Unique/innovative Solutions of the problems Statement are invited from the following areas: (Revision- 3 / Dated 24th October 2024)

SI No	Organization	Problem Statement Title	PS Number	Theme
1	**ONGC**	**Upscaling biofuel production** It involves enhancing the efficiency and sustainability of processes that convert biomass into fuels. There are various lab methods where biofuels have beensuccessfully extracted from organic materials. However, most of the methods prove uneconomical once scale upto industrial level is done. Hence, there is a need for the development of methods which can prove economic viability once they are upscaled to an industrial level.	JECHAC1	Renewable / Sustainable Energy
2	**ONGC**	**Instrument development and process engineering for acid digestors** it should aim at the development of acid digesters required for the acid hydrolysis or digestion of the biomass to sugars which must have the potential of having great load capacity, less reaction time, least toxin generation, temperature and pressure controllers etc.	JECHAC2	Renewable / Sustainable Energy
3	**ONGC**	**Acid recovery unit** Development of an indigenous acid recovery unit which as the capacity to recover the catalyst widely used for acid hydrolysis of biomass to produce biofuels and in the transesterification of oils to produce biodiesel. Recovery of acid will have both economical and environmental impact.	JECHAC3	Renewable / Sustainable Energy
4	**ONGC**	**Recovery of crude oil from oily sludge** Recovering crude oil from oil sludge generated during oil production in oil fields is vital for environmental sustainability and resource management. This project should focus on employing extraction techniques to efficiently separate oil from sludge. The method should not only recycle valuable hydrocarbons but also be environmentally sustainable.	JECHAC4	Crude oil
5	**ONGC/ OIL**	**Green hydrogen production** This project should focus on the production of hydrogen by using electrolysis of water by using electrolytic cell via green electricity. It should also focus on the development of new storage and transportation alternatives for highly flammable hydrogen gas.	JECHAC5	Clean & Green Technology
6	**ONGC/OIL**	**Green hydrogen storage and transportation** Development of storage units for hydrogen which can cater the high pressure and low temperature requirement of hydrogen.	JECHAC6	Clean & Green Technology
7	**ONGC**	**Use of Drones to survey oil spills and bioremediation** The project should aim to explore the potential of drone technology in monitoring crude oil spillage in water and soil pits. By utilizing unmanned aerial vehicles (UAVs), the project should seek to gain a better understanding of oil spill characteristics, including thickness, penetration, and spread. The data collected from drone-mounted sensors should be able to analyze and develop a comprehensive model for monitoring crude oil spillage during bioremediation. The project will contribute to improved environmental monitoring, enhanced spill response, and reduced ecological impact of crude oil contamination in water and soil pits.	JECHAC7	Robotics and Drones

8	**ONGC**	**Water treatment procedures** There is observance of yellowish colour in treated drinking water even though iron content at permissible limit. Even after treatment with recommended dosage of Sodium Hypochlorite and Bleaching powder, no residual chlorine concentration is observed in treated water. **Solution required**: 1. Suggested design of filter media and system that can help solve the problem of drinking water colouration. 2. Suggested changes in dosing system/proposed dosing design to achieve the desired residual chlorine concentration level in drinking water (0.2-0.5 ppm).	JECHAC8	Clean & Green Technology
9	**OIL**	Developing solar powered attendance management system for employees working at remote operational areas of OIL INDIA LIMITED.	JECHAC9	Smart Automation
10	**JECAA**	**Rural education** Rural education is a particularly challenging area in India due to its size and spread. An Innovative idea for solving any one identified problem in this segment is required to be showcased. The idea should demonstrate some original thinking and problem-solving aptitude.	JECHAC10	Edutech
11	**JECAA**	**Improvement of Technical Skill Training thru AR/VR** Technical education and training needs a combination of Expert teachers and study content. There is a huge market for such AR/VR solutions which can improve the delivery of technical education. The Edutech startup is expected to develop an innovative idea for solving any one identified problem in the field of technical education. The idea should showcase some original thinking and problem-solving aptitude.	JECHAC11	Edutech
12	**JECAA**	**Drone based surveillance of garden areas** Tea gardens are very big in size and cost of manuallabour to oversee the garden is going up. A drone-based system which can reduce this manual supervision cost is required. A system which is easy to operate and uses computer vision helps control the issues in garden management.	JECHAC12	Robotics and Drones
13	**JECAA**	**Better quality control in the factory thru automation / Data Analytics** The process of tea factory needs extensive control of quality of leaves and its processing steps. Assam tea is losing its quality status as most of the garden are now buying leaves from outside their garden areas. Quality control of leaves is a manual process. Some has tried to import some machines which can do a computer vision-based analysis of leaves and raise alarms.	JECHAC13	Smart Automation
14	**JECAA**	**Bamboo based products** Innovative Bamboo-based building materials are becoming popular due to their sustainability benefits. An example is Bamboo based Wooden flooring. An innovative Bamboo based product idea for the building material industry is required to be showcased. The idea should showcase some original thinking and problem-solving aptitude	JECHAC14	Clean & Green Technology

