**Part A-16: Multidisciplinary/Interdisciplinary**

Homi Bhabha National Institute is a conglomeration of eleven constituent institutions/off- campus centre (CIs/OCC) with a thriving academic and research environment. It conducts postgraduate and doctoral programmes in various disciplines, viz., chemistry, physics, mathematics, life sciences, medical and health sciences and engineering sciences across all the eleven CIs/OCC. Since its inception in 2005, HBNI has been taking great efforts to promote multidisciplinary education, interdisciplinary education and research through its CIs/OCC.

One of the constituent institutions of HBNI, NISER apart from offering PG and doctoral programmes in science subjects also offers doctoral programmes in Humanities and Social Sciences. NISER also offers integrated 5-year M.Sc. Programme in physics, chemistry, mathematics and biology, with each programme having core and elective courses (subjects). The students of these courses also have the option to obtain a minor in a discipline other than their major discipline by taking a certain number of courses from the other discipline. For example, a student opting for a major in physics can also obtain a minor in chemistry, mathematics, or biology by taking certain courses in either of these departments.Faculty members of HBNI in all its CIs/OCC are encouraged to collaborate among themselves and other researchers of various Institutes for carrying out research in the area of their expertise and other multidisciplinary / interdisciplinary areas both nationally and internationally. The outcome of such efforts is clearly visible in the multiand interdisciplinary publications generated in the academic year 2022-23 as a result of these collaborative activities.

HBNI also offers DGFS PhD Programme for engineering postgraduates (M. E. / M. Tech. /Equivalent Degree) where one PhD supervisor is from the science stream and the second PhD supervisor is a technologist. The arrangement provides the student with a unique opportunity to translate his/her research into technology useful for the nation

**Part A-17: Academic Bank of Credits**

Presently, HBNI is carrying out extensive discussions at its various academic forums, e.g., Standing Committee of Deans, Academic Council etc to evolve the process of implementation of the academic bank of credits.

**Part A-18: Skill development**

HBNI is keen to impart knowledge and skills to students through progressive teaching and learning methods. HBNI offers various skill developmental programs and fellowships to students to improve employability and promote entrepreneurship. Through these programmes, HBNI also aims at providing a platform for endorsing knowledge exchange and facilitating the interactions of industries with the institute. This is carried out through the implementation of internships and field projects for the students which will benefit them with practical work experience in nationally recognised research institutes and industries.

One of the constituent institutions of HBNI, The Tata Memorial Centre (TMC) offers a series of skill-based fellowships in the field of oncology every year. These include fellowships in Orthopaedic Oncology, Breast Oncology, Thoracic Oncology, Gastroenterology & HPB Oncology, Uro-Oncology, Oral Oncology & Reconstructive Surgery, Plastic & Reconstructive oncology, Interventional Radiology, Cancer Imaging, Pulmonary Oncology, Onco-Anaesthesia & Pain, Dental & Prosthetic Surgery, Preventive Oncology and Paediatric Oncology. These fellowships provide comprehensive and multidisciplinary training to individuals committed to a career in oncology. The fellowships also provide a broad exposure to all range of clinical problems encountered which will help the candidate to develop expertise and manage the patients independently. TMC also provide other skill-based fellowships such as Surgical Pathology, Haemato- Pathology, Molecular Haemato-Oncology and Infectious Diseases & HIV Medicine. TMC also conducts skill-based MSc courses (two years) followed by a one-year internship in Nuclear Medicine and Molecular Imaging Technology, Clinical Research, Public Health and Epidemiology, and Occupational Therapy in Oncology. BARC also conducts skill-based MSc programme in Hospital Radiopharmacy and MSc programmes in Nuclear Medicine and Molecular Imaging Technology.

BARC, one of the CIs of HBNI is running DipRP (Diploma in Radiation Protection) and Radiography Testing Techniques and Radiological Safety to address the need of experts in safe handling as well as applications of radiation and radioactivity. The courses have generated a pool of experts who serve various hospitals and industries ensuring radiation safety.

