automatically from circuit simulation waveforms for accurate source modeling and thus accurate emissions analysis (EMI/EMC). ▪ Circuit simulation (Designer, Simplorer and EMIT) • ID circuit simulation capability for following RF simulations ○ Linear analysis ○ DC analysis ○ Oscillator Analysis ○ Harmonic Balance Analysis (1-Tone and N-Tone) ○ Transient Analysis ○ Time Varying noise Analysis ○ Phase noise Analysis ○ Multi-tone harmonic balance analysis ○ Envelope analysis ○ Load pull analysis and model support ○ Periodic transfer function analysis • Circuit System solver should have ○ Build power electronic circuits using IGBT, BJT, MOSFET, etc. ○ Capability to characterize semiconductor switches from manufacturer datasheet ○ Capability to do time and frequency domain simulations ○ Capability to co-simulate with physics-based models ○ Capability to import Reduced-Order Models generated for Physics-based simulations • 1D Power Spectral Based solver for finding RF interference between different Microwave system • System-level solver for Integrating physics-based model with multi-domain based components, Power Electronic circuits, etc. • Power Spectral solver should provide following RFI matrics across multiple Transmitter and Receiver platform: EMI Margin, Sensitivity, Availability, Desense, Noise In-Band EMI Margin • Power Spectral solver should provide RF interference of Mulitple Transmitter to the single receiver. • Power Spectral solver should support Non-Linear Interference Effects in RF interference analysis
3	Graphical User Interface for EM analysis The software package should have the following features: • Tools should have an option or toolkit to automatically setup simulations for following RCS/Radar simulation: Range Profile, ISAR, Range Doppler Prcoessing and waterfall. • The tool should have an option to encrypt the 3D component, which a user can share with others without revealing the IP

	• The tool should have an option to import/export encrypted/unencrypted 3D component models for simulation.
	• The tool should have templates for setting up EMI EMC simulation like Radiated Emission, Conducted Emission, ESD, BCI
	• The tool should have the capability to model and parameterize any arbitrary 3D model
	• The tool should have the capability to do operations such as unite, subtract, intersect different objects to create a model
	• There should be a provision for creating equation-based curves/surfaces for creating more complex models.
	• There should be provision for wrapping sheets onto curved surfaces.
	• The software should have the ability to import, edit, simplify and parameterize 3D CAD models from third-party tools.
	• The capability to clean up 3D CAD and detection tools for Short Edges, Overlap Faces, Corrupt Faces
	• The tool should allow users to edit STL files directly and leverage automatic repair tools
	• Options for cleaning imported 3D models
	  o Options for analyzing individual objects of the complete 3D model to locate any faults in the modelling
	  o Possibility to find inter-object misalignments
	• There should option for healing the geometry
	• There should be provision to model layouts into a stackup based environment and simulate in the same environment
	• Layout interface should have options to change the stackup, trace widths, via and padstack.
	• PCB Trace modelling options in the Layout interface
	  o Surface roughness – Huray and Groisse
	  o Options for Etching

	Import ECAD/MCAD
	• Integrated design flow that allows user to easily import design geometry from commercial layout packages such as:
	  o Cadence Allegro and APD,
	  o Sigrity UDP,
	  o Zuken CR5000, CR8000,
	  o Mentor BoardStation, Expedition, and PADS Layout,
	  o Altium Designer,
	  o DXF and GDSII files.
	• Ability to import circuit component models of various types like,
	  o HSPICE and spectre models
	  o IBIS models, including IBIS-AMI
	  o W-element
	  o S-parameters, as Touchtone, CITI files
	  o X-parameters
	  o Verilog libraries
	• Ability to import Chip Power Model (CPM) for the die/IC, to perform accurate power integrity analyses.
	• The tool should support the import of following 3D DATA: ACIS, Acrobat 3D, 2D PDF, AMF, AutoCAD, CATIA, Creo Elements/Direct Modeling,

