Indian Institute of Technology Jodhpur

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Review Period: July 2015 to 31 July 2022

Evaluation Sheet for Internal Review of the Institute

Committee Members

1. **Prof Surendra Prasad**
2. **Prof Ashutosh Sharma**
3. **Dr Aloknath De**
4. **Prof Partha P Chakrabarti**

The committee may provide a single combined report.

Note:

1. In column 2, please provide description of the committee's assessment.

2. In column 3, Please choose one of the progress indicators from the below

Excellent

Very good

Good

Average

Below Average

Due to the nature of some specific questions, it may not require any progress indicator.

3. Please use additional pages if required.

4. Please sign on every page and submit to the Director IIT Jodhpur

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Sr. No	Item	Evaluation
1.	Opinion and suggestions about Structure/Curricula of different academic programs (B.Tech/M.Sc/M.Tech/Ph.D./M.Tech-Ph.D/M.Sc.-M.Tech) **Undergraduate Programs and Curricula:** Like in established IIT's, the undergraduate programs of IIT Jodhpur are designed to follow the broad philosophy of science based engineering education. This is how it should be, since in premier institutions like IIT's, it is important both to impart fundamental insight and ability to apply it to real life problems. This requires a good understanding of the basic principles involved in designing technologically appropriate solutions to problems and needs of society, which are rooted in scientific insight. The curriculum also lays emphasis on the current needs of the society to producing engineers with a multidisciplinary perspective. Design component of teaching at IIT Jodhpur seems to be well integrated into the curriculum and it encourages students to look for a holistic approach to solving real life engineering problems. Introduction of design courses, at an early stage in the curriculum, and methodologies that focus more heavily on conceptual solutions and less on discipline-specific artefacts is a refreshing ingredient of the curriculum. While introduction of design as an objective of engineering education in early part of the curriculum is particularly relevant, it is nice to see that this component receives increasing emphasis as the student progresses through the program. The other unique feature of the UG curriculum is its industry linkages. The curriculum provides for a five month project in an industry or R&D organisation to make the students industry-ready. From the presentations made to the committee, it seems that this flexibility of the curriculum has been welcomed by the participating industries. Students who are inclined to solving real life problems in an industrial framework have also expressed their satisfaction with this opportunity. Students can also opt for Entrepreneurship as an option for the minor-area and engage in an innovative product or process conceptualization as part of their B.Tech program. They can even continue for one additional year and get an M.Tech degree in the area of their minor or specialization. Unlike the conventional approaches to the dual degree programs, the curriculum at IIT Jodhpur thus provides for directed specialisation in the areas of interest to students. This should serve the student's interests well. To promote entrepreneurship, students are encouraged to continue their entrepreneurial journey as part of their M.Tech and translate a concept though an incubator for a start-up. This is well aligned with NEP recommendation of integrating and promoting entrepreneurship as part of a formal academic structure.	

These are very interesting learning alternatives that help the student to develop confidence in design and developing innovative products. The committee was very appreciative of these initiatives.

The undergraduate curriculum also attempts to provide a broad perspective to the student through exposure to courses in humanities and social sciences on the one hand, and principles of management on the other. The academic structure at IIT Jodhpur provides for diversity in faculty specialisation in several such non-engineering disciplines.

On the whole, the undergraduate curriculum is well-positioned to provide a balance between high scholarship, sensitivity to application of principles and flexibility to choose one's own educational needs and objectives.

Postgraduate Programs:

Again, in keeping with the practices of IIT's and other reputed global universities, the post-graduate programs of IIT Jodhpur have widespread offerings in different specialized themes of science, engineering and humanities. The post-graduate programs has stated to attract good students from some of the best known undergraduate institutions of the country and are quite popular.

The committee noted that the Masters and Ph.D. programs of the institute have gone through a recent phase of review and reforms. The new curriculum provides for development of basic foundations in the core program followed by an in-depth exposure to other relevant courses.

Some of the interesting features of the Masters programs include seminars by leading experts, industry-linked courses and provision for fractional credit courses by visiting experts and faculty, on special topics. There is also provision for a limited number of self-study and independent study courses, which could be project based as well. This makes the offerings quite flexible and also very useful for a broad-based and topical exposure for the students.

IIT Jodhpur has created several opportunities for multiple entries and exits for the post-graduate students. As an example, a student can join an M.Tech. Program through the normal stand-alone M.Tech option, as an integrated M.Sc – cum - M.Tech. dual degree option, as a B.Tech – cum - M.Tech. dual degree option, and as a B.S -cum - M.Tech. dual degree option, depending on his background and inclination. This is not only a very useful and bold step, it also aligns well with the flexibility recommended in the NEP-2020.

Another nice feature of The Masters programs is the encouragement it provides students from different cohort groups to work together to innovate and develop a product. The students are also provided appropriate opportunities for courses and knowledge for developing entrepreneurial skills and are encouraged to consider a start-up career based on their work.

In collaboration with AIIMS Jodhpur, IIT Jodhpur has started in 2020 three transdisciplinary innovation-oriented joint programmes at the Masters, Masters'

	+ Ph.D. and Ph.D. level in Medical Technologies aligned with the national objective of achieving self-reliance in medical equipment manufacturing. This offering, first of its kind in the country is a welcome initiative and can prove to be a game-changer in the domain of Medical Technologies in the country. In general, the committee noticed a strong industry focus in the interdisciplinary programs offered at IIT Jodhpur, which is a welcome feature. The committee was particularly happy to see that the post-graduate programs at IIT Jodhpur seek to add special value to the students' overall learning experience. The overall performance of the Institute in this category is Excellent.	
2.	Comments about the teaching learning process adopted by the institute. Your suggestions and advice for the same. General comments Like all good insitutions, IIT Jodhpur has created adequate mechanisms to ensure quality in the teaching learning process. The institute has a robust system for regular feedback of all the courses that are offered and also for effecting improvements based on this feedback. Awards for good teaching based on student feedback have been put in place to promote excellence in good teaching. The improvement in teaching learning processes is well supported by frequent workshops held to exchange experiences in good practices and enhance the general teaching learning ambience at all levels. At the doctoral level, the institute has devised a strategy whereby the scholars are encouraged to also look at the patent maps of their areas of interest so that they are sensitized to the application potential of their research, thus promoting development of attitudes for innovations. This is a unique feature that is worth taking further. The institute should, however, ensure that this does not come in the way of blue sky and fundamental research, which must form an important ingredient of all good research institutions. The institute is sensitive to the needs of students from the industry or other institutions who might wish to attend and benefit from some special courses available with IIT Jodhpur, and earn credits for the same. IIT Jodhpur's casual student scheme provides ample opportunities to enable registration of such students on a short-term basis (for a semester or more) and enables transfer of the earned credits to their parent institution, including a grade equivalence system for this purpose. Similarly, IIT Jodhpur students can earn credits elsewhere and get it transferred to IIT Jodhpur transcripts. Such flexibility is very useful. The presentation gave several examples where students have benefitted from this arrangement. The institute has nicely integrated on-line and digital education for non-resident student cohorts (especially in executive programs for corporate and employed students) with the physical teaching of regular students by synchronising the	

