शैक्षणिक परिषद की 01/2023-24 बैठक का कार्यवृत्त

MINUTES OF THE 01/2023-24 MEETING OF THE ACADEMIC COUNCIL

21st Aug, 2023

DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY

(DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT 1956)

GIRINAGAR, PUNE - 411025

DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY

(DEEMED TO BE UNIVERSITY), GIRINAGAR, PUNE

1/2023-24 MEETING OF THE ACADEMIC COUNCIL
10:00 HRS, MONDAY, 21st AUG 2023

Item.No.	Particulars
1	Opening remarks by the Vice-Chancellor and Chairman, Academic Council
2	Progress/Action taken report on minutes of the last Academic Council meeting
3	Confirmation of the minutes of the last Academic council meeting held on 01st May 2023.
4	**Reporting Items-** i) NIRF Ranking ii) Outlook Ranking iii) Admission update through CCMT and Other Categories iv) Joining of 6 new faculty members in DIAT v) The 6th National Aerospace Conceptual Design Competition (NACDeC VI), won by DIAT team Vayamrit from Aerospace Engineering Department vi) AICTE approval for M.Tech seats/intake
	AGENDA POINTS FOR DISCUSSION
5.	Introduction of M.Sc. in Defence Technology.
6.	i) Approval of Courses of Study for Postgraduate Programmes 2023-25, (Booklet) ii) Approval of Academic Calendar 2023-24 iii) Fee structure of M.Tech (Self-Financed Category) & M.Sc. Programs
7.	**Any other point with the permission of the chair** Ratification of M.Sc. Data Science Syllabus

DEFENCE INSTITUTE OF A DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY
(Deemed to be University under Section 3 of UGC Act 1956)
Girinagar, Pune-411 025

DIAT/F/REG/ACAD/AC/01/2023-24 Dated 21st Aug 2023

Minutes of the Meeting of Academic Council held on 21st Aug, 2023 at 1000 Hrs, 4th Floor Conference Room, DIAT, Pune

The Following Members were present: -

1.	Dr. C. P. Ramanarayanan Vice Chancellor	**Chairman**
2.	Dr. R. K. Jain Sc'G', Assoc Director, HRD,DRDO HQ, New Delhi	Member (Rep DHRD)
3.	Prof. K. Sudhakar Dept. of Aerospace Engg, IIT, Bombay, Powai	Member (Attended through Video Conf.)
4.	Prof. Rajeev Srivastava Dept. of Computer Science and Engg, IIT(BHU), Varanasi	Member (Attended through Video Conf.)
5.	Prof. K. Balasubramanian Dean (Academics) , HoD, Metallurgical & Materials Engg. & IQAC Director	Member
6.	Prof. K. P. Ray HoD, Dept, of Electronics Engg.	Member
7.	Prof. A. Kumaraswamy Dean (Student Affairs) & Director, School of Robotics & HoD, Dept. of Mech Engg	Member
8.	Prof. P. K. Khanna HoD, Dept. of Applied Chemistry	Member
9.	Prof. G. Raghavan Director, School of Quantum Technology	Member
10.	Prof. Sangeeta Kale Dept. of Applied Physics / CoE	Member/ Permanent invitee
11.	Prof. S. K. Panigrahi Dept. of Mechanical Engg., Dean (Sponsored Research)	Member
12.	Prof. D. G. Thakur Dept. of Mechanical Engg	Member
13.	Prof. C. R. S. Kumar School of Computers Engineering and Mathematical Science	Member

14.	Prof. Somanchi V.S.S.N.V.G. Murthy School of Computers Engg and Mathematical Science	Member
15.	Prof. Prashant Kulkarni Director, School of Energy and Environment	Member
16.	Prof. Shaibal Banerjee Dept.of Applied Chemistry, Chairman PGC &	Member
17.	Dr. Manisha Nene Director, School of Computers Engineering and Mathematical Science	Member
18.	Dr. Sumati Sidharth HoD, Technology Mgmt.	Member
19.	Dr. Ajay Misra, HoD, Dept. of Aerospace Engineering	Member
20.	Dr. Suwarna Datar HoD, Dept. of Applied Physics	Member
21.	Dr. Tejashree Bhave Assoc. Prof, Dept of Applied Physics .	Member
22.	Dr. A. A. Bazil Raj Assoc. Prof, Dept of Electronics Engg.	Member
23.	Dr. Sunita Dhavale Asst. Prof, School of Computers Engineering and Mathematical Science	Member
24.	Dr. Vidya K. Gargote Finance Officer	Member
25.	Dr. T. U. Patro Joint Registrar (Academics)I/c	Permanent Invitee
26.	Shri. Kamal Kumar Bajre Registrar	Secretary

Leave of absence was granted to the following:

1. Prof. Avinash Mahajan, Dept. of Physics, IIT Bombay, Powai, Mumbai
2. Dr. Debashish Pradhan, Assoc Professor, School of Computer Engg., & Mathematical Science.

1. **Welcome Remarks by Vice Chancellor & Chairman, Academic Council:**

At the outset, the Chairman welcomed all the members of the Academic Council, including esteemed individuals from other organizations Prof. K. Sudhakar, Former Professor, Department of Aerospace Engineering, IIT Bombay, Prof. Rajeev Srivastava, Professor, Department of Computer Science and Engineering, IIT (BHU) Varanasi, and Shri R. K. Jain, Sc'G', Associate Director, Rep. of DHRD, DRDO HQ, New Delhi. The Vice-Chancellor briefed about recent ranking of the institute, i.e. 57th in the NIRF ranking, 5th in the Deemed to be Universities category in IIRF, and 20th in Outlook Magazine in top 25 Govt. Institutes in Engineering categories. He further assured that DIAT would continue to maintain the highest academic standards through its academic curricula by revising syllabus through Board of Studies from time to time.