	Design Modeler, ECAD IDF, IGES, Image Files, Inventor, JT Open, Keyshot, Acrobat PDF 2D, AMF, AutoCAD, CATIA, Excel, ECAD IDF, IGES, Image files, NX, Parasolid, Point curve text, POV-Ray, Microsoft PowerPoint, Pro/ENGINEER • The tool should support the export of following 3D DATA: ACIS, Acrobat PDF 3D, Acrobat 2D PDF, AMF, AutoCAD, CATIA, ECAD IDF, IGES, Image Files, Inventor, JT Open, Keyshot, Acrobat PDF 2D, AMF, AutoCAD, CATIA, Excel, ECAD IDF, IGES, Image files, NX, Parasolid, Point curve text, POV-Ray, Microsoft PowerPoint, Pro/ENGINEER, Rhino, SketchUp, SolidWorks, STEP, STL
5	Mesh Options • Use tetrahedron element for 3D models and triangles for sheet structures (HFSS/Q3D/MAXWELL) • Option to have curvilinear mesh elements for accurately solving curved geometries (HFSS) • Mesh Control (HFSS/Q3D/MAXWELL) • Options to specify surface deviation, normal deviation and aspect ratio to control mesh density(HFSS/Q3D/MAXWELL) • Ability to restrict the number of elements/size of the elements within an object or just on the surface of the object (HFSS/Q3D/MAXWELL) • Skin-depth based seeding capability (HFSS) • Advanced capability like Assembly Meshing: Independent component meshing allows mesh reuse, no re-meshing in parametric variations, independent mesh settings for different components and more robust meshing for models with a significant difference in scale. Especially useful for Antenna Placement and scattering problems where mesh reuse can be done (HFSS) • Phi mesher (Prism elements) for faster meshing of the planar structures (HFSS). • Provision of automatic & manual meshing to be available (Icepak) • Automatic meshing for fluid & solid regions to be available(Icepak) • Different type of mesh models like body fitted Cartesian mesh etc. to be available to represent complain shapes in the electronic model (Icepak) • Ability to import external mesh in addition to native mesh (Icepak)
6	Advanced Material Library which should include; • A comprehensive materials database containing permittivity, permeability, electric and magnetic loss tangents for common substances. • Users must be able to include anisotropic materials, ferrites, temperature and frequency-dependent material properties. Frequency-dependent material models like Debye and Djordjevic-Sarkar models to ensure that the material satisfies causality conditions. • Provision for Spatially dependent material properties and boundary conditions. • Data base of interface materials like thermal components (manufactures like 3M, Aavid, etc). • Heat sinks: Standard heat sinks of different manufactures like Aavid, Thermshield etc to be provided. Minimum of 500 No's of heat sink database.

7	Excitation and Boundary Condition
	• Excitation for Ports SYZ parameter excitation
	  o Arbitrary internal and external ports – Waveport and Lumped Port
	  o Ability to solve all ports in one solution and not port-by-port
	  o Floquet ports for antenna arrays, frequency selective surfaces (FSS) and other periodic structures
	  o The software should have a provision for extracting fields/active S parameter as per user specified excitation magnitude and phase
	• Option to provide voltage source and current source
	• Magnetic bias for ferrite models
	• Incident wave excitations available from following wave types:
	  o Plane Wave, Hertzian dipole wave, Cylindrical wave, Gaussian Beam Wave
	  o Linear Antenna wave, Far Field Wave, Near Field Wave
	  o Far-field wave and near field wave can be from another design or the measurement.
	• Boundary conditions available:
	  o Radiating, perfectly matched layers and FEBI
	  o Impedance boundary
	  o Layered Impedance with shell elements which can account for thickness even when modelled as sheets
	  o Lumped RLC boundary
	  o Symmetry boundary for reducing the problem size
	  o Period boundary condition for solving arrays
	  o Finite conductivity boundary with the capability to include metal roughness using Huray or Groisse algorithm
	  o Fresnel Boundary