	two on a semester basis. The compulsory immersion component of this ensures that the outside students get exposed directly to the institute ambience for learning and develop relationships with regular students (this is equally useful for the latter) and with faculty on a more personal basis. Programs for such executive education are offered at the Master's level in Artificial Intelligence, Cyber Physical Systems, Data and Computational Science, Robotics & Mobility Systems, Augmented Reality and Virtual Reality (AR & VR), Intelligent VLSI Systems. Inter-disciplinarity. Interdisciplinarity has always been a hall mark of engineering education, and has now become even more important due to emergence of the novel technologies like Miniaturization, Parallelism, Smart Materials, Bio-mimetic Systems, AI and Cognitive Systems. The role of an engineering institute is not only that of preparing students in their major areas of study but also on developing other related skills and encourage interdisciplinary teams to address challenges faced by the society. It was refreshing to note that the institute is not only aware of this responsibility, but is actively promoting such attitudes as an essential component of PG education. One particularly interesting experiment here was the possibility of offering a pathway for students with such abilities and aptitudes to combine a science degree with an engineering M.Tech in a relevant area. This can also provide opportunities for knowledge creation that can come from such diversity of knowledge and skills. Performance Evaluation and Grading. The faculty of IIT Jodhpur are encouraged to use all possible tools and methodologies for evaluation of students performance, which they do and for which they make use of all modern technologies for grading as appropriate. As always happens, despite best efforts, grading will necessarily have a subjective component (a fact pointed out by the students in their interaction with the committee), which can make students unhappy about it. The real encouragement needed here is for the faculty to understand that grading is best used as a device to encourage learning, rather than making students to work harder with more assignments and fine discrimination between so-called good and bad students. A balanced approach to grading is always a difficult matter, and the teaching-learning workshops should be used for a periodic discussion on such issues to enable faculty members to develop the right view and approach. The overall performance of the Institute in this category is Excellent.	
3.	Provide your broad overall evaluation about outcome of the different programmes and performance of the graduated students in the profession. Any suggestions will be welcome	

IIT Jodhpur has revamped its academic programmes with a clear vision towards attaining high quality teaching and research eco-system to produce highly trained manpower with the right blend of skills and knowledge. The undergraduate curriculum provides opportunities for capability linked specializations, which can be department specializations, interdisciplinary specializations and minor areas. B.Tech in Engineering science students can opt for open elective specialization and can outline their own curriculum in the form of electives selecting courses from across disciplines of engineering, science, and humanities. Further, B.Tech students are allowed to take 10 credits of open electives across the Institute.
In the 2018 batch of UG students graduated in 2022, 66 students opted for minors or specializations in different areas including Visual Computing, Management, Entrepreneurship, Data Science, Robotics, VLSI Systems, Engineering Innovation and Cyber Physical Systems. In the 2019 batch, 60 students are currently pursuing minors and specializations. Implementing the Institute policy of Design credit has improved students' critical thinking and improved the institute's research culture, leading to about 15 selections in MITACS.

In PG and Ph.D. programmes total 116 students registered in interdisciplinary research area including Digital humanities, Internet of things & Applications, Smart Health Care, Space Science and Technology, Robotics and Mobility Systems, Quantum Information and Computation and Medical Technologies. In all PH programs students are allowed to register for 6 credits of open electives of their choice.

PG students have published 44 publications in different interdisciplinary research areas and a total 7 patents have been filed of which 3 patents have been provisionally granted.

The Institute has excellent placement for its undergraduate programs with more than 97.5% placement and 100% for MBA. It is around 75.5% at M. Tech level, where the CS-IT group has an average of over 95%, but other units have lower placement record. The Placement record at MSc level is a little over 50% with certain departments like Physics and Mathematics having low values.

The trend is at par with most other IITs with some interesting highlights. For example, the Bioengineering programme registering 100% placement which is better than other IITs. Also, some of the unique Masters programmes of IIT Jodhpur seems to have been a success, like Cyber Physical Systems, Data and Computational Sciences and Artificial Intelligence. Like other top Institutes the MBA programme has 100% placement. Some UG/PG graduates have opted for higher studies abroad.

Many students have moved towards early Entrepreneurship and this is showing promise as a trend. One of the success stories is kukuFM, an online podcast platform, founded by three IIT Jodhpur graduates who received the Forbes 30 under 30 recognition.

The doctoral graduates have taken up faculty positions. Many of them have joined other IITs and NITs. Some of them have joined Corporate R&D

	organizations. Others have gone for post-doctoral work. The institute has a scheme to support pre-incubation post completion of Ph.D. work to enable Ph.D. students for commercial exploitation of the contribution during doctoral studies. The overall performance of the Institute in this category is Very Good.	
4.	Provide your assessment about the doctoral programmes (PhD & MTech-PhD) . Please indicate your suggestions for improving the same. This is a major area of improvement seen by a few committee members since their earlier visit to the institute before 2019. There has been a major revamping of the Ph.D. programmes to ensure admission of high quality candidates and ensure a well-formulated plan for their graduated progress towards knowledge creation. This includes rigorous course work, comprehensive examination, state-of-the-art seminars and research proposal defence within a defined time-frame and others. Annual progress monitoring (APM) is an important part of the process. The APM is evaluated by the Student Research Committee (SRC) but the presentation is open to the entire Institute fraternity. This is done through poster presentations across the institute wherein students can interact and discuss their work annually with all faculty and students. As already noted elsewhere, in collaboration with AIIMS Jodhpur, IIT Jodhpur has started in 2020 three transdisciplinary innovation-oriented joint programmes as Masters, Masters'+Ph.D. and Ph.D. levels in Medical Technologies aligned with the national objective of achieving self-reliance in medical equipment manufacturing. Another welcome feature noted was that for all the M.Tech. and Ph.D. programs, several non-graded courses on ethics and professional life, systems engineering and project management, and innovation and IP management have been made integral elements of learning. The overall performance of the Institute in this area is Very Good	
5.	Your broad feedback about laboratory facilities including research infrastructure and facilities in various academic units of the institute. The institute has made significant investment to establish various lab facilities at the institute. The institute has spent around 280 crores to this end and another 75 crores of HEFA loan is in process. It is especially notable that the labs established and being established have a clear vision, planning and execution harmonizing the objectives and the infrastructure created based on the needs. The labs address a good balance of the current and futuristic needs of the higher	

education and R&D. They also focus both on the global cutting-edge (e.g., Cyber-physical Systems) and the local (e.g., water; desert).

One major facility of the greatest scale and use merits special mention. The state-of-the-art central instrumentation facility of IIT Jodhpur which was established in the year 2018 has been designated as the Centre for Research & Development of Scientific Instruments (CRDSI). The CRDSI has an endeavour to provide advanced scientific instrumentation service in the multidisciplinary field of research to the undergraduate, graduate, Ph.D students and the faculties of the institute as well as researcher from other institutes across the country. At present 93 high end useful instruments are under CRDSI facility. Currently, The space allotted for CRDSI facility houses 22 equipment including various sophisticated instruments such as 500 MHz NMR, Single Crystal XRD, Powder XRD, AFM, SEM, PPMS Dynacool, SQUID, Surface area analyzer, DSC, TGA etc. Rest of the equipment under CRDSI facility are located at various departments of the institute.

The model of having central facilities which are professionally managed is an excellent one in optimizing the use and economics of facilities. The facility has a sound management model. The overall day to day activities and the policy of the centre is determined by a committee of faculty of this institute. The CRDSI committee appointed a faculty in charge for each of the instruments under the centre for smooth running and maintenance the equipment. Further, CRDSI facility at IIT Jodhpur imparts an opportunity towards its users for accessing various latest and advanced instruments persuasively via a transparent online booking portal. Thus CRDSI facility contributes its users significantly to publish their research findings in internationally peer reviewed journals. IITJ CRDSI facility welcomes external users from all national institutes and R & D organizations for accessing this facility on a minimal chargeable basis.

A noteworthy aspect of R&D labs at IITJ is that they faithfully mirror the requirements of globally competitive and futuristic areas. Some important areas where foundational lab infrastructure is created include tech for healthcare, machine learning, language technology, genomics, deeptech, social computing, biocomputing, sustainability, heritage, quantum, water, and security. That the research being carried out is competitive is attested by the support provided by all the major funding agencies of GoI including DST, SERB, MEITY, DBT, Ministry of Ayush, MHA, DRDO, MHRD, MSME, CSIR, ISRO, and Rajasthan Government. From industry, several projects have been supported through grants from companies including Facebook/Meta, Microsoft, Accenture, Siemens, and Google. While the public funding allows deep dive with quality into fundamental knowledge generation, the private support brings relevance and direction of R&D in greater focus.