2. **Progress/Action Taken Report (ATR) on Minutes of the Last Academic Council Meeting:**

The Registrar presented the ATR on the decisions taken in the last Academic Council Meeting held on 01st May 2023 as given below: -

Sr. No.	Para of Minutes of the AC Meeting held on 01st May 2023	Agenda Point	Status/Action
1.	5	Introduction of New Course - M.Sc programme in Data Science.	Action Completed
2.	6	Introduction of (02) New M.Tech programmes i.e M.Tech in Renewable Energy and M.Tech in Green Technology.	Action Completed
3.	8 (a)	Proposal for starting new Program-Integrated Ph.D	Action on hand
4.	8 (b)	Exit option for Ph.D students after completion of three years (Either by institute or student). Student may be awarded MS (by research) degree, provided student must fulfil credit and other academic requirement as per existing rules and regulations of DIAT for MS (by research)	Action on hand. This was presented before A.C.

The Academic Council noted that the institute has progressed well since the last A.C. Meeting.

3. **Confirmation of the Minutes of the Last Academic Council Meeting held on 01st May 2023**

The minutes of meeting of the Academic Council held on 01st May 2023 were circulated and no comments were received. Therefore, the minutes of Academic Council meeting held on 01st May 2023 were confirmed, as circulated.

4. **Reporting items: Prof. Balasubramanian K., Dean Academics presented the following:**

- **Ranks obtained by DIAT:**

  - 57th in Engineering categories in the National Institute Ranking Framework (NIRF) Ranking for the year 2023.
  - 20th in top 25 Govt. Institutes in Engineering categories in OUTLOOK-ICARE RANKING for the year 2023.
  - 05th in Deemed to be Universities [Govt. & Private] for M.Tech Research Programme in Indian Institutional Ranking Framework (IIRF) for the year 2023.

  The Academic Council congratulated the institute for these achievements and advised to strive harder to achieve still higher ranks.

- **Admission updates: Annexure -1**

- **Following 06 new faculty members have joined DIAT:**

  1. Dr. Amrita Kaurwar Nighojkar, Asst.Professor, Dept. of Technology Management
  2. Dr. Nikhil A Bhave, Asst. Professor, School of Energy and Environment Systems
  3. Dr. Hari Om Verma, Asst. Professor, Dept. of Aerospace Engg.
  4. Dr. Rahul Yadav, Asst. Professor, School of Energy and Environment Systems
  5. Dr. Shanmughasundaram, Assoc Professor, Metallurgical & Materials Engg Dept.
  6. Dr. Sumati Siddarth, Assoc Professor, Dept of Technology Management, (through CAS)

- **DIAT team "Vayamrit" from Aerospace Engineering Department won the 6th National Aerospace Conceptual Design Competition [NACDeC VI].**

- **The A.C. noted, the revised AICTE approval for M. Tech seats/intake: Annexure -2**

Agenda Points for discussion:

5. **Introduction of M.Sc. in Defence Technology**

The proposal for introduction of M.Sc. Defence Technology was presented by Prof. Shaibal Banerjee, Chairman PGC. Cdr Manoj Kulkani, MILIT was invited as a MILIT representative, since the program will be run by both DIAT and MILIT, under a joint working agreement. After detailed deliberation, the Academic Council resolved that the programme be commenced from the AY 2023-24. The Academic Council further advised to upgrade the program to M.Tech. and also offer to other wings of Tri-Services besides Navy.

The detailed syllabus of the programme is given as **Annexure -3.**

Action: Chairman PGC

6. **The following items were presented by Dr. T.U.Patro, Joint Registrar (Acad) I/c**

- The Academic Council after detailed discussion approved the following:

  i) Printing of the Courses of Study for the Post Graduate Programmes 2023-25 (Booklet) (**Annexure -4).**

  The external expert suggested, the printing of minimum number of booklets based on the number of academic departments and making a digital version of booklet available on the institution's website.

  ii) Academic Calendar 2023-24 for circulation **(Annexure-5).**

  iii) Fee structure of M.Tech. (Self Financed Category) & M.Sc. Programmes **(Annexure - 6)**

7. **Additional Agenda Point discussed with the permission of the Chair:**

Prof. Somanchi Krishna Murthy appraised the committee on the implementation of updated syllabus for M.Sc. Data Science. The Academic Council approved the same. The updated syllabus is given as **Annexure 7**.

Action: Director, School of Computer Engg., & Mathematical Sciences

8. **Concluding remarks by Chairman**:

In the concluding remarks, the Chairman expressed his appreciation for the good response of students for the M.Sc. Data Science Program.

With no further items for discussion, the Chairman extended his gratitude to all the members for their valuable suggestions. The meeting concluded with a vote of thanks to the Chair.

30/08/23.

(Kamal Kumar Bajre)
Registrar & Secretary, AC

Kamal Kumar Bajre
Registrar
Defence Institute of Advanced Technology
(Deemed to be University)
Girinagar, Pune-411 025.

Annexure -1

- **M.Tech Admission through CCMT and Other Categories**

Category	2022-23	2023-24
Sponsored/ Self Sponsored	48	51
Self Financed	23	86*
Scholarship	149	94*
Total:	220	231*

- **Ph.D Admissions For the Session July- 2023**

Sr. No	Dept/School	Nature of Candidature						Total
		DRDO	Service Officer	Internal [DIAT]	Insti. Fellow	Industry	Other Govt. Org.	
1	Applied Chemistry	03	00	00	01	00	00	04
2	Aerospace Engg.	02	00	00	01	00	00	03
3	Applied Physics	00	01	00	05	01	00	07
4	Electronics Engg.	01	00	01	00	00	01	03
5	Mechanical Engg.	02	00	00	00	01	00	03
6	Metallurgical & Mate. Engg	00	00	00	02	00	00	02
7	School of CE & MS	01	01	00	00	00	01	03
8	School of QT	00	00	00	05	00	00	05
9	School of Robotics	02	00	01	01	00	00	04
10	Technology Management	00	00	00	00	01	00	01
TOTAL		**11**	**02**	**02**	**15**	**03**	**02**	**35**