15	**JECAA**	**Student Innovation** The ideas should be firmly based on the agricultural challenges, issues faced by Agri Industry and Progressive Farmers. Its main aim is to solve the current Agricultural problems through technologies and bring forward all the enthusiastic start-ups, entrepreneurs, Researchers and students to come forward and show up their technical potential.	JECHAC15	Agriculture, FoodTech & Rural Development
16	**JECAA**	**Sustainable Rural Business Model** Design an innovative business model that leverages local resources and technologies to promote sustainable economic development in rural areas. The solution should focus on generating employment, improving living standards, and ensuring environmental sustainability.	JECHAC16	Agriculture, FoodTech & Rural Development
17	**JECAA**	**Smart Agriculture for Small Farmers** Develop an IoT-based solution to help small-scalefarmers optimize crop yields by monitoring soil health, weather conditions, and resource usage (water, fertilizer, etc.). The business model should ensure affordability and scalability in rural communities.	JECHAC17	Agriculture, FoodTech & Rural Development
18	**JECAA**	**Waste-to-Wealth Solutions** Propose a model for converting municipal or household waste into usable products like energy, organic fertilizers, or reusable materials. The solution should outline a sustainable and economically viable approach to waste management in urban or semi-urban areas.	JECHAC18	Waste Management
19	**JECAA**	**Renewable Energy for Remote Areas** Create a business model for implementing decentralized renewable energy systems (such as solar, wind, or biomass) in remote and off-grid areas. The model should include aspects of financing, deployment, and maintenance, ensuring community participation**.**	JECHAC19	Renewable / Sustainable Energy
20	**JECAA**	**Tech Solutions for Urban Traffic Management** Develop an innovative solution to reduce traffic congestion and pollution in growing urban areas using IoT or AI-based systems. Your model should outline how to integrate this solution within existing city infrastructure**.**	JECHAC20	Smart Automation
21	**JECAA**	**Water Conservation through IoT** Design an IoT-enabled solution for efficient water management in societies or agricultural setups. The problem should focus on minimizing wastage, recycling greywater, or improving irrigation efficiency.	JECHAC21	Agriculture, FoodTech & Rural Development
22	**JECAA**	**Affordable Health Monitoring for Rural Areas** Propose a business model for low-cost health monitoring devices or telemedicine solutions to cater to rural populations. The solution should leverage technology to improve healthcare accessibility and preventive care.	JECHAC22	Agriculture, FoodTech & Rural Development
23	**JECAA**	**Circular Economy Solutions for E-Waste Management** Develop a sustainable business model to manage and recycle e-waste (such as old smartphones, computers, and smart meters). Your model should include collection, processing, and the generation of new products from the recycled materials**.**	JECHAC23	Waste Management

24	**JECAA**	**Agrivoltaics Business Model:** Create an innovative business model for setting up agrivoltaics (combining solar power generation with agriculture) in rural areas. The model should explain how farmers can benefit from dual land use and renewable energy generation.	JECHAC24	Agriculture, FoodTech & Rural Development
25	**JECAA**	**Decentralized Clean Water Supply Model** Propose a model for providing clean drinking water to remote or water-scarce regions using decentralized and renewable energy-powered filtration or desalination systems.	JECHAC25	Clean & Green Technology
26	**AAU**	**Separation and grading of harvested tender tea leaves** Device for separation and grading of harvested tender tea leaves from harvested aged leave	JECHAC26	Agriculture, FoodTech & Rural Development
27	**AAU**	**Pesticide detection kits** Real time-based pesticide detection kits for harvested tea leaves	JECHAC27	Agriculture, FoodTech & Rural Development
28	**AAU**	**Millet processing machine** Small scale automation based Millet processing machine suitable for foxtail and finger millet processing.	JECHAC28	Agriculture, FoodTech & Rural Development
29	**OIL**	**Attendance management system** Developing attendance management system for employees working at remote operational areas of OIL INDIA LIMITED preferably using Renewable energy sources for offsite locations.	JECHAC29	Smart Automation
30	**OIL**	**Modelling** Modelling emissions from a Gas-based power plant under varying load conditions using sensors and real-time data analysis system, preferably using AI-based systems.	JECHAC30	Smart Automation
31	**OIL**	**Oil and gas processing installations** Estimation of fugitive emissions in oil and gas processing installations using Multi-sensor network, IOT, data processing, AI with GIS and 3D mapping for real-time pollution detection and raising of alarms.	JECHAC31	Pollution Control
32	**OIL**	**Air and water quality monitoring system** Adaptive air and water quality monitoring system using Multi-sensor network, IOT, data processing, AI with GIS and 3D mapping for real-time pollution detection and raising of alarms.	JECHAC32	Pollution Control
33	**OIL**	**Food Industry** Development of sustainable, eco-friendly packaging material, preferably using locally available material. Target industries are Restaurants, hotels, Food processing companies, the Tea industry, Transportation of fruits and vegetables, etc.	JECHAC33	Agriculture, FoodTech & Rural Development
34	**OIL**	**Food waste management** Sustainable food waste management – innovative solution for environmental, economical solution with social impact.	JECHAC34	Agriculture, FoodTech & Rural Development
35	**OIL**	**AI chatbot for public awareness** Key functionalities are automatic message generation using AI based algorithm and dissemination of the same to larger public audience using Social media connectors.	JECHAC35	Smart Automation