Additionally, the BARC training school of HBNI organizes soft skills workshops for all the postgraduate diploma and MTech students every year. The workshop sessions cover areas like communication skills, presentation skills, creativity & innovation, time management and work ethics. Workshops on “Administrative Procedures and “Nuclear Security” are also conducted for the benefit of the students by the BARC training school of HBNI.

**19. Appropriate integration of Indian Knowledge system (teaching in Indian Language, culture, using online course)**

HBNI is taking initiatives to popularize /boost the use of Hindi/local language as a medium of instruction in all its CIs/OCC.

As a first step towards this goal, HBNI has published a Nuclear Glossary (English-Hindi) containing the translation of 11000 scientific terms. The nuclear glossary is highly useful for writing articles and research papers. HBNI is planning to publish such a glossary for other Indian languages also. All the CIs/ OCC also conduct Hindi Diwas celebrations on September 14 every year when competitive events in Hindi like shrut lekhan, essay writing, quiz open speech competition etc are organized. The CIs/OCC also organize conferences, seminars/webinars and workshops in Hindi.

**Part A-20: Focus on outcome based education**

The academic programmes offered by HBNI intend to create professionals in the areas of Engineering, Mathematics, Medical research, etc., and are capable of building manpower in the research and development areas of various domains, particularly in the field of Nuclear Science and Technology. These programmes are unique in their aspects and are able to address the needs of the country. Postgraduate diploma programmes are offered at BARC Training schools at Mumbai, Kalpakkam, Hyderabad and Indore. The courses offered as part of these programs also meet the requirement of M. Tech / MSc(Engg) programs. These courses are designed to meet the mission needs of the concerned centres. For example, courses at IGCAR, Kalpakkam, focus on the needs of the fast reactor program, while courses at RRCAT focus on the needs of the accelerator program. Some of the courses are multidisciplinary in nature and can address the human resources of the country in the vital domain of indigenous development of nuclear science and technology. The curriculum is also designed to cater to M. Tech students from defence organizations, who get trained to engage in associated defense programs through exposure to elements of nuclear technology and radiation safety. The academic programs offered by HBNI in the domain of Medical and Health Sciences are able to fulfil the national requirements of expertise and knowledge base in the treatment of various types of cancers prevalent in India. These programs perform a significant role in establishing a knowledge base and contributing towards cancer research. Additionally, there are programs related to applications of radioactivity and various types of radiation such as Diploma in Radiation Protection are aimed to provide specialists who could ensure radiation safety in the hospitals and industries in our country.

All the programmes offered by HBNI clearly state the programme and the course outcomes which is available to all the stakeholders on the HBNI website.

**Part A-21: Online educational programs**

In order to enhance the impact of effective teaching and learning, the faculty members of HBNI use online resources. Some CIs and in particular, the Institute of Mathematical Sciences (IMSc), have established multi-functional facilities to handle video conferencing and web streaming, video recordings and meetings. Using this unique facility, IMSc has hosted a large number of video lectures and courses in mathematics, physics and computational biology, on its website http://ekalavya.imsc.res.in, and also hosted them on the YouTube channel “MATSCIENCE”. The students from other CIs also get benefitted from the online lectures and programs. A similar smart classroom with videoconferencing / video recording facilities has been established in IGCAR also.

The Tata Memorial Centre (TMC), one of the CIs of HBNI makes available online lectures and videos through its e-learning site, Omnicuris. It is a one stop online learning destination for Healthcare professionals, globally impacting patient care and outcomes, through evidence based, unbiased and cutting edge scientific content.

During the academic year 2022-23, HBNI conducted online educational courses on Advanced Materials Chemistry, Emerging Trends in Biophysics, Nuclear Law and Policies, Corrosion Degradation in Light water Reactors, and Research Methodology. The recording of some of these courses are available on the HBNI Webinar and YouTube channel of HBNI. HBNI also organised several educational webinars delivered by eminent scientists and engineers online. The webinars were streamed live and recordings of webinars are available on the YouTube channel of HBNI, HBNI Webinar.