- **M.Sc. Admission through CCMN and Other Categories**

Programme	2022-23	2023-24
M.Sc. in Applied Chemistry	-	05
M.Sc. in Data Science	-	12
M.Sc. in Material Science	12	07
M.Sc. in Applied Physics [Photonics]	-	05
M.Sc. in [Tech] in Photonics	-	05
M.Sc. in Food Technology	05	Admission is under process
M.Sc. in Information Technology	07	12
Total:	24	46

Annexure -2

All India Council for Technical Education

(A Statutory body under Ministry of Education, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2023-24

Extension of Approval (EoA)

F.No. Western/1-36515470664/2023/EOA

Date: 02-Jun-2023

To,

The Secretary,
Tech. & Higher Education Deptt.
Govt. of Maharashta, Mantralaya,
Annexe Building, Mumbai-400032

Sub: Extension of Approval for the Academic Year 2023-24

Ref: Online application of the Institution submitted for Extension of Approval for the Academic Year 2023-24

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Education) Regulations, 2020 notified on 4th February 2020 and amended on 24th February 2021 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to:

Permanent Id	1-770234221	**Application Id**	1-36515470664
Name of the Institution	DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY	**Name of the Society/Trust**	DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY
Institution Address	GIRINAGAR, NEAR KHADAKWASALA DAM, KHADAKWASALA, PUNE - 411 025, KHADAKWASALA, PUNE, PUNE, Maharashtra, 411025	**Society/Trust Address**	GIRINAGAR, NEAR KHADAKWASALA DAM, KHADAKWASALA,PUNE,PUNE,Maharashtra,411025
Institution Type	Deemed to be University(Govt)	**Region**	Western
Year of Establishment	1996		

To conduct following Courses with the Intake indicated below for the Academic Year 2023-24

Level	Program	Course	Affiliating Body (University /Body)	Intake Approved for 2022-23	Intake Approved for 2023-24	NRI Approval Status	FN / Gulf quota/ OCI/ Approval Status
POST GRAD	ENGINEERING AND TECHNOLOGY	COMPUTER SCIENCE AND ENGINEERING	NOT APPLICABLE	24	24	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	AEROSPACE ENGINEERING	NOT APPLICABLE	48	48	NA	NA

Level	Program	Course	Affiliating Body (University /Body)	Intake Approved for 2022-23	Intake Approved for 2023-24	NRI Approval Status	FN / Gulf quota/ OCI/ Approval Status
POST GRAD	ENGINEERING AND TECHNOLOGY	MECHANICAL ENGINEERING	NA	48	48	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	ELECTRONICS & COMMUNICATION ENGINEERING	NA	75	75	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	SENSOR TECHONOLOGY/ LEOC	NA	25	25	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	MODELING AND SIMULATION	NA	24	24	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	MATERIALS ENGINEERING	NA	24	30	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	DATA SCIENCE	NA	24	30	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	QUANTUM COMPUTING	NA	24	30	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	MASTERS OF TECHNOLOGY MANAGEMENT	NA	24	30	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	AUTOMATION AND ROBOTICS	NA	24	30	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	NANO SCIENCE AND TECHNOLOGY	NA	18	18	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	CYBER SECURITY	NA	18	24	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	RENEWABLE ENERGY	NOT APPLICABLE	18	18	NA	NA
POST GRAD	ENGINEERING AND TECHNOLOGY	GREEN TECHNOLOGY	NOT APPLICABLE	0	24 ##	NA	NA

Approved New Course(s)

Course(s) Applied for Closure by the Institution for the Academic Year 2023-24

Level	Program	Course	Affiliating Body (Univ/Body)	Course Closure Status	Intake Approved for 2023-24
POST GRAD	ENGINEERING AND TECHNOLOGY	MATERIAL SCIENCE AND CHEMICAL TECHNOLOGY	NOT APPLICABLE	Approved	0
POST GRAD	ENGINEERING AND TECHNOLOGY	OPTO ELECTRONICS AND COMMUNICATION SYSTEMS	NOT APPLICABLE	Approved	0

Total seats before	Total seats after enhancement
418	478

Annexure:3

M.Sc. in Defence Technology Program

Proposed to be conducted by School of Defence Technology and Navy Wing, MILIT

MINUTES OF THE POST GRADUATE COMMITTEE (PGC)
MEETING HELD ON 30th June 2023 AT 11:00 HRS.

1. The Post Graduate Committee meeting was held on 30th June 2023 at 11:00 hrs at the office of Department of Applied Chemistry. The following members were present:

i)	Prof. Shaibal Banerjee	: Chairman, PGC
ii)	Dr. Tejashree Bhave	: Member (AP)
iii)	Dr. Sunil Nimje	: Member (ME)
iv)	Dr. Arun Mishra	: Member (CSE)
v)	Dr. T.U Patro	: Member & Jt. Registrar (Acad.)
vi)	Dr. D. Srikanth	: Member Secretary
vii)	Dr. R. SHARMA	: Member

2. Chairman, PGC welcomed all members present and briefed them about the agenda of PGC meeting.

3. **Agenda 3 (Award of M.Sc. in Defence Technology by DIAT for the officers of Defence Services Technical Staff Course (NAVY)**: JR (Acad.) informed the committee that a request has been received from MILIT for award of M.Sc. in Defence Technology programme by DIAT for Officers of Defence Services Technical Staff course (Navy) at MILIT vide letter no. MILIT/F/31017/Trg dated 26th June 2023. The draft syllabus was also submitted in this regard. The committee after deliberation made following recommendation:

a) Board of Studies to be conducted for finalization of course structure of the proposed M.Sc. programme
b) Admission to be done as per DIAT norms
c) Evaluation pattern to be followed by involving CoE in conjugation with DIAT(DU) rules.
d) Faculty members of DIAT to be involved in teaching of this programme
e) Existing working arrangement of M.Sc. (IT) programme conducted at INS Hamla maybe adopted.
f) Committee in principal recommends for approval for start of **M.Sc. in Defence Technology** programme for Navy officers.

4. 8. As there were no more points, the meeting ended with vote of thanks.