8	General Solver Options
	• Direct or Iterative approach for solving the matrices
	• Hybrid solver with Integral equation solver should support matrix solving with ACA (Adaptive Cross Approximation) or MLFMM (multilevel fast multipole method).
	• Basis functions are available as zero, first, second and mixed order for simulation of various class of problems.
	• Import mesh to design from other similar design
	• Frequency sweep options
	  o Interpolation sweep
	  o Discrete sweep
	  o Fast sweep
	• Broadband frequency sweeps with the capability to take into account dispersive ports, materials and skin effect.
	• Enforce passivity / enforce causality for the broadband sweep
	• DC point solver option for PCBs for accurate DC point characterization
	• The asymptotic solver should enable all SBR solver like PTD, UTD, and CW in a single simulation
	• PO and SBR+ asymptotic solver should support lossy dielectrics
	• SBR solver should support multilayer dielectrics

	• FEM frequency-domain solver should have the capability to simulate even in THz region for applications such as metamaterials, FSS etc. • There should be an option of using 2.5D MOM or FEM solver to analyze planar layouts. • Solution convergence and control:Convergence based on S parameter, field quantities or user-defined expressions • The software should have the capability for adaptive meshing across different frequencies of broadband structures. • Eigenmode solver should be able to find the natural resonances and quality factor of the lossy structure. • The solver (FEM) should have an option to o physically divide the simulation model into the different sections o Enable parallel meshing and solving for each section individually • Solver has the capability for solving a single unit cell of an array for Active Element Patterns using Periodic Boundary Conditions • The solver should have the ability to create and solve Finite Array Simulation by combining different types of unit cells. • Finite Array simulation should support features like Array Mask creation for arbitrary sparse array configuration. • Scattered field simulation for solving RCS problems. Provision for both bistatic and monostatic RCS along with incident field excitations. • RCS calculation should be able to conduct with FEM, IE and SBR+ solvers • RCS simulation using SBR solver should automatically combine additional solvers like PTD, UTD and CW in a single design • Broadband frequency sweeps with the capability to take into account dispersive ports, materials and skin effect. • The IE and SBR should have an option to create an ISAR image, Near Filed Radar ROM (Waterfall plot) of the Radar target • SBR+ Radar simulation should support Pulsed Radar and FMCW Radar • Capability to generate raw IQ data from Radar simulation (FMCW) • Mulitpaction solver should support multiple port simultaneous excitations for RF breakdown analysis • Basic Solver should enable 4 cores HPC (High Performance Computation) capability. • Built-in Antenna model for RF interference and SBR+ simulation: Short Dipole, Half-wave dipole, Quarter wave Monopole, Pyramidal Horn, Small Loop, Parametric Beam Antenna, Wire Monopole • SBR solver should have the ability to simulate Radar Simulation o Able to incorporate multiple transmitting and receiving antenna o Able to create Radar simulation scenarios o Scenario simulation with respect to time • Calculate Range, Velocity and Angle of Arrival • Types of flow for thermal analysis: o Laminar, transition & turbulent flows o Ability to model multiple fluids. • Transient, steady state and parametric analysis (Thermal) • Joule heating in objects with temperature dependent properties supported