Particular mention needs to be made of the R&D labs and infrastructure related to the digital/cyber/AI universe which has a myriad of application sectors. To this end, the following state-of-the-art labs have been established: High Performance Computing - iHub Drishti has installed the World's First AI System Built on NVIDIA A100, NVIDIA DGX™ A100 which is the universal system for all AI workloads and offers unprecedented compute density, performance,

	and flexibility in the world's first 5 petaFLOPS AI system. It features NVIDIA A100 Tensor Core GPU and thus will enable TIH to consolidate training, inference, and analytics into a unified, easy-to-deploy AI infrastructure. TIH is developing facilities for AR, VR, Mixed Reality, Vision based Autonomous Systems, data collection and annotation. Databank: 4 databanks have been created under RAKSHAK Program: Chest CT scans data of Indian COVID 19 patients, Speech and Coughing Breathing Sound Data, Radiology Data for SARS nCov-2 and 5 Lung Diseases Chest X-Ray Dataset. **Centre of Excellence (CoE)**: TIH is developing CoE for Animation, Visualisation, Gaming and Comics (AVGC). **<u>Suggestions:</u>** 1. Effective utilization of labs, equipment and facilities by all researchers in the Institute can be enhanced by developing a portal that lists all the major equipment (say costing more than 10 lakhs), their location and PI/coordinator/contact and the process for its utilization, including booking and rational charges. An Institute empowered committee can oversee this work allowing sharing of resources in a transparent way with the ease of doing business. 2. For a young Institute, it is especially important that the efforts of faculty in developing facilities and allowing their use for the users across the Institute is encouraged, recognized and suitably rewarded. 3. A clear road map for the maintenance of facilities/major equipment needs to be worked out. The overall performance of the Institute in this area is Excellent.	
6.	Comment about Innovation Ecosystem of the institute: Technology Park, TISC, TIH- iHub Drishti (i.e., Various Section 8 companies and their integration with the institute) **IITJ's innovation ecosystem** spans across multiple innovation entities. It was observed that the faculties and students are at the core that connects to the ecosystem. The initiative aims to stimulate ideas through incubation support and industrial partnerships. Also, a multi-tier structuring of innovation life-cycle was noted making it easier to manage fund sources and outcome levels from each initiative feeding possibly to another. **Institution's Innovation council (IIC),** with fund from MoE, facilitates in scouting and incubating ideas. Student committee activities are quite aligned to IIC goal. **TISC** has been in its early stage; but has taken concrete steps for handholding startup, IP protection, industry interaction and specific implementation of DBT, MSME, MeitY projects. The **TIH** at IIT-Jodhpur, named **iHub Drishti**, focuses on building cyber-physical systems for computer vision, AR and VR. It is a Section-8, Not-for-profit Organisation funded by DST under NM-ICPS initiative. TIH has a few excellent state-of-the-art Labs with Nvidia, Samsung and others. TIH is developing facilities for AR, VR, Mixed Reality, Vision-based Autonomous Systems, and associated	

	data collection and annotation activities involved in AI-driven projects. Two sets of projects: one in healthcare arena, e.g., Telemedicine for Homecare, Chest CTScans, AI-based Social Distance Alert System; and the other in infotainment arena, e.g., animation, visualization, gaming, comics are noteworthy. **IIT Jodhpur Technology Park** has been promoting learning, research, inventions, and finally technology innovation towards economic value creation. It aims to boost the creation of new-age technology ventures and directly contribute to the capacity building for emerging industries. For example, Johari Digital Healthcare Limited has nurtured a CoE in Medical Technologies. Similarly, Renewable Energy and CPS Security centers are two other examples of centers-of-excellence. Some of the R&D work is on technology advancement like in the domains of Advanced Electronics, AI and Deep learning, Polysilicon research. And some work is on the applied field like automatic cleaning systems, interventions in solar panel technologies. On top of global projects, **The Jodhpur City Knowledge and Innovation Cluster (JCKIC)** accounts for creativity around local needs and activities. This entity has been established under the aegis of PSA, GoI office and is working to support Jodhpur City's well-being activities. In summary, IIT-J has tapped into multiple funding sources from the center and the state. Also, it has studied how to create an entity that leverages one or more govt departments and how innovation-linked activities can be stacked up to provide a full-chain service. The committee recommends that (i) the institute streamlines further the overall structure in terms of process efficiency and unique value delivery by each entity, (ii) it measures regularly the input-output metrics against the set objectives, (iii) it creates some revenue-generation capacity in each entity to be able to mitigate any risk on the program with any unforeseen funding challenges from the present sources. The overall performance of the Institute in this category is Excellent.	
7.	Provide committee's assessment of academic research being conducted in various academic units in particular, provide your input about: (i) Quality of the research activities pursued by the various Academic Units. (ii) Number and quality of publications Your suggestions and advice will be of immense value Quality of research often depends on its profoundness and relevance and measured by outcomes in papers, patents, citations and the support attracted. There are several impactful projects in important areas being executed at IIT Jodhpur which have a huge continued potential. Some examples are: 1. **Responsible and Dependable AI:** One of the overarching research themes at IIT Jodhpur is Dependable and Responsible AI. IIT Jodhpur has made several contributions in this domain including indigenously built Deepfake tool being used by several user agencies, being part of DigiYatra platform implementation	

team, contributing in the Responsible AI for All guideline document by NITI Aayog, contributions to building Framework for Establishing Medical Imaging Data Banks (NITI Aayog), and IUSSTF Dependable AI initiatives.

2. Healthcare: An important theme for India is universal (inclusive) and holistic health (e.g., well-being)—both of which are being reflected in the healthcare related projects at IITJ. IITJ has also recognized early on that the disruptive technologies such as AI will play an increasingly important roles in the effective and inclusive delivery of healthcare in India.

IIT Jodhpur has recently formed a Transdisciplinary Centre of Excellence in Integrative Precision Health. As a part of this, an AyurTech Centre of Excellence in collaboration with the Rajasthan Ayurved University, Jodhpur, is established with the goal of "Establishment of AI driven integrative framework for population and individual risk stratification and early actionable precision health interventions with a special focus on arid regions". This scientific and data driven approach to Ayurveda diagnostics and therapeutics can achieve evidence based Ayurveda, which will greatly help in globalizing Ayurveda similar to traditional Chinese medicine which has seen higher acceptance and adoption internationally. In addition, other impactful projects include silicosis detection, explainable COVID19 detection, radiogenomics, cataract detection, medical databank, and many more.

3. Water: IIT Jodhpur has initiated technology interventions for clean drinking water, wastewater management, air pollution analysis. Several prominent projects such as clay ceramic water filters named "G–Filters", water purification in rural schools, smart graded-water supply grid at IITJ Campus, advanced wastewater treatment at Sangaria CETP, Jodhpur have touched the lives of thousands. The Institute has also instituted National Jal Jeevan Mission.

While IITJ is a young institute, the quality and full impact of its research will depend greatly on the vision, infrastructure, areas, faculty/students and culture being established now (as in some examples above). In particular, emphasis on hugely interdisciplinary and multidisciplinary areas being pursued at IITJ is rather exceptional in India. Despite the IITJ faculty being relatively younger, they have been receiving peer recognition through committees, fellowships, editorial boards and awards in sufficient numbers commensurate with the age of the institute. These peer recognitions have been detailed institute reports.

IIT Jodhpur is one of the early and even only institute to offer interdisciplinary doctoral degrees in such important, interdisciplinary and futuristic areas such as Digital Humanities, Space Science and Technology, Quantum Information and Computation, Robotics and Mobility Systems, Science of Intelligence, Smart Healthcare, and Internet of Things and Applications.

All of the above factors related to the areas of research, infrastructure, and quality of faculty/students are contributing to the research initiatives of the institute and outcomes, which is also partially reflected in the statistics of publications as below.