Dr. T.M. Bhave

Dr. R.Sharma 20/06/23

Dr T U Patro 20/06/23

Dr. A. Mishra

Dr. D. Srikanth

Prof. S. Banerjee
Chairman, PGC

[Approved/ Not Approved]
VICE CHANCELLOR 30/6/23

SEMESTER - I						
Sr No	**COURSE CODE**	**COURSE**	**L**	**T**	**P**	**CREDIT**
1	NA501	Armament Technology	3	1	-	4
2	NA502	Guided Missile and Radar Technology	3	1	-	4
3	NA503	Information Warfare and Cyber Security	3	1	-	4
4	NA504	Energetic Materials, Lasers and Fiber Optics	3	1	-	4
5	NA505	Electronic Warfare and Sonar Technology	3	-	2	4
6	NA506	Information and Communication Technology	3	-	2	4
						24

SEMESTER - II						
Sr No	COURSE CODE	COURSE	L	T	P	CREDIT
1	NA507	Statistics, Reliability and Operation Research	3	1	-	4
2	NA508	Acquisition Process - Revenue and Capital	3	1	-	4
3	NA509	Artificial Intelligence and Machine Learning	3	-	2	4
4	NA510	Mechanics of Mechatronics and Robotics	3	-	2	4
5	NA511	Advances in Marine Propulsion and Materials	3	-	2	4
6	NA512	Infrastructure Management of Navy	2	1	2	4
						24

SEMESTER - III						
Sr No	COURSE CODE	COURSE	L	T	P	CREDIT
1	NA513	Naval Planning Process	2	1	2	4
2	NA514	Maritime Workshop	2	1	2	4
3	NA515	Naval Operational Logistics	2	1	2	4
4	NA516	Sustenance Planning at Sea	2	1	2	4
5	NA517	Naval Operations	2	1	2	4
6	NA518	Geopolitical Studies	2	1	2	4
7	NA519	Naval Procurement Management	2	1	2	4
						32

SEMESTER - IV						
Sr No	**COURSE CODE**	**COURSE**	**L**	**T**	**P**	**CREDIT**
1	NA551	Mini Project - International Relations	2	2	4	6
2	NA552	Mini Project - Naval Qualitative Staff Requirements	2	2	4	6
3	NA553	Dissertation	-	-	-	12
4		***Elective-I***	-	-	-	4
						24

ELECTIVE - I						
Sr No	**COURSE CODE**	**COURSE**	**L**	**T**	**P**	**CREDIT**
1	NA554	Skill Development (Prezi, Power BI, Advance Excel, AI & Data Science)				
2	NA555	Open Elective from any Department				
		Total				**104**

Course Name – *Armament Technology*

Course Code – *NA501*

Unit I : Explosive Technology and Polymers - Military Explosives, Propellants, Pyrotechnics, Modern Engineering Materials, Rubbers and Elastomers, Fuels and Lubricants, Ammunition.

Unit II: CBRN (NBC) - CBRN threat perceptions, radiation exposure status and op exposure Guidance, Procedure for decn drills, detection and quarantine, CBRN Organisation and training set up in all three services incl their scaling, Duties of staff offrs at various levels and action / reports required to be taken / generated post CBRN attack, CBRN warning sys and CBRN message interpretation, Future and present battle field in r/o CBRN warfare, Armed forces preparedness wrt CW & BW.

Unit III: Armament - Armament Engineering, Fire control system, Naval Armament, Guided Naval Armaments, Naval Gun Fire Support and requirement of migration to heavy calibre guns on naval ships, Electro-Magnetic Rail Guns, Advanced Hit Efficiency and Destruction (AHEAD) Ammunition, Magneto Hydrodynamic Explosive Munitions

Unit IV: Underwater Weapons, Heavy Weight and Light Weight Torpedoes, Super Captivating Torpedoes, Processor Based Mines, Torpedo Defence Systems, Extended Range Anti-Submarine Rocket, Adaptive beam control optics and software algorithms to fine tune energy into focused beam, High Power Microbeam,

Unit V: Air Armament - Aircraft Gun ammunitions, Bombs and Fuzes, Classification and requirement of aircraft bombs, Construction, description and functioning of various bombs and fuzes & New Generation fuzes and its requirement, Principles of rocket technology, Construction features of aviation rockets, Rockets of IAF inventory and its capabilities.

Course Name – *Guided Missile and Radar Technology*

Course Code – *NA502*

Unit I: Introduction to guided missiles - Missile System, Missile Propulsion Missile Aerodynamics Missile Guidance Missile Control, Smart Munitions with flight path control for loitering capability, Scramjet technology in missile propulsion, Hypersonic Missiles, Multi-Spectral and Multi Lens Missiles Seekers, Size, weight and power (SWaP) – Constrained enhanced electronics for sensors, Guidance and Communications.

Unit II: Radar Technology - Basic Principle and Properties of Electro Magnetic Waves, Basic terminology of Radar, Principle of Radar, Radar Range Equation, Operating Principle of Radar Transmitter, Operating Principle of Radar Receiver.

Unit III: Types of Radar Antennas and their characteristics, Types of Displays and applications, Operating Principle of Pulsed Radar, Operating Principle of CW Radar, velocity measurement of Target, Operating Principle of FMCW Radar, Range measurement using FMCW radar, Operating Principle of MTI Radar, explanation of Blind speeds and Delay Line Canceler.

Unit IV: Operating Principle of Tracking Radar, Types of tracking, Range Gate Tracking, Operating Principle of Phased Array Radar, Types of arrays, Principles of Beam Forming and Beam Steering, Introduction to Link II System. Configuration of Link-II Mod-III.

Course Name – *Information Warfare and Cyber Security*

Course Code – *NA503*

Unit I: Introduction of Information Warfare - Role of Information in Warfare, EW vs IW, Information Environment, Evolution of IW, Enabling Technologies, OODA Loop (Decision Cycle).