	• In case of transient simulation, ability to model variables as a function of time (Thermal). • Bi-directional coupling with Q3D, Maxwell, HFSS for node to node EM loss mapping and coupled electro-thermal simulation • Bi-directional coupling with SIwave for electro-thermal analysis with automatic transfer of power dissipation on PCB along with temperature dependency on material properties • Importing of Chip Thermal model powermap from Apache Redhawk for accurate power dissipation from chip level tool
	Pre-Processing Options • Ability to perform package merge with PCB. • Advanced and easy-to-use layout-based GUI allowing users to easily manipulate layouts, with features as follows: o trace drawing utilities, o layer stackup editor, o padstack editors, o add bondwire - standard JEDEC bondwire, non-standard bondwire, o solderball and bump creation utilities, o generate 3D models of selected nets, areas or both o pin grouping • Ability to import Chip Power Model (CPM) for the die/IC, to perform accurate power integrity analyses. • Feature to perform optimization of decoupling capacitor scheme on the PDN of PCB/package design, based on constraints like target impedance, number and types of capacitors, cost etc. • Built-in Circuit and system components library including wide range of active, passive, and distributed device models from transistors to transmission lines, including sources and probes. • Should be able to identify electronics objects from the imported CAD geometry and convert them automatically in native objects (Icepak) • Import power maps in form of X, Y, Z, P. X, Y and Z are the coordinates and P is the heat flux
9	Post-processing options- The output from the tool should be • Network parameters like SYZ • Characteristic port impedances and propagation constants • Capability to observe near field and far-field radiations • Far field antenna parameters like o Gain o Directivity o Radiation efficiency o Axial ratio • Capability to observe co-pol and x-pol antenna patterns • Observe antenna array patterns based on array factor and pattern multiplication • Characterize RCS of structure o Monostatic RCS and Bistatic RCS • SAR plot

	• Capability to dynamically link electromagnetic models to circuit simulator for further system analysis. There should be an option to push excitation back from circuit to the electromagnetic solver to observe fields based on actual excitation • Feature to perform optimization of decoupling capacitor scheme on the PDN of PCB/package design, based on constraints like target impedance, number and types of capacitors, cost etc. • The electromagnetic solver should have the option to export s parameter data in touchstone format, generate equivalent RLGC models, export W element model, export equivalent spice models • Field Animation ○ Capability to animate E-field/H-field and Current density • User Defined Field Calculations using Field Calculator • RF Link Budget analysis: using simulation or measured data • Option to add rain and atmospheric attenatuion in RF interference and Link budget calculation. • Wireless Propagation Models support for RF interference and Link Budget calculation: Hata model, S parameter model, Path loss coupling, two ray path loss coupling, Log distance coupling, Walfisch-Ikegami model, Erceg Coupling, Indoor propagation model, Two-ray ground-reflection model • The tool should have option or toolkit to automatically post process and display the following RCS/Radar outputs: Range, Range Doppler, ISAR, Waterfall • The tool should have option or toolkit to automatically calculate Power Density and Cumulate Derivtive Function from phased array or antenna simulations • Ability to get a quick idea of characteristic impedance by generating an impedance delay plot for each trace path selected and also to rapidly generate transient voltage waveforms of pin-to-pin signal propagation. • Ability to simulate for TDR and TDT for specified nets in design • Provide impedance scan feature to quickly examine trace impedance profiles and identify any violations according to user chosen criteria • Provides two-way coupling with thermal or electronics cooling solver to solve for joule heating • Perform QuickEye analysis, a pattern-dependent convolution based approach to calculate eye diagram from transient analysis of single transitions. • Perform VerifEye analysis using a fully statistical approach to calculate the BER directly. • Perform IBIS-AMI analysis allowing time-domain simulation of a linear channel using customer-supplied models for the transmitter and receiver. • Direct integration with HSPICE simulation software, allowing transient simulations with HSPICE and also plot results directly from HSPICE output data files.
10	Advanced analysis features and parallel solve • Analytical derivatives to find output sensitivity to design parameters without resolving structure. • Capability for simulation of very large models across a network of machines using all of the available memory using Domain Decomposition.