There are more than 8000 papers contributed by IITJ faculty members (irrespective of affiliation).

There are also more than 1.25 lacs citations for the papers published by various IITJ faculty members (irrespective of affiliation).

There are 21k+ citations with IITJ affiliation publications.

The top most cited papers with IITJ Affiliation (Source: Scopus) attest to both the areas of relevance and emphasis in IITJ as well as their quality. The areas cover life sciences, sensors, energy and communication.

1. Guidelines for the use and interpretation of assays for monitoring autophagy (4th edition)1
   (2021) Autophagy, 17 (1), pp. 1-382. **Cited 590 times.**
   https://www.scopus.com/inward/record.uri?eid=2-s2.0-85102619204&doi=10.1080%2f15548627.2020.1797280&partnerID=40&md5=32bc24d3ffd8e3f626d0d619cf3a8fc8

2. Meng, L., Shafiee, Q., Trecate, G.F., Karimi, H., Fulwani, D., Lu, X., Guerrero, J.M.
   Review on Control of DC Microgrids and Multiple Microgrid Clusters
   (2017) IEEE Journal of Emerging and Selected Topics in Power Electronics, 5 (3), art. no. 7890986, pp. 928-948. **Cited 370 times.**
   https://www.scopus.com/inward/record.uri?eid=2-s2.0-85029482979&doi=10.1109%2fJESTPE.2017.2690219&partnerID=40&md5=e53b7c4dca063836ea7c40fcbdb48f62

3. Mahela, O.P., Shaik, A.G., Gupta, N.
   A critical review of detection and classification of power quality events
   (2015) Renewable and Sustainable Energy Reviews, 41, pp. 495-505. **Cited 293 times**.
   https://www.scopus.com/inward/record.uri?eid=2-s2.0-84907606361&doi=10.1016%2fj.rser.2014.08.070&partnerID=40&md5=69e86a9f69c7511a00a93dfba69376c0

4. Kumar, R., Goel, N., Kumar, M.
   UV-Activated MoS2 Based Fast and Reversible NO2 Sensor at Room Temperature
   (2017) ACS Sensors, 2 (11), pp. 1744-1752. **Cited 246 times**.
   https://www.scopus.com/inward/record.uri?eid=2-s2.0-85034855303&doi=10.1021%2facssensors.7b00731&partnerID=40&md5=491404856e3b5d5de1a083a2246a6938

5. Bhati, V.S., Hojamberdiev, M., Kumar, M.
   Enhanced sensing performance of ZnO nanostructures-based gas sensors: A review
   (2020) Energy Reports, 6, pp. 46-62. **Cited 217 times.**
   https://www.scopus.com/inward/record.uri?eid=2-s2.0-85071889210&doi=10.1016%2fj.egyr.2019.08.070&partnerID=40&md5=94583db2008b79493c7c4c579575a212

6. Freeman, L., Guo, H., David, C.N., Brickey, W.J., Jha, S., Ting, J.P.-Y.
   NLR members NLRC4 and NLRP3 mediate sterile inflammasome activation in microglia and astrocytes
   (2017) Journal of Experimental Medicine, 214 (5), pp. 1351-1370. **Cited 205 times.**

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85021662528&doi=10.1084%2fjem.20150237&partnerID=40&md5=aa18d5ae7d4e83422513b785c81cb83e

7. Murarka, S.
N-(Acyloxy)phthalimides as Redox-Active Esters in Cross-Coupling Reactions
(2018) Advanced Synthesis and Catalysis, 360 (9), pp. 1735-1753. **Cited 202 times.**
https://www.scopus.com/inward/record.uri?eid=2-s2.0-85042528320&doi=10.1002%2fadsc.201701615&partnerID=40&md5=c584ae394170271a8857079a59e62ea5

8. Arora, K., Goel, N., Kumar, M., Kumar, M.
Ultrahigh Performance of Self-Powered β-Ga2O3 Thin Film Solar-Blind Photodetector Grown on Cost-Effective Si Substrate Using High-Temperature Seed Layer
(2018) ACS Photonics, 5 (6), pp. 2391-2401. **Cited 172 times.**
https://www.scopus.com/inward/record.uri?eid=2-s2.0-85046969339&doi=10.1021%2facsphotonics.8b00174&partnerID=40&md5=4dbe35a86e738d0d7130347ead67ea83

9. Tripathi, S., Mohan, A., Yadav, S.
A Compact Koch Fractal UWB MIMO Antenna with WLAN Band-Rejection
(2015) IEEE Antennas and Wireless Propagation Letters, 14, art. no. 7059214, pp. 1565-1568. **Cited 169 times.**
https://www.scopus.com/inward/record.uri?eid=2-s2.0-84939245481&doi=10.1109%2fLAWP.2015.2412659&partnerID=40&md5=c4c11851c6772e80f3313265eeac0c61

10. Gupta, R., Rao, K.D.M., Kiruthika, S., Kulkarni, G.U.
Visibly Transparent Heaters
(2016) ACS Applied Materials and Interfaces, 8 (20), pp. 12559-12575. **Cited 167 times.**
https://www.scopus.com/inward/record.uri?eid=2-s2.0-84973333886&doi=10.1021%2facsami.5b11026&partnerID=40&md5=7110b9e401d341f0f7129ef8bf67f476

Further, the quality of R&D and its relevance is also reflected in technology development and impact as through the following examples.
Technological Development & Impact:

1. Novel Cold-plasma Detergent in Environment 'CODE' device to mitigate Air Pollution to reduce the risks of infection from airborne pathogens in the indoor environment.
2. Deepfake Detection in Images and Videos.
3. Design, development and flight testing of an indigenous autopilot system (both
hardware and software).

	Suggestions: 1. Enhancing the quality of research is vitally dependent on recruiting and motivating top class faculty and PhDs /post docs. 2. In a young Institute with missing generations, it is critical to have a quality mentorship program, maybe as a weeklong retreat with ample opportunities of discussions and interactions with experienced faculty from other institutions. 3. Develop mentorship programmes for the foundational skills and mind-sets/culture for newly recruited PhD students. 4. Encouraging for formation of large interdisciplinary groups to sove defined problems that have takers of that research identified and committed in the beginning. 5. An Institute Research Day may showcase the research outcomes and reward the top performing faculty (with a separate < 40 years category) and PhD students. 6. Formulate and share (!) or at least sensitize transparent and realistic achievements expected of faculty at different stages of their career. 7. Attract larger number of visiting faculty at senior levels to provide sharing of best practices with the younger colleagues. 8. Encourage filing of intellectual property and its connect with industry. 9. Authors of three to five highest impact publications each year may give institute lectures and share on their ways of doing research. A plaque and certificate may be provided as some kind of in-house research award which may for example also carry a small grant. The overall performance of the Institute in this area is Excellent	
8.	Provide committee's assessment of different sponsored research and consultancies undertaken by the various academic units of the institute. Research at IIT Jodhpur focuses on different areas, covering horizontals and verticals at basic, developmental R&D and industrial linkages. Some of the prominent areas include Healthcare, Artificial Intelligence & Machine learning, Language technology, Genomics, Social computing, Biocomputing, Sustainability, Heritage, Quantum, Water, Energy, Infrastructure and Security. Interdisciplinary and Transdisciplinary research is fostered in IIT Jodhpur and this has led to research in some unique areas like Robotics and Mobility, Digital Humanities, IoTs and Cyber-Physical Systems, Advanced Manufacturing, etc. This has led to IIT Jodhpur taking regional and national leadership with some unique R&D centres like TIH i-Hub Drishti, Jodhpur City Knowledge and Innovation Cluster, CoE in Ayurtech, Centre for Advanced Security Technology in Cyber Physical Systems, Deep-Tech Bio-Design Centre, TISC and Research Park to name just a few. IIT Jodhpur's capability and leadership was demonstrated when it led the COVID-19 RAKSHAK project where some high-quality R&D and Technology Development was rolled out rapidly in collaboration with national experts and in-house teams. The Sponsored Research activity in IIT Jodhpur has shown a steady growth and is quite high compared to other IITs at per faculty level. From FY 2015-16 to 2022-23, IIT Jodhpur has grown in terms of research productivity. The following table shows	

the total number of projects and sanctioned grants in different categories: sponsored research projects, fellowship projects (including Swarnajayanti Fellowship and Abdul Kalam Technology Fellowship), consultancy, and others.