Unit II: Basic Engagement Model (Edward Waltz), Spectrum of IW, Relevance of IW, Objectives of IW, Defining features of IW, Principles of IW, Components of IW, Application of IW, IW Vision, Effects of offn IW, Objectives of offn IW, Effects of Def IW, Objectives of Def IW, IW Planning Process & Key

Unit III: Issues, Definition, Aim, Principles of Psychology Warfare, Objectives of Psychology Warfare, Psychology Operations Roles, Category of Psychology Operations, Types of Psychology Operations, Benefits, Planning Considerations, Agencies & their Responsibilities, Audiences, Key Communicators, Classification of Audiences, Types of Audiences, Theme types, Theme Selection, Symbol, Symbol Selection. Analysis & Techniques of Counter Psychology Operations.

Unit IV: Introduction of Cyber Security - Cyber Security Vulnerabilities and Cyber Security Safeguards, Securing Web Application, Services and Servers, Intrusion Detection and Prevention, Cryptography and Network Security, Cyberspace and the Law, Cyber Forensics, Cyber Security for Naval Officer,

Unit V: Organisation of IHQ-DIW/ NCG and Commands CCOSW, Cyber Security Governance, Vulnerability Assessment Methodology, Risk Management Framework, Disaster Recovery, Business Continuity and Crisis Management Plans, Emerging Threats and Defences.

Course Name – *Energetic Materials, Lasers and Fiber Optices*

Course Code – *NA504*

Unit I: Introduction of Energetic Materials, LASERS - Concept of Coherence, Absorption, Spontaneous Emission and Stimulated Emission Processes, Population Inversion, Pumping, Gain, Optical Cavities, Main Components of Laser, Principle of LASER Action.

Unit II: Introduction to General LASERS and their types. Three & Four level LASERS, CW & Pulsed LASERS, Atomic, Ionic, Molecular, Excimer, Liquid and Solid-State LASERS and Systems, Short Pulse Generation and Measurement,

Unit III: Laser - Laser Applications in Medicine and Surgery, Materials Processing, Optical Communication, Metrology and LIDAR and Holography, LASER weapons

Unit IV: Introduction of Fiber Optices - Geometrical Optics Description of Step and Graded-Index Fibers, Wave Optics Description, Modes in Step-Index Fibers, Dispersion in Single-Mode Fibers: (Group-Velocity and Polarization-Mode, Dispersion-Induced Limitations, Losses, Nonlinear effect), Applications of Fiber Optics

Course Name – *Electronic Warfare and Sonar Technology*

Course Code – *NA505*

Unit I: Introduction of Electronic Warfare - Electromagnetic Environmental Effects (E3), Electromagnetic Noise, EMI Triangle, Emissions, Susceptibility, Coupling Paths, Historical Examples / Incidents related to EMI/EMC, Decibel (dB), dBm, dBi, dBc, Conducted Voltage (dBμV), Conducted Current (dBμA), Radiated Electric Field (dBμV/m), Radiated Magnetic Field (dBpT), Near & Far Fields, Power Density, Standards Bodies in the World (ITU, IEC, CISPR, CENELEC, FCC, IEEE, SAE, GOST, VCCI etc).

Unit II: Difference between Commercial & Military EMI/EMC Test Standards, Examples of Commercial Test Standards & Military Test Standards, MIL-STD-461, Applicability of MILI-STD-461 Tests, Typical CE, CS, RE & RS tests (test setup and method) Grounding, Bonding, Shielding, Filtering.

Unit III: Operational methods to contain EMI; EMC in design (of equipment and platforms); Operational Problem Analysis & Solution, HERF, HERP, HERO, Limits of safety in standards, Test Methods, Precautions to be taken.

Unit IV: Sonar Technology - Oceanography and Underwater Acoustics, Sound Transmission in the Ocean, Propagation Characteristics, Ray, Acoustics & Shadow Zones.

Course Name – *Information and Communication Technology*

Course Code – *NA506*

Unit I: Introduction of Computer Networking - Data communication & Computer Networks – Transmission Media, Digital & Analog Transmission, Routing, Network Topologies, Various Network types like LAN, WAN, MAN, Introduction to Networking Components like HUB, Router, Switches, ISO / OSI model, Introduction to Wireless Networks. Internet and Applications like e-mail, FTP, Telnet, WWW etc.

Unit II: Introduction of Basic Communication - Elements and Brief Description of a Communication System, Modulation, RF frequency bands with Typical Applications. Propagation of Radio waves, Tropo-Scatter, SATCOM. Ground Waves, Sky Wave, Atmospheric Effects on Sky Wave Propagation

Unit III: Introduction of Satellite Communication - Satellite Orbits, MIMO in HF and Tropo Scatter Communications, Satellite Navigation Systems.

Unit IV: Introduction of Computer Networking - Data communication & Computer Networks – Transmission Media, Digital & Analog Transmission, Routing, Network Topologies, Various Network types like LAN, WAN, MAN, Introduction to Networking Components like HUB, Router, Switches, ISO / OSI model, Introduction to Wireless Networks. Internet and Applications like e-mail, FTP, Telnet, WWW etc.

Course Name– *Statistics, Reliability and Operation Research*

Course Code – *NA507*

Unit I: Introduction of Reliability – Engineering Types of Statistics (Descriptive and Inferential Statistics), Types of Data (Primary/ Secondary, Grouped/ Ungrouped and Qualitative/ Quantitative) and Data Representation (Textual, Graphical and Tabular).

Unit II: Measures of Central Tendencies (Mean, Mode & Median) for Grouped and Ungrouped, Measures of Dispersions (Mean Deviation and Standard Deviation), Basic Axioms of Probability, Tree Types of Events: Dependent/ Independent, Mutually Exclusive/Not Mutually Exclusive Events.

Unit III: Operation and Research - Overview of OR techniques, Linear Programming (Formulation and Finding initial basic feasible solution, Optimality check of Solutions, Simplex Method, Introduction to Duality, Sensitivity & Degeneracy) and Introduction to Goal Programming.

Unit IV: Transportation Models (LCC & VAM), Optimization of Transportation Models and Transshipment Problem, Assignment Model & Hungarian Algorithm, Network Models, Minimum Spanning Tree Problem, Prim's Algorithm, Kruskal's Algorithm.