	• Data link for field-to-field 3D electromagnetic linking – Enabling fields from one simulation to be used as source in another simulation. • Dynamic link for circuit and EM co-simulation with smith tool capability for matching circuit design. • The capability of tools to integrate with other application such as Thermal, Mechanical for Multiphysics Problems • Should be capable of doing: o Queuing the projects for solving o Support for remote analysis with client and server each on any supported platforms • 64-Bit Support: o The software should be able to support 64-bit CPU architecture on Windows and Unix Operating system for both solver and user interface. o Should support unbounded 64-bit Solver Memory allocation.
11	Optimetrics – For optimizing designs • Integrated optimization capability including: o Parametric analysis o Optimization analysis o Sensitivity analysis o Statistical analysis • Optimizer should have these algorithms: o Pattern search algorithm o Quasi-Newton search algorithm o Sequential Non-Linear Programming (SNLP) Optimizer o Genetic optimization algorithm o Link to Matlab for custom optimization codes o Screening (Shifted Hammersley) o MOGA (Multi-Objective Genetic Algorithm) o NLPQL (Non-linear Programming by Quadratic Lagrangian) o MISQP (Mixed-Integer Sequential Quadratic Programming Method) o Adaptive Single-Objective o Adaptive Multiple-Objective • Analytical derivatives to find output sensitivity to design parameters without resolving structure. • Capability to solve parametric variations of a design in parallel using processor cores in a single machine or spread over networks
12	Automation and distributed computing • Scripting options for model creations, plotting, exporting results thus providing automation • Scripting languages o VB script o Iron python script o Java script • Able to use multiple cores in simulation for faster simulations. o Multiple cores can be a single machine or across the network • Domain Decomposition Method for solving electrically large model

	○ Automatically break the large problem into smaller domains and solve them in parallel • Distribute frequency points and solve in parallel • Should be capable to Queue the projects for solving • Support for remote analysis with client and server each on any supported platforms

Ansys Lumercial Software Technical Specification

SL. No	Design module/area	Specification
		Ansys Lumerical Strengths: ▪ **Application Gallery with wide range of application examples** ▪ **Lumerical AIC/ALH courses** ▪ **Automation API with Python** ▪ **Inbuilt scripting** ▪ **Powerful CAD Environment** ▪ **Stability** ▪ **Foundry collaboration** ▪ **EPDA with Cadence and Siemens** ▪ **Interoperability with Zemax and Speos: end-to-end optical simulation** ▪ **Popularity across Academics and Industry**
1.	Optical waveguide design and analysis in 3D and 2D	**3D analysis** • The software should use 3D/2D Maxwell Solver with Finite Difference Time domain method. • The software should have multi-coefficient models for accurate material modelling. • The software should have wide range of non-linear, negative index and gain models. • The software should support PML, Symmetric and Anti-symmetric, Bloch and periodic boundary conditions to simulate photonic structures. • The software should have conformal meshing algorithm to get accurate results for coarse mesh. • The software should have a library of photonic crystal models. • The software should have the option to export 3D data in GDS II file catering to foundry supports. • The software should have 3D CAD Environment with STL and GDS II file import option. • The software should support surface import option. • There should be capable to convert SEM image to 3D object. • The software should have broadband fixed angle source technique for simulating broadband sources. • The software should consist integrated Mode source along with other types of sources (e.g. Gaussian source, dipole source and plane wave source etc.) • The software should support import of custom source profile from monitor data or equations.

		• It should support export of field results in the form of movie (.mp4) • The software should have the option for dedicated scripts for parameter sweep, optimization and S-parameter calculations in the same window. • The software should have dedicated analysis groups for solar cells, electro-optic and thermo-optic modulators etc. **2D analysis** • The software should have waveguide solver using 2.5D var FDTD, Finite difference Eigenmode and bidirectional EigenMode Expansion solving techniques. • The software should have the option for virtual prototyping of large integrated optical components, reducing the need for expensive, time-consuming manufactured prototypes. • The software should have dedicated analysis tabs like modal, frequency and overlap analysis etc. • The software should have dedicated scripts for parameter sweep, optimization and S-parameter calculations in the same window. • The software should be capable to model surface roughness of the waveguide. • The software should consist of a library of primitive and complex structures like rounded corners, waveguide bends, helix and spiral structures and surface roughness etc. • The software should have 3D CAD Environment with STL and GDS II file import. • The software should support surface import. • The software should be capable of converting SEM image to 3D object. • The software should have custom time signal and spectrum source. • It should support PML, Symmetric and Anti-symmetric, Bloch and periodic boundary condition to simulate photonic structure. • It should support the export of field results in the form of movie (.mp4) • The software should have the option to export 3D data in GDS II file catering to foundry supports. • The software should be capable of integration with Ansys tools.
2.	Charge transport analysis	• The software should have dedicated charge transport solver to calculate charge flow in opto-electronic and photonic devices. • The software should have wide library incorporating temperatures, doping and high-field effects.
3.	Heat transport analysis	• The software should have dedicated finite element heat solver to handle conductive, convective and radiative effects.
4.	3D electromagnetic and waveguide Simulation	• The software should have Discontinuous Galerkin Time domain solver for complex geometries. • The software should be capable to model surface roughness of the waveguide. • The software should have dedicated finite element Maxwell solver for curved and complex waveguides.