With respect to funding agencies, major funding agencies include DST, SERB, MEITY, DBT, Ministry of Ayush, MHA, DRDO, MHRD, MSME, CSIR, ISRO, and Rajasthan Government. From industry, several projects are supported through grants from several companies including Facebook/Meta, Microsoft, Accenture, Siemens, and Google.

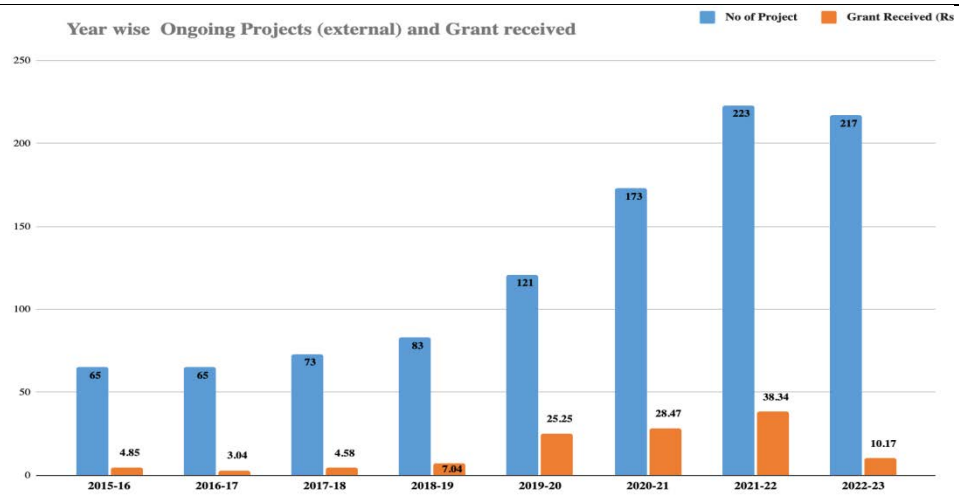
Special mention needs to be made regarding the collaboration that IIT Jodhpur has fostered with various neighbouring Institutes and regional bodies to set up a healthy collaboration ecosystem. While this is there in a bottom-up fashion in other IITs, IIT Jodhpur has developed an Institutional mechanism for such collaborations. This is very commendable.

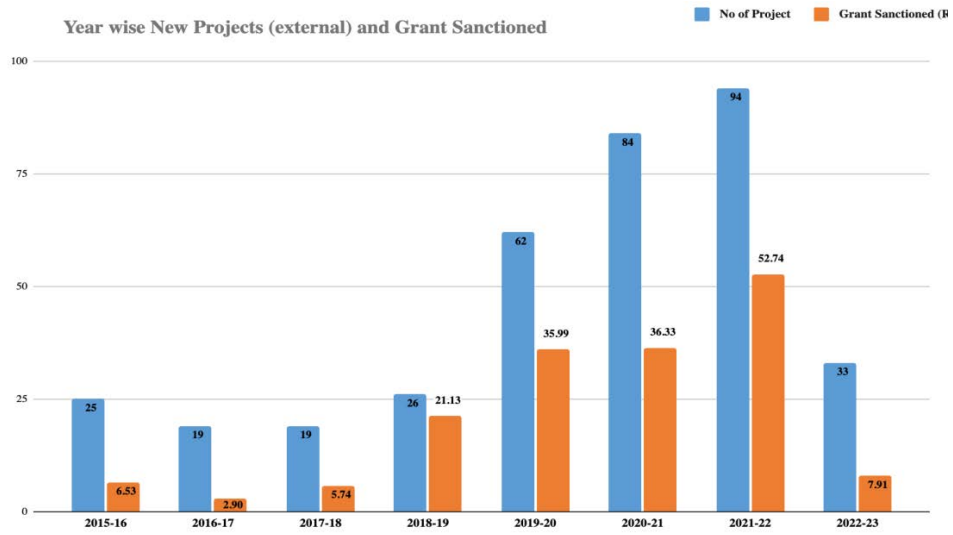
No. of projects and Sanctioned Grant (Rs. in Crores)

from FY 2015-16 to 2022-23 (till 30.09.22)

Category Projects	**No. of Projects**	**Sanctioned Grant (Rs. in Crores)**
Sponsored Research Project	241	149.66
Fellowship project	18	6.24
Consultancy	61	11.26
Sponsored/Conf/WS/Symposia/Others	42	2.15
Grand Total	**362**	**169.31**

In the following figures, the exponential growth in research projects is further highlighted by two graphs “year wise ongoing active projects” and “year wise new projects”. These highlight the growth in the research portfolio of IIT Jodhpur.





The overall performance of the Institute in this category is Excellent.

9.	Provide committee's assessment of industry engagement and industry linked research activities by the various academic units of the institute. The Institute's Corporate Relations office, under the Dean (International Relations, Alumni Relations and Corporate Relations), looks after the Industry Relationship. The office has been steadily putting effort to engage with the big corporate houses, R&D Labs, MSMEs and start-ups. Regular visit of industry professionals are also happening so as to identify industry-sponsored fellowships, engage on common-interest problems and guiding students jointly with an industry mentor. Some liasing are at the Institute central level and some are department-centric engagements.	

	IIT-J has signed MoU's with several companies like GE, TCS, Cognizant and a few more are in the offing including one with the CII for 100:100 initiative. There have been grand projects being discussed with DRDO entities, based in Rajasthan. Thus far, direct engagement with companies has been the modus operandi, but the newly-engaged CII path can be "transformative" in terms of faculty engagement in the CII-driven courses, use-case labs, student internships, sponsorship from industries in establishing Chair Professor positions. The committee takes note of all MoUs, e,g, with Siemens on the Development of affordable and efficient technological solutions for healthcare especially in the areas of point-of-care devices, IoT-based devices, medical implants, medical waste management etc. There are MoUs for Design Thinking promotion, Cloud microservices, Quantum Secure Communications and so on and so forth. Such deeper engagements with industries also make it easier to organize corporate-linked and industry-oriented technical talks by the R&D heads and CxOs periodically. Interesting to note is that the UG students can opt for a specialization in Engineering Innovation, in which they can do a one-semester long industrial or academic research project at an off campus location. Similarly, students can also opt for Entrepreneurship as an option for the minor and engage in an innovative product or process conceptualization as part of their B.Tech program. They can even continue for one additional year and get an M.Tech degree in the area of their specialization or minor. In the case of Entrepreneurship, minor area students can continue their entrepreneurial journey as part of their M.Tech and translate to an incubator for a start-up – aligned with NEP recommendation of integrating and promoting entrepreneurship as part of a formal academic structure. Such steps intertwine studies with entrepreneurship. The committee believes that industry and entrepreneurship-linked activities are in the right direction and can gradually be scaled up. The IIT-J will be more effective (i) by having an internal committee with people who have been part of industry---this team can regularly review the signed MoUs and recommend actions for higher success metric, (ii) by ensuring industry talks are part of regular course and assessment structures for due importance from the students community, (iii) by defining a broad pathway for participating actively in industry-led and industry-motivated research above and beyond academia-led research that Institute is good at. The overall performance of the Institute in this category is Very Good.	
10.	Provide committee's assessment about joint degree programs, outreach, continuing education/executive education programmes of the institute. Please indicate committee's suggestions for improving the same. Continuous learning has become the need of the hour and is of paramount importance to all professionals irrespective of the age. The colleges were designed for young learners; but it is no more all young students attending the college.	