Unit V: Decision Theory, Forced Decision Matrix, Decision Matrix, Various Criteria for Decision Making.

Course Name– *Acquisition Process –Revenue and Capital*

Course Code – *NA508*

Unit I: Introduction of Revenue Procurement - GFR 2017 and DFPDS 2016-Organisation structure in MoD and Service HQ for Revenue Procurement, Schedules of Financial powers and Delegated Financial Powers Annual Revenue Procurement Plan (ARPP).

Unit II: Integrated Logistics - Concept of RML (Revolution in Military Logistics), Modernization of Logistics in Armed Forces, e- Logistics Initiatives in Armed Forces and its Impact, Benefits of Integrated Logistics in Armed Forces.

Unit III: Formulation of SOC, RFP, TEC, Commercial Bid, Analysis and conduct of CNC, Contract formulation as per DPM, e-Procurement through CPPP and GeM.

Unit IV: Capital Procurement & DAP - Classification/Categorization Jargon, Acquisition – Organization/Structure, Acquisition Planning Process, Initiation of project, RFI and SQRs formulation, Process flow, RFP and evaluation, OCPP, Challenges and Su[illegible] Challenges in Capital Procurement along with case study.

Course Name – *Artificial Intelligence and Machine Learning*

Course Code – *NA509*

Unit I: Introduction of Artificial Intelligence (AI)- History of AI, Researchers Computer Scientists like Alan Turing, John McCarthy, Marvin Minsky and Geoffrey Hinton, Key concepts like the Turing Test Difference between AI and ML.

Unit II: Data as lifeblood of AI, Algorithms for finding patterns to work with data in an AI project.

Unit III: Introduction of Machine Learning - Traditional Statistical Techniques like Regressions, Algorithms, Overview of Advanced Algorithms such as k-Nearest Neighbor (k-NN) and the Naive Bayes Classifier, Putting together a Machine Learning Model.

Unit IV: Deep Learning - Neural Networks to find patterns that mimic the brain, Introduction to Algorithms like Recurrent Neural Networks (RNNs), Convolutional Neural Networks (CNNs), and Generative Adversarial Networks (GANs).

Course Name– *Mechanics of Mechatronics and Robotics*

Course Code – *NA510*

Unit I: Introduction of Robotics - Laws of Robotics, Types and Components of Robot, Robot Terminology-Link, Joints, DOF, Work Volume, Robot Geometrical Configuration (PPP, RPP, RRP, RRR, etc).

Unit II: Application of Ground, Underwater and Aerial Robots for Defence Sensors for Robotics, Robot Control and Programming, Artificial intelligence and Machine Learning Robot Applications, Lab/Practice Session.

Unit III: Introduction to Mechatronics Systems- Working Principles of Sensors and Instrumentation System Mechanisms, Actuators and Drives for Industrial Automation, Motors- DC, Induction & Synchronous with Speed Control, Fluid Power Systems-Pneumatic, Hydraulic and Electro Pneumatic Systems.

Unit IV: Industrial Automation-Understanding of Microprocessors, Programmable Logic Controller (PLC), Programming SCADA HMI, Applications of Industry 4.0.

Course Name – *Advance in Marine Propulsion and Materials*

Course Code – *NA511*

Unit I: Introduction Marine Propulsion - Propulsion Systems, Transmission Systems and Propellers, Service Conditions and Formulation of Staff Requirements for Propulsion Systems.

Unit II: Resistance - Hydrodynamic Resistance, Interaction of Hull and Propeller, Power Demand, Load and Drive Characteristics, Types & Configurations of Propulsion System packages feasible.

Unit III: Power Plant Concepts: Direct Drive, Geared Drive, Multiple Shaft and Combined Drives, Electrical Concepts, all Electric ship Concept and Hybrid drives. Matching criteria: Design Speed, Design and Off-Design conditions, Fuel Consumption and Emissions, Technical Evaluation of various equipment of the integrated Propulsion System, Methodology of Propulsion System Integration at Design and Implementation Stages.

Unit IV: Marine Materials - Marine Environmental Challenges Dictating Specifications of Marine Materials, Introduction to Corrosion and Corrosion Control Techniques used for Marine Platforms, Specific Marine Material selection at Design Stage for Marine Equipment, Marine Material trends in indigenised Ships/ Submarines and Technical/ Manufacturing Challenges, Future Trends in Marine Materials for the Newer Platform and the Lifecycle Effects of the same, Indigenised Capabilities of R & D and Industry Partnership.

Course Name– *Infrastructure Management of Navy*

Course Code – *NA512*

Unit I: Infrastructure Management of Navy -Conceptualization / Necessarily of project, study in detail actions from Approval in Principal (AIP) to Letter of Acceptance (LoA) (NIT for EoI, Shortlisting of Consultants, Finalisation of SoW/ RFP, Pre-Bid Meeting, Opening and Evaluation of T-Bid/ Q-Bids, LoA),

Unit II: Study in detail actions from Letter of Acceptance (LoA) to Draft Project Report (DPR). Issue of WO, Contract Conclusion, Kick Off Meeting/ Site Meeting, Land Utilisation and Feasibility Report, Finalisation of DPR, NOC from various agencies, Environmental Clearance.

Unit III: Processes and formalities for Project Sanction, Execution and Completion, Life Cycle Management of Infrastructure Project.

Unit IV: Visit to DGNP (Mbi/ Vzg), Case Study of completed / ongoing / future ATWP Projects including guarantee/ payments / legal issues [illegible]

Course Name– *Naval Planning Process*

Course Code – *NA513*

Unit I: Basics of Planning- Why We Plan, Military Planning, Planning Principles, Military Planning Logic.

Unit II: Naval Operational Planning- The Naval Process, The Naval Component Planning, Execution Co-ordination, Planning Products, Additional Service Responsibilities.

Unit III: Joint Operation Planning- National Response, Military Action, Joint Operations Planning Processes, Campaign Planning, Ready to Fight Prepared through Planning.