36	**OIL**	**AI-based detection of public grievance** AI-based detection of public grievance on pollution-related issues by automatic scanning of social media, capturing the keywords and analyzing them using automated systems, detecting the issues being discussed in the public domain and then presenting them to a central system for creating awareness in the Pollution control board.	JECHAC36	Smart Automation
37	**BCPL**	Vibration of a compressor is measured with proximity sensor. During thundering suddenly all the vibration values go off and automatically restored after awhile. The erratic behavior of the monitoring system is to be resolved by designing proximity sensor compatible to the compressor and its control logic during typical situation of thundering.	JECHAC37	
38	**BCPL**	A few battery of a battery bank develops high specific gravity during the float charging process. DM water is normally used in the cells but as remedial measures, it was tried with distilled water but with no success. It is necessary to find out solution of the problem and to develop an automated monitoring system of alerting high specific gravity on real time basis.	JECHAC38	
39	**BCPL**	Conventional metallic pipes as well as aluminum frame scaffolding with platform provision are used for working at height, which is not user friendly or safe. A light weight, sturdy, portable, safe and user friendly scaffolding to be designed with automated operating mechanism.	JECHAC39	
40	**BCPL**	Design of a work table for maintenance of small equipments, machines like pump, compressor, motor etc with provision of table height adjustment, equipment lifting arrangement, rotational movement and of portable use.	JECHAC40	
41	**Tocklai Tea Research Institute, Tea Research Association, Jorhat, Assam**	**Waste Management and By-Product Utilization** **Problem**- During the manufacturing of tea, a lot of waste is produced, such as dust, stalks and fluff, which are to be destroyed as per govt. regulations. **Engineering Focus:** Create systems for effective waste management and by-product utilization, such as converting waste into bio-compost, hydrogen energy, or secondary products like tea extracts.	JECHAC41	
42	**Tocklai Tea Research Institute, Tea Research Association, Jorhat, Assam**	**Improving Mechanical Harvesting Efficiency of tea leaves** **Problem**- Currently available mechanical harvesters harm the tea bushes and lower the quality of the leaves (fine count) compared to traditional hand picking. On the retro respect, manual tea picking is labour and cost intensive. **Engineering Focus:** Develop advanced AI based mechanical harvesters that can efficiently and	JECHAC42	

		selectively pluck fine leaves while minimizing damage to the tea bushes and maintaining consistent quality.		
43	**Tocklai Tea Research Institute, Tea Research Association, Jorhat, Assam**	**Green hydrogen fuel from tea waste as a substitute to fossil fuel for use in tea industry** **Problem-** Tea production is an energy intensive process. Pollution and other climatic impact caused by fossil fuels used in tea factories is a serious cause of concern. Thus, identification and implementation of suitable green energy resources to meet the energy demand of tea industry is the order of the day. **Engineering Focus:** Identify and implement hydrogen fuel from locally available tea waste and study the cost-feasibility and safety features to address environmental and energy challenges.	JECHAC43	
44	**Tocklai Tea Research Institute, Tea Research Association, Jorhat, Assam**	**Process optimization & quality control in tea processing using non-destructive techniques** **Problem-** Conventionally, the quality of tea is assessed by a Panel of Tea Tasters, which is subjective and may be prone to human errors. Chemical quality estimates are accurate but are time consuming, destructive and require skilled personals. **Engineering Focus:** Development of automated non-destructive quality assessment, monitoring and control system for tea using AI and IoT based instruments	JECHAC44	

(Er. Arindom Choudhury)
President
Jorhat Engineering College Alumni Association (JECAA)

(Er. Nawaj Ahmed)
President
GPD Hackathon Organizing Committee