5.	Optical Multilayer simulation	• The software should have multilayer thin-film simulator used for AR coatings, filters, Lasers, also captures interference and micro cavity effects.
6.	Quantum mechanical simulation	• The software should be capable of computing quantum mechanical band-structure calculations using k-p method. • The software should be capable of computing gain and spontaneous emission in multi-quantum well structures.
7.	Photonic Integrated Circuit (PIC) system design and simulation	• The software should have the capability to design, simulate and analysis of photonic integrated circuits, photonic components and optical interconnects in time and frequency domain. • The software should have hierarchical schematic editor with an extensive library of elements. • The software should have foundry specific PDK elements. • The software should have integrated laser simulations. • The software should be interoperable with industry related EDA and PDA tools. • The software should have dedicated analysis tools for PBG devices. • The software should have High Performance Parallel Computing (HPC) Support to get faster simulations. • The software should have APIs with other industry leading products like Zemax, Mentor Graphics, Cadence, MATLAB, Python. • The software should have photonic model development kit. • It should have automation API to support optimization and scripting. • The software should have inbuilt library of laser models • The software should have in-built library of photonic crystal models • The software should easily couple with Ansys tools.

Ansys Zemax OpticStudio Premium
Imaging & afocal design
Sequential ray tracing
12 field points
50 field points (best for aspheric design)
Optimization
High-Yield Optimization
Contrast Optimization
Tolerancing
Quick yield Analysis
Tolerance Data Viewer
Tolerance Data analysis
Thermal analysis
Black Box encryption
Image quality analysis
Image Simulation analysis
Aspheric design
Freeform optics
Diffractive optics
Ghost Focus Generator
Multiple configurations
Birefringence
Stock Lens Matching Tool
2000+ field points (best for freeforms)
TrueFreeform™
Lighting & illumination design
Non-sequential ray tracing
Geometric light sources
Measured light sources
Objects
Detectors
Optimization
Freeform optics
Tolerancing
Colorimetry
Ray splitting
Ray scattering
Measured source models
Measured surface scattering models
LightningTrace™
Source Illumination Map
Phosphor & fluorescence modelling
Path analysis
Programming Interface
Zemax Programming Language
User-configurable shortcut keys
MATLAB interoperability
User-defined surfaces and objects

User-defined scatter profiles & sources
Programmable interface (ZOS-API)
Lasers & fibers
Gaussian beams
Scanning systems
Single mode fibre coupling
Multi-mode fiber coupling
Optimization
Tolerancing
Physical Optics Propagation
M2 & beam quality
CAD integration
Export to STEP, IGES, SAT, STL
import of STEP, IGES, SAT, STL
Part designer – static parts
Dynamic link to CAD software
Part designer – dynamic parts
Data Libraries
Design Templates collection
Lens Catalog
Materials Catalog
Coatings Catalog
Test Plate Lists
Spectrum data files
IS Scatter Catalog
Radiant Source Models
IES Source Models

ManufacturingAnsys Granta Research Advanced Materials-Additive Manufacturing	
What's included	Contains the Senvol DatabaseTM, a comprehensive set of additive manufacturing machines and materials
Available data	**AM Materials (3400+):** - Ceramics - Composites - Metals (steels, nickel, titanium, aluminum, cobalt, …) - Polymers (ABS, PA, epoxy, PP, acrylic, …) - Sands - Waxes **AM Machines (1640+):** - Binder Jetting - Direct Energy Deposition - Material Extrusion - Material Jetting - Powder Bed Fusion - Sheet Lamination - Vat Photopolymerization