Unit IV: Military and Political Planning Structure- Flexible decision making and Command, Logical Framework within Naval Staff, Evaluation of the Situation, Translation of decision into Subordinate Action.

Course Name– *Maritime Workshop*

Course Code – *NA514*

Unit I: Maritime Cooperation- Maritime Information, Maritime Piracy, Human and Drug Trafficking, Legal Aspects of Combating These Challenges.

Unit II: Indian Ocean Region (IOR)- World Trade and Economic Prosperity of Nations, Multi- National Activities at Sea, Collaborative Approach to Maritime Security, Security Challenges in the IOR.

Unit III: Maritime Domain Awareness (MDA), Maritime Manoeuvre, Maritime Strike, Indian Maritime Doctrine.

Unit IV: National Values, Policy and Plans, Sea Control, white Shipping Information, Indian Ocean Naval Symposium (IONS).

Course Name– *Naval Operational Logistics*

Course Code – *NA515*

Unit I: Basic Element of Naval Logistics. Nature and fundamental of Naval Logistics, Scope of Logistics, Levels of Logistics Support, Functional Area of Logistics, Process Element, Principles of Logistics.

Enhanced Reach Logistics Sustainability- Longer Operational Cycles, Force Mixed Ratio, Logistics Support, Extended Air Reach, Operational Turn Round Facilities (OTR), Co-operative Logistics, Through Life Support.

Unit II: Operational Logistics- Critical List of Spares and Equipment, Review and Refine the Maintenance Philosophy, Technical Practices and Logistics Support Structures, Quality Maintenance and Logistics Support, Effective Budget Management for Logistics support.

Unit III: Naval Logistics Planning- Logistics Planning Considerations, Logistics Planning Process, Crisis Action Planning, Multinational Planning.

Unit IV: Logistics Command and Control Systems- Naval Logistics System Organisation, Logistics Command and Control Ashore /Afloat, Logistics Information System.

Course Name– *Sustenance Planning at Sea*

Course Code – *NA516*

Unit I: Exploitation Pattern of Machinery- Engine Exploitation Factor (EEF), Running Hrs Base Routines, Calendar Hrs Based Routines, Periodic Health Checks, Safety Devices Checks, First Line Maintenance.

Unit II: Planning of Maintenance Routines and Maintenance Periods- Scheduling of Routines including Second and Third Line Support, Defect Rectification at Foreign Ports, Management of Operational Defects, Compliance to Maintenance Schedule, Forecast List (FCL) of Spares.

Unit III: Onboard Inventory Management- Critical List of Spares for Long Term Sustenance, Onboard Spares (OBS), Repair of Store Items, Preservation of Spares, Demand and Survey for Replenishment of Spares.

Unit IV: Stowage and Management of POL- International Standards (NATO and GOST) for POL, Shelf Life Considerations, Testing of POL, Introduction to NAS Standards, Handling of POL, Safety of POL, SOP for safe handling and suitable PPE against inadvertent ingestion.

Course Name– *Naval Operations*

Course Code – *NA517*

Unit I: Maritime Security Strategy in Perspective- Strategy for Shaping Favorable and Positive Maritime Environment, Strategy for Coastal and Offshore Security, Power Projection and Sea Control.

Unit II: Maritime Security imperatives and Influences- India's Maritime Outlook and Geography, Neighbors and Relations, Maritime Economy. Sea Lines of Communication, Overseas Maritime Investments, Area of Maritime Interest.

Unit III: Maritime Threats, Traditional Threats and Sources, Non-Traditional Threats and Sources, Maritime Terrorism, Piracy and Arm Robbery at Sea, Unregulated Activities at Sea, Climate Change and Natural Disasters, Crucial Common Requirements for Maritime Security.

Unit IV: Strategy for Deterrence and Conflict – India's Deterrence Strategy, Nuclear, Conventional Deterrence, Force Structure and Capabilities, Threat Assessment Contingency Planning, Strategic Situational Awareness and Maritime Domain Awareness, Strategic Communication, Preparedness and Presence, Operational Principles/ Enablers, Operational Actions, Force Projections.

Unit V: Strategy for Maritime Force and Capability Development- Conceptual Capability Development, Force Levels and Capability Development, Indegenisation for Self-Reliance and Self Sufficiency, Standardisation and Modularity, Maritime Domain Awareness.

Course Name– *Geopolitical Studies*

Course Code – *NA518*

Unit I: Physical and Economic Components of India's Geography- Physical Component, Location, The Northern Belt, The Eastern Region, The Central Plains, The Deccan Plateau, The Coastal Belt, The Western Thar Desert, The Western Plains, Island Territories, Different Economic Components.

Unit II: Human Component of India's Geography- Population – Size, Growth Rate and Distribution, Social Structure, Population and Social Characteristics, Religion, Language, Literacy, Cultural Environment.

Unit III: Geographical Imperatives for India's Security- Imperatives from Physical, Economical and Human Components of Geography.

Unit IV: India's Military Elements as it exists Today- Composition of India's Armed Forces, Organisation Command And Control, Recruitment and Training, Territorial Army and Para Military Forces, Weapons And Equipment- Manufacturing and Procurement Policies, Mobilisation and Deployment, Nuclear Option Factor, Missile Technology and Development, Defence Research and Development Infrastructure.

Unit V: Relationship Between India's Geographic Element and its Military Element- Force Projection, Use of Military Assets, Necessity for Sturdy Weapons and Equipment, regional Based Employment Philosophy, India's Role in Assisting Regional Stability.

Course Name– *Naval Procurement Management*

Course Code – *NA519*

Unit I: Acquisition Management and Contract Administration- Acquisition Planning, Market Research, Source Selection Planning, Proposal development, Tender/ Solitation Management, Source Selection Evaluation and Contract Award. Advance Contracting principles.

Unit II: Contingency Contracting: Contracting In Battle Field- Contract in Country for the Leasing of Vehicles, Guard Services, Interpreter Services, Trash Collection, Cooks Maintenance, Construction, Bridge and Road Repair, Humanitarian Assistance.