	Working professionals are returning to colleges for their upskilling and reskilling. In certain courses, the learnings are happening completely online or in hybrid mode. The IIT-J has set up a dedicated unit catering to the need for working professionals through various programs. The institute has taken lead in offering world-class Executive Education for such professionals, taking care of industry-specific requirements or industry-cluster needs or generic programs of common value to industries. These are in the form of Short-term courses, Workshops, Certificate courses, Post-graduate Diploma Programs and Executive M.Tech programs. A student can join an M.Tech. Program through stand-alone M.Tech., M.Sc.-M.Tech. dual degree, B.Tech.-M.Tech. dual degree, and B.S.-M.Tech. dual-degree options. The committee specifically appreciates implementation of certain principles of NEP-2020. These are with reference to incorporating emerging technologies and designing courses with multiple entry-and-exit criteria. Also, the institute has injected the real benefits of online mode and mixed nicely both mode of teaching. This is very important for IIT-J given its distance from the large set of professional communities. Virtual Platform surely helps IIT-J to reach to all parts of India and even internationally. Alongside the course sequencing and the learning pace, one unique advantage that IIT-J offers is undertaking joint-thesis work with parent industries and deliberating with faculty and students through campus immersion component. IIT-J has imbibed well the technology growth trajectory and incorporated these in the appropriate-formatted course programs. The course includes latest technology areas as thrust areas. Executive M.Tech program examples are M.Tech in AI, Data and Computational Science, AR&VR, Robotics etc. and Post-Grad Diploma certificate programs are in Data Engineering, Cloud Computing and others. We understand that there are even short-term certificate courses and some are with partners like Wiley. Hundreds of working professionals are benefitting from these programs as they learn while they work. With a good appreciation of the initiatives, the committee recommends that (i) these course program outlines be regularly updated even though incremental in nature, (ii) industry case studies, best practices be incorporated formally, (iii) more relevant partners can be invited to have marketing for better reach, (iv) having a formal process to measure the outcome of course learning in the present job or new career initiation. The Overall Performance of the Institute in this Area is Excellent.	
11.	Please indicate committee's broad assessment of departments including their linkage with the peer groups in the country and abroad and interdisciplinary connect Suggestions of the committee for improvement in the department specific academic and research activities will be of immense value. Please feel free to make department specific comments.	

IITJ has been working to establish various academic units have strong linkages with various universities across the globe. The Institute has entered into MoUs with internationally reputed academic institutions such as the State University of New York at Albany, State University at New York at Buffalo, EPITA France, Deakin University Australia etc.

IIT Jodhpur has also entered into joint programs with AIIMS Jodhpur in medical technologies, both at the M.Tech level as well as at Ph.D level. This is an important constituent to the Jodhpur City Knowledge and Innovation, being supported by the Office of the Principle Scientific Advisor, Govt of India.

Currently, the Institute has 6 enrolled international students in various postgraduate programs from Indonesia, Syria, Nepal and Bangladesh, through various initiatives of GoI such as ASEAN fellowship program, Study in India and ICCR.

To support young faculty members in making international connects and collaborations, the institute has also created the following scheme.

International Research Mobility Grant Award (2021 to 2022)

IIT Jodhpur has initiated an international research mobility grant program to young faculty members. In the program, R&D office support up to Rs. 10 lakhs towards international travel and collaboration with researchers from top 100 research universities (using QS and other ranking schemes). In the last two years, seven faculty members have received the mobility grant and several international collaborations have been initiated.

Suggestions:

1. Scale and strength of connects and collaborations flourish when these are valued by the Institute through the culture and empowerment of such practices.
2. Internal support to research may prioritize and reward the intra- and inter-institute collaborative research.
3. Celebrating a Collaborative Research Day (or similar) may showcase and recognize interdisciplinary, collaborative research (within and outside India). A workshop or two may also imprint on students and faculty the best practices for success in collaborative research.
4. Every department may have a high level advisory group that understands the needs and status of the department and provides an outsider's perspective on the department-centric SWAT parameters and actions.
5. Each department needs to evolve a rational policy for promotions so that aspirations and actions are better tuned with the expectations. The Advisory Group may help partially evolving such best practices based on experience.

The overall performance of the Institute in this area is Excellent.

12.	Committee's assessment of infrastructure facilities in the institute and institute's efforts towards sustainable campus. IIT-J is in the desert region of Rajasthan and the summer is a prolonged one in the region. So, that way, the institute is quite unique in its location and the weather. Also, the campus is large and the area is 850 acres or so. In such a situation, the campus design and sustenance need a special attention. Given global thrust on Sustainable development in this era, IIT-J has the opportunity to showcase some of the best practices in its campus itself. The first and foremost attention was needed for ensuring Water availability for the campus residents to manage daily chores and for ascertaining Quality drinking water. This target seems to have been achieved by IIT-J with measures like rainwater harvesting, reduced water usage, sewage recycling and other pertinent measures. Also, the campus and building architecture needed to be developed and maintained in a way that protects the residents against sandy dust-storms in the summer. Service tunnel of size 4m x 4 m about 3.1 Km long network of trenches and sub-trenches has accommodated HVAC, Water supply, Fire- fighting, Data Networking, LV cables, LT cable services. This greatly simplifies maintenance, expansion and reliability of the services. The Campus is surrounded by Berms on the South West side of 14-15 m height to prevent entry of hot winds in buildings during summers. Front Berms have been covered with plants and space below are being utilized for Substation, A.C. Chillers, Services Centre, Bank, Offices, Laboratories, Museum, Activity rooms, etc. Native plant species that consume less water and stabilize soil are the desired ones to grow. We learnt that the IIT-J Campus was selected for the 2017 Exemplary Performance Award in the 'Passive Architecture Design' by the Ministry of Urban Development, Government of India. And such recognition is rightfully so. The Waste management and disposal is the next big thing that IIT-J is addressing currently. Mechanisms for Bio-waste, radio-active and/or sensitive material disposal are critical given researchers' involvement in the associated investigation areas. The other sustainable goal would be Campus-scale Solar and Renewable Energy generation at least to augment the supply from the State Electricity Board. Energy Generation and Energy Efficiency in campus usage can be made quite trend-setting. The committee notes the other good initiatives of the institute in making the campus Walking and Bicycle-dominant, having thermally comfortable smart buildings with low-embodied energy materials, and driving a smart campus with wireless connectivity throughout. The Computer Centre provides services like troubleshooting and any other services to all the fraternity through industry-standard service desk powered by Jira. This helps institute to achieve Time-To-Resolution with 89% SLA performance and satisfaction score of 4.7 for the last one year.	

	Keeping all of the sustainability pathways in mind, the Committee recommends to IIT-J Management and Administration team to conceive IIT-J Campus-as-a-Lab and initiate multidisciplinary programs under a common umbrella. The mega-thinking can be broken onto smaller projects and assigned to students as mini-projects to be conducted over their stay duration period. The students can be accorded activity points or certain credits in the curriculum. Such community activities with science and technology mindset can also serve as a breeding ground for beyond-syllabus innovation and excellent teamwork. The Overall Performance of the Institute in this Area is Very Good.	
13.	Committee's assessment of organization of different student bodies, hostel infrastructure, sports facilities and other amenities available in the institute. IIT Jodhpur has developed a robust system of participatory management with the students. This covers curricular, co-curricular, extra-curricular and hostel related activities. There is student participation in Institute Senate. The Student Council is a set of units that enable the students to come up with their own proposals for various aspects of their life covering the three main areas of academics, extra-curricular (sports, culture, technology, events) and amenities (hostel infrastructure, food, medical, other supplies, etc). The Student Body is represented through Councils – Student Activity Council (SAC) and Academic and Co-curricular Activity Council (ACAC). The councils aim to empower students so that they can actively contribute towards a harmonious academic, social and cultural ecosystem at IIT Jodhpur. These councils are the key instrument for coordination and cooperation between various sections of the student community. The Student Senate is the ultimate representation of the general student body and acts as a bridge between the student community and the institute administration and ensures effective coordination between the two. This seems to be working quite well with many faculty members involved. A large number of unique sports, cultural, technological activities are held which cover local, regional national and international themes. This is in synch with the IIT culture. The council structure has allowed students to initiate actions and participate in decision-making. The participation of a diverse students has increased because of the inclusion of various interests. The council's inclusion of diverse interests is catered with the organization of year-long events and showcasing their talent at different fest and events with a specific focus on Varchas (sports fest), Aaftab (literature fest), Prometeo (Technical fest), Ignus (cultural fest), Virasat (SPICMACAY event), EBSB events. Through councils, the students have made significant contributions. To name a few, the Board of Co-curricular activities was involved in organizing this year's INAE SERB youth conclave, where BCCA societies not only organized but also	