Available properties	**On both the processed and feedstock:** - Mechanical performance (in the three principle directions) - Thermal - Impact - Physical and layer thickness for the processed material - Powder or liquid properties for the feedstock material **On the specific machine configuration:** - Build envelope size - Machine size - Price - Achievable layer thickness - Installation requirements	
Usage	- Fast access to leading data on AM machines and materials - Comparing the performance of material produced by additive and conventional manufacturing techniques - Comparing the performance of the same material produced on different machines - Selecting materials based on material type, performance, AM process, and machine model - Selecting machines based on AM process, material type, component size, machine cost and machine manufacturer	

Technical Specifications of Engineering Material Solution Software

Sl.No	Specifications
17.	**Material Data Management** • Multiple Unit System Support • Browse Materials Data • Edit and Update Materials Data • Search and Query Materials Data • Represent Property Data in Interactive Charts • Comparison Tables and Comparison Charts • Export Data to Excel and Third-Party Software
18.	**Integration with third party/native modules for CAD, CAE, PLM**
19.	**Materials Selection & Related Tools** • Reference Data for Materials Selection on PC/Laptop • Interactive 'Ashby Charts' of Materials Property Space • Systematic Materials Selection Methodology • Filter Materials Based on Property Profile • Filter Materials Based on Links to Other Materials / Processes / Objects • Materials Substitution & Equivalency - 'Find Similar' • Performance Index Finder • Engineering Solver - Convert Engineering Requirements to Materials Properties • Hybrid Synthesizer - Predict Properties of Hybrid Materials • Part Cost Estimator • Selection Reports & Export of Charts for Presentations • Eco Audit for a Product or Conceptual Design
20.	**Data Library – MaterialUniverse** • Unique materials screening dataset of around 4000 materials, compiled by materials experts • Covers all classes of engineering materials • Data for generic grades of materials, linked to specialist grades • Includes technical, economic, regulatory & eco data • ProcessUniverse: - Main manufacturing processes used for shaping, joining and surface treatment - Key process characteristics - Process capabilities - Cost models for primary shaping processes • Battery cells: Battery cell performance and specifications, representing the performance of the generic battery cell type - Energy and power specifications - Weight - Dimensions - Nominal ratings - Charge/discharge behaviour

21.	**Data Library – JAHM** • Database of temperature-dependent materials properties. • Widely respected source of data for simulation. • Over 8500 materials, covering: - Ceramics and glasses - Composites (ceramic, metal & polymer matrix) - Elements, organics, hydrocarbons, and other compounds - Functional materials (Fuel cells, batteries, electro-ceramics, moulds, semiconductors & optical) - Metals and alloys - Woods - Molten salts and ionic liquids - Polymers and elastomers • Properties available: - Physical: Density, viscosity, vapor pressure - Elastic: Bulk and shear moduli, Poisson's ratio - Plastic: Tensile and yield strengths, elongation - Stress-strain: True stress strain curves - Fatigue: S-N and e-N fatigue curves - Creep: Creep strength, stress-rupture - Thermal: Thermal conductivity, specific heat, thermal expansion, thermal diffusivity, emissivity - Electrical: Electrical conductivity, electrical resistivity

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Department of Mechanical Engineering
Indian Institute of Technology Kanpur
Kanpur 208 016, India

Terms and Conditions:

1. All equipment must be compatible with Indian electrical standards and codes. Engineering documentation on the physical sizes and weights of all major and minor components must be submitted.
2. IIT Kanpur is partially exempted from payment of Customs Duty (We will provide Custom Duty Exemption Certificate, CD applicable is 5.5%).
3. TENDER Specific Manufacturer Authorization Form from OEM Required.
4. The Institute reserves the right to cancel the tender at any stage without assigning any reason thereof.
5. All prices should be **F.O.R IIT Kanpur.**
6. This is PAC Tender. Maker's Name: Ansys Inc. , Authorized dealer: M/s CADFEM India Pvt. Ltd. Unsolicited bids may be summarily rejected.