	participated in various hackathons, ideathons, etc. Last year they were among the top performers, standing 8th among all IITs and 1st among all 2nd generation IITs. Different societies have been participating in various competitions and performing well. During Inter IIT sports meet, the team performed well with a break in training due to the pandemic. During the Inter-IIT cultural meet, IIT Jodhpur performed well and secured the top 3 positions in a different competition. The Student wellbeing committee has been instrumental in mentoring and supporting students. Each year the freshers coming are alloted an SG for a smooth transition to college life. An SG deals with introducing the freshers to college activities. An SG also mentors the allotted students throughout their college life. The Institute has enabled the aspirations and ambitions of student activities by providing various kinds of reasonably good quality infrastructure support. There is a dedicated indoor sports facility housed in 'Akash Building'. Outdoor sports facility includes football, cricket, hockey, volleyball, basketball grounds, etc. There berms space is allocated to the students' body for club activities, tinkering lab, meeting space, etc. During the COVID period, complete infrastructural support was provided to conduct many of the fest and events online. The campus is scenic and there is enough open space for further development. The hostels provide single occupancy air-conditioned room for majority of the students except first year with 24x7 high speed WIFI and LAN connections. Housekeeping, laundry and maintenance facilities are available. There is 24 h security, CCD camera surveillance on hostel main gate. Sports and recreational facilities (TV room, reading room, art and music room, indoor sports, badminton court, gymnasiums) are adequate. There is daily bus transport service to the city at different times. Snacks, beverages and utility vending machines are provided inside the hostel. There is open area inside the hostels for casual sports and recreational activities. IIT Jodhpur provides round the clock health care facilities to not only to its students, but to the faculty and staff members of the Institute, at its campus. This fully equipped and self-sufficient facility is run by M/s. Goyal Hospital & Research Center Private Limited, Jodhpur, on contract. Reasonably adequate are available at the Primary Health Center (PHC) including Doctors, Visiting Specialists, Paramedical Staff, Diagnostic laboratory, Physiotherapy Unit, Pharmacy, 24 Hours Emergency Room and an ACLS Ambulance. Besides this, IIT Jodhpur is also availing facilities available at the All India Institute of Medical Sciences, S. N. Medical College and some specialized hospitals. The Institute has agreements with a few prominent hospitals (empanelled hospitals) for priority treatment to its employees and students. These include: Goyal Hospital and Research Center, MediPulse Hospital, ASG Eye Hospital, and Vasundhara Hospital. The students in the campus get free OPD treatment in these hospitals. This is an important area and the current facilities are fine for now. On the infrastructure front, they have made effective usage of some of their special facilities. Campus is surrounded by Berms on the South West side of 14-15 m height to prevent entry of hot winds in buildings during summers. Front Berms have been covered with plants and space below are being utilized for Substation, A.C. Chillers,	

	Services Centre, Bank, Offices, Laboratories, Museum, Activity rooms, etc. A service tunnel of size 4m x 4 m about 3.1 Km long network of trenches and sub trenches has accommodated HVAC, Water supply, Fire- fighting, Data Networking, LV cables, LT cable services. This greatly simplifies greatly simplifies maintenance, expansion and reliability of the services. The overall performance of the Institute in this area is Excellent.	
14.	Based on Vision, Mission and Goals identified by the institute comment about the committee's overall assessment of the progress made so far. The committee came back with a very positive feeling about the evolution of IIT Jodhpur over the last few years as an institute of learning, scholarship, all round development of students with a view to meet its Vision, Mission and Goals. The Vision & Strategy document captures the essentials of its approach towards meeting its educational, research and broad institutional objectives, and the committee was happy with the clarity of this expression. By and large, the committee is of the view that this strategy is being deployed successfully in formulating new directions and policies. The developments observed by the Committee are largely aligned with these statements, as outlined in detail in the rest of the report. No doubt there will be changes in strategy as the institute evolves further. The overall performance of IIT Jodhpur is Excellent.	
15.	Overall assessment by the committee and suggestions In our overall assessment of IITJ, we should remember that the diversity of strengths different IITs collectively bring is an important aspect of the higher education and research in the country, rather than all of them being just near identical clones of each other. IITJ has developed some unique important strengths and directions which need to be noted. **Unique Initiatives and strengths of Indian Institute of Technology Jodhpur** 1. In collaboration with AIIMS Jodhpur, IIT Jodhpur has started in 2020 three transdisciplinary innovation-oriented joint programmes as Masters, Masters'-Ph.D. and Ph.D. programmes in Medical Technologies aligned with the national objective of achieving self-reliance in medical equipment manufacturing. This offering is first of its kind. 2. With the present PG programmes, IIT Jodhpur has created many opportunities for multiple entries and exits. A student can join an M.Tech. Programmes through stand-alone M.Tech., M.Sc.-M.Tech. dual degree, B.Tech.-M.Tech. dual degree, and B.S.-M.Tech. dual degree options. 3. The new curriculum focuses on the holistic development of students and	

creates strong internal systems for supporting diverse student cohorts in academic, industrial and social domains both inside and outside the formal academic interactions of the classroom.

4. UG students can opt for a specialization in Engineering Innovation, in which they can do a one-semester long industrial or academic research project at an off campus location. Similarly, students can also opt for Entrepreneurship as an option for the minor and engage in an innovative product or process conceptualization as part of their B.Tech programme. They can even continue for one additional year and get an M.Tech degree in the area of their minor or specialization. In the case of Entrepreneurship, minor area students can continue their entrepreneurial journey as part of their M.Tech and translate to an incubator for a start-up – aligned with NEP recommendation of integrating and promoting entrepreneurship as part of a formal academic structure.

5. As an option, students can also switch to a broader Engineering science B.Tech Programme after the first year. B.Tech. in Engineering science has a feasible combination of Engineering disciplines, Sciences and Liberal arts, and is curated for a student based upon his/her choice under the supervision of a faculty.

6. TIH, TISC, and Tech Park have been instigating translation research where joint project with industry and local MSME is fostered.

7. School of AI and Data Sciences has established centres of excellence in - Brain Science and Applications, Mathematical and Computational Economics, Intelligent Infrastructure, AI and Ethics and AI for Integrative Precision Medicine which runs a Centre on Ayur-Tech – for technology initiatives in Ayurveda, supported by the Ministry of Ayush.
.
8. A modular postgraduate diploma programmes is being offered to have multiple exits with certificate(s), and diploma.

9. A student admitted to an M.Tech. programme who has at least completed the minimum credit requirement of the first semester can keep his studentship alive while he is pursuing any professional activity, by opting for Registration Kept Alive (RKA) in subsequent semesters. This is a unique feature of the regulation.

10. For Online and Digital Education, executive programmes are being offered in a synchronized online mode of delivery with a compulsory campus immersion component. M.Tech. Executive programme in Artificial Intelligence, Cyber Physical Systems, Data and Computational Science, Robotics & Mobility Systems, Augmented Reality and Virtual Reality (AR & VR), Intelligent VLSI Systems.

11. IIT Jodhpur has also set up the School of Liberal Arts, which aspires to be a forerunner in Liberal Arts education and research, which is currently offering a unique M.Sc. in Computational Social Science with specialization in Economics and Sociology for providing opportunities in holistic education.

12. AIOT Innovation Hub is one unique initiative from IIT Jodhpur. It is planned to take care of the development of intelligent systems which involves sensors design and its fabrication, signal processing, control electronics, data analytics, signal communication, IoT, etc. These systems can be for various sectors like Healthcare, Smart Cities, Precision Agriculture, Industry 4.0, Automotive industry, etc.

13. First of its kind centre for Technology Foresight and Policy; the centre works on foresight based policy research.

14. Unique Infrastructure:
    Service tunnel of size 4m x 4 m about 3.1 Km long network of trenches and sub trenches has accommodated HVAC, Water supply, Fire- fighting, Data Networking, LV cables, LT cable services. This greatly simplifies greatly simplifies maintenance, expansion and reliability of the services.
    Campus is surrounded by Berms on the South West side of 14-15 m height to prevent entry of hot winds in buildings during summers. Front Berms have been covered with plants and space below are being utilized for Substation, A.C. Chillers, Services Centre, Bank, Offices, Laboratories, Museum, Activity rooms, etc.

    Computer Centre:
    Service Desk for IT services: Computer Centre provides services like troubleshooting and any other services to all the fraternity through industry standard service desk powered by Jira. Very few IITs use service desk-based support. We achieved Time To Resolution with 89% SLA performance and satisfaction score of 4.7 for the last 1 year.

Academic Impact

1. Peer recognition of IITJ faculty (FIEEE, FINAS, INAE-Abdul Kalam Technology Innovation National Fellowship, Editorial Boards of top journals).
2. 21k+citations with IITJ affiliation publications.

Technological Impact
1. Novel Cold-plasma Detergent in Environment 'CODE' device to mitigate Air Pollution to reduce the risks of infection from airborne pathogens in the indoor environment.
Key features of IITJ's Novel CODE Device:

(i). Produces Cold-plasma Detergent in Environment (well-known nature of detergent) with optimum concentration
(ii). Residency time of active ions more than 25 sec to effectively deactivate the long-living pathogens
(iii). Produces requisite active ions so as to balance negative and positive charges similar to mother nature and also to produce local fields in the air to rupture harmful pathogens in the aerosols
(iv). Consumes less power (for optimized source avg. discharge power < 5 W)

2. Deepfake Detection in Images and Videos.

The Deepfake Detection tool is used for predicting whether a given image or video is real or fake. Next, the user selects the type of file for which a prediction is needed. Two types are supported- image and video. After navigating to the folder containing the file using the Browse button, the user can select your file for real or fake prediction. On pressing the Run button, the result is shown next to the 'Prediction' and 'Score' tags. A real 'prediction' means the input file is real, and vice-versa. The 'score' varies from 0 to 1. A value close to zero means the sample prediction is real, whereas a value closer to 1 means that the sample is fake. (Patent for this technology is applied.)

3. Design, development and flight testing of an indigenous autopilot system (both hardware and software).

Social Impact

1. The institute has installed more than 15 UF units in rural schools of different districts of Rajasthan namely Sirohi, Jhunjhunu, Pali, Jodhpur. These units serve the schools with student numbers in the range 45-315 and provide clean drinking water customized for their water contaminants.

With a collaboration with villages and NGOs we operate the Har Aangan Kheti (Hak) namely under UBA adopted villages as well as under Arpan Seva Sansthan (an NGO having MOU) using a water and soil conservation technology named Sub-surface Porous Vessel (SSPV), developed in a project under RuTAG IITD center. c. IITJ has also released its own Flora and Fauna identification App named Prakriti 1.1 to capture and enjoy the knowledge base of animals and plants around us.

Here is a quick summary of some of the Strengths, Weaknesses, Opportunities and Threats to do a holistic planning and develop an action roadmap for the Institute.

<u>Strengths</u>

- Futuristic vision and leadership in both contents and processes
- IIT Brand name
- Young and thus flexible, energetic, hungry, accepting of change and experimentation
- Emphasis on interdisciplinary/multidisciplinary education and research
- Focus on translational research, evolving tech – AR, VR, Quantum, IOT, etc
- Large available space for big pilot projects in e.g., green energy generation – solar-PV, Solar-Thermal, wind, water harvesting and purification, recycling.
- Focus on problem-solving research
- Several institutions of HE and research around Jodhpur providing substantial interdisciplinary collaborations, e.g., in health, defense, tech management and conservation.

<u>Weakness</u>

- Young institute: developing infrastructure, brand within IIT system; lack of top performing role models from previous generations; lack of continuity of best practices and culture; lack of transmission and connect across generations
- Lack of age related diversity
- Attracting Top Talent both as faculty and students
- Limited Autonomy in creating new models / or incoming revenue

	- Adhoc Financial Grants preventing implementation of a long term vision
	- Internal systems and mind-sets required for future sustenance
	- Sustainable Business Model for future
	- Capacity Building in faculty and staff
	- Location –
	  - Connectivity
	  - Limited industry ecosystem
	  - Climate
	- Nearby residential and job opportunities for spouses and educational opportunities for children
	Opportunities
	- Evolving new models of education delivery: e.g., Immersive Online Education
	- Executive Offsite Location
	- New Business Models
	- Focus on local resources and unique local opportunities: Renewable exploitation; Water research and its business model; Arid Zone cultivation research and biz mode; Defense Technology; Healthcare – AIIMS, Ayurved; Tourism and Heritage: through AR/VR and other digital-physical technologies
	- Alumni, CSR, Philanthropy based generation
	- Monetizing Technology
	- Virtual incubators
	- Industrial hub- incubator, tech park, industry park, Med-tech park
	- Entrepreneurship Development – MSME Development
	Threats
	- Grant based funding reducing with increased competition
	- Global competition arriving locally
	- Repurposing IIT's as joint institutions.
	- Interest towards engineering discipline.
	- Disruptive changes in models of HEk
	
	The combined performance of the Institute in the last five years is Excellent, given the status five years ago and where it is now and ready to go forward.	

16.	Any other aspect committee wish to note/highlight There are certain important achievements of IIT Jodhpur that came to our notice. The Institute has made rapid progress in the last five years in all aspects covering academic programmes, research and development, innovation infrastructure, collaborations, campus development and has brought about a significant improvement in various benchmarked parameters as well as perception. Several new directions have been opened in core and transdisciplinary areas merging deep tech with application areas like healthcare that combines state of the art knowledge with Indian Knowledge Systems. They have also set up some unique collaborative programmes. For example, In collaboration with AIIMS Jodhpur, IIT Jodhpur has started in 2020 three transdisciplinary innovation-oriented joint programmes as Masters, Masters'-Ph.D. and Ph.D. programmes in Medical	

	Technologies aligned with the national objective of achieving self-reliance in medical equipment manufacturing. This offering is first of its kind. The stress on including Digital Technologies in all areas with integration of AI/ML is also shaping up well and IIT Jodhpur is becoming a referral centre in some aspects. Its research and academic integration with Humanities and Culture is unique. A case in point is the setting up of the new Centre of Excellence in Arts and Digital Immersion. Another important achievement has been its local and regional integration, not only with the top academic institutions in the state but it has taken leadership in tackling important and relevant areas related to sustainable development through R&D activities and has become a State Hub for the same. Finally, it has also taken up key national initiatives, both as participants as well as leads. Transdisciplinary Policy making is also a unique aspects for a new IIT through a Centre of Technology Foresight and Policy which is uniquely positioned for foresight based policy research. These aspects touch upon important recommendations of NEP and IIT Jodhpur may like to develop new vistas and lead the immersive holistic education in this direction. In short, the progress of IIT Jodhpur in the last five years has been truly excellent.	