Appendix -1

TENDER ACCEPTANCE LETTER
(To be given on Company Letter Head)

Date: _____

To,

_____
_____
_____

Sub: Acceptance of Terms & Conditions of Tender.

Tender Reference No: _____

Name of Tender / Work: -

_____

Dear Sir,

1. I/ We have downloaded / obtained the tender document(s) for the above mentioned 'Tender/Work' from the web site(s) namely:
_____as per your advertisement, given in the above mentioned website(s).

2. I / We hereby certify that I / we have read the entire terms and conditions of the tender documents from Page No. _____ to _____ (including all documents like annexure(s), schedule(s), etc .,), which form part of the contract agreement and I / we shall abide hereby by the terms / conditions / clauses contained therein.

3. The corrigendum(s) issued from time to time by your department/ organisation too have also been taken into consideration, while submitting this acceptance letter.

4. I / We hereby unconditionally accept the tender conditions of above mentioned tender document(s) / corrigendum(s) in its totality / entirety.

5. I / We do hereby declare that our Firm has not been blacklisted/ debarred/ terminated/ banned by any Govt. Department/Public sector undertaking.

6. I / We certify that all information furnished by our Firm is true & correct and in the event that the information is found to be incorrect/untrue or found violated, then your department/ organisation shall without giving any notice or reason therefore or summarily reject the bid or terminate the contract, without prejudice to any other rights or remedy including the forfeiture of the full said earnest money deposit absolutely.

Yours Faithfully,
(Signature of the Bidder, with Official Seal)

Appendix -2

Certificate for Tender
(To be given on Company Letter Head)

Date: _____

To,

_____
_____
_____

Sub: Certificate of compliance as per Rule 144 (xi) GFR's 2017

Tender Reference No: _____

Name of Tender / Work: -

_____

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"

Yours Faithfully,
(Signature of the Bidder, with Official Seal)

Appendix -3

Certificate for Tender for Works involving possibility of sub-contracting
(To be given on Company Letter Head)

Date: _____

To,

_____
_____
_____

Sub: Certificate of compliance as per Rule 144 (xi) GFR's 2017

Tender Reference No: _____

Name of Tender / Work: -

_____

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify
that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"

Yours Faithfully,
(Signature of the Bidder, with Official Seal)

Appendix - 4

Declaration for Local Content

(To be given on Company Letter Head - For tender value below Rs.10 Crores)
(To be given by Statutory Auditor/Cost Auditor/Cost Accountant/CA for tender value above Rs.10 Crores)

Date:
_____

To,
The Director,
Indian Institute of Technology Kanpur,
GT Road, Kalyanpur, Kanpur -208016

Sub: Declaration of Local content

Tender Reference No: _____

Name of Tender / Work: -
_____

4. Country of Origin of Goods being offered: _____
5. We hereby declare that items offered has ____% local content.

"Local Content" means the amount of value added in India which shall, be the total value of the item being offered minus the value of the imported content in the item (including all customs duties) as a proportion of the total value, in percent.

*"*False declaration will be in breach of Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law."*

Yours Faithfully,
(Signature of the Bidder, with Official Seal)

Appendix - 5

Bid Security Declaration
(To be given on Company Letter Head)

Date: _____

To,
The Assistant Registrar
Central Stores
IIT Kanpur-208016

Sub: Certificate for bid security declaration

Tender Reference No : _____
Tender ID : _____

Name of Tender / Work: -
_____

"I/We have read the clause regarding Bid Security Declaration/Earnest Money Deposit and I/We are fully aware that if I/We withdraw or modify the bid during the period of validity I may be suspended for a period of 3 years ."

Yours Faithfully,
(Signature of the Bidder, with Official Seal)