Unit III: Contract Pricing and Negotiations- Study and Application of Pricing Theory and Strategies, Cost Methods, Cost and Price Analysis, Cost Principles, Analytical Tools for Cost and Price Analysis, Negotiations Skills.

Unit IV: Defence System Contracting- Contracting for Major Systems, Multi-Year Procurement, Acquisition Environment and Strategy, Source Selection, Incentive Contracting, Risk Management, Post Award System Contract Administration, Government Electronic Procurement,

Unit V: International Negotiations- Complexities Related to Cross Cultural Negotiations, Preparations for Negotiations, Strategies and Tactics for Negotiations.

Course Name: - *Skill Development*

(Prezi, Power BI, Advance Excel, AI and Data Science)

Course Code – *NA554*

(A) Skill Enhancement - Prezi Presentation-

Unit I: Introduction - Prezi versus Power Point - An Introduction to Non-Linear Presentations.

Unit II: Planning & Designing Prezi - The Importance of Planning, Useful Techniques - Mind Mapping, Brain Dump, Lists, BIG Picture, Best practice when choosing imagery.

Unit III: Working with Basic Content, Prezi Basics, Creating your Prezi, Using the Theme wizard, Frames - Inserting and grouping with Frames, Contents - Inserting Text, Images, Shapes, Diagrams, Video, Sound, Web-Link, Re-arranging content with favorites, Arranging and Zooming elements, Understanding 3D Background.

Unit IV: Preparing for a Coaching Session, Collaborating with other on Prezi, Presentation options and Considerations - Portable Prezi, Desktop App, Remote option, Sharing and Publishing your Prezi.

(B) Skill Enhancement - Power BI

Unit I: Getting Started with Power Query, Starting with 99 Functions (Text, Date, Number), Appending Clean Data in Power Query.

Unit II: Merging data in Power Query - DON'T USE VLOOKUP, Transformation of data in Power Query without coding, Conditional Columns and Flash fill, Custom Columns.

Unit III: Stop to Understand the Confusing things in Power Query, Automating your daily routine task with Power Query, Exploring other visuals.

Unit IV: Working with Interactive Slicers in Power BI, Working with Powerful Filters in Power BI, Using objects to Enhance reports in Power BI.

Unit V: Introduction to Power BI Service, Creating a Dashboard in Power BI Service, Automating Reports and Dashboards, Introduction to Power Pivot.

(C) Skill Enhancement – Advance MS Excel

Unit I - Basic of Excel Sheets, Tables and Conditional formatting

Unit II - Getting Started with Basic Excel Functions, Working with Advanced Excel Functions

Unit III- Working with Data, Lookup Functions

Unit IV- Hyperlink, I[illegible]duction to Charts, Graphs and Maps

Unit V- Introduction to World [illegible] Table and Pivot Charts, Print Settings and Security

(D) Skill Enhancement – Artificial Intelligence and Data Science

Unit I: Artificial Intelligence, Natural Language Processing, Speech Recognition, Computer Vision, Artificial Neural Networks, Automatic Programming. Planning and Decision Support/ Expert Systems.

Unit II: Linear Algebra Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix Multiplication, Identity and Inverse Matrices, Linear Dependence and Span, Norms, Special Kinds of Matrices and Vectors, Eigen Decomposition, Principal Component Analysis. Chain Rule, Partial Differential Equations-Applications in finding the Minima and Maxima of a function.

Unit III: Statistics for Data Science Types of Statistics, Correlation, Covariance, The Central Limit Theorem, distributions of the sample mean and the sample variance for a normal population, Sampling distributions (Chi-Square, t, F, z). Test of Hypothesis- Testing for Attributes –Mean of Normal Population – One-tailed and two-tailed tests, Analysis of variance ANOVA.

Unit IV: Bayesian and Perceptron Learning, Probability Bayesian learning, Maximum Likelihood Hypothesis, Naïve Bayes Classifier, Artificial Neural Networks- Perceptron's, Feed forward Neural Networks, Back Propagation. Fuzzy Logic

Unit V: Probability Theory- Random variables, Probability Distributions, Marginal Probability, Conditional Probability, Chain Rule of Conditional Probabilities, Expectation, Variance and Covariance, Common Probability Distributions.

Unit VI: Image Processing- Image Processing Fundamentals, Different Types of Images, Image Enhancement in Spatial Domain. Spatial Filtering using Convolution Filters. Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening.

Annexure 4

1. M.Tech Programs for the Academic Batch 2023-25

Sr. No.	Programme Title (M.Tech.)	Specializations	Page No.
1	Aerospace Engineering	Guided Missiles	09
		UAVs	11
		Air Armament	13
2a	Mechanical Engineering	Marine Engineering	38
		Mechanical System Design	41
		Armament and Combat Vehicles (ACV)	43
2b	Automation and Robotics	-	98
3a	Cyber Security		120
3b	Computer Science and Engineering	Artificial Intelligence	150
4	Modeling and Simulation		198
5	Data Science		231
6	Sensor Technology	-	261
7	Optoelectronics and Communication Systems	Lasers and Electro-Optics (LEOC)	279
8	Quantum Computing	Quantum Communication & Sensing	300
9	Technology Management		316
10	Electronics and Communication Engineering (ECE)	Signal Processing and Communication	344
		Radar and Communication	345
		Defence Electronics Systems (DES)	346
		VLSI and Embedded Systems	347
11	Nanoscience and Technology	-	427
12	Material Science and Chemical Technology (MS&CT)	Materials Science and Technology (MST)	434
		Corrosion Technology #	453
13	Materials Engineering	-	472

Sponsored (DRDO/Tri Services/DPSUs/PSUs/Industry) only.

2. MASTER OF SCIENCE (M.Sc.) PROGRAM and PG Diploma PROGRAM

Sponsored (DRDO/Tri Services/DPSUs/PSUs/Industry) only.

Annexure:5

ACADEMIC CALENDAR 2023-24 (ODD SEMESTER)
(AUG 2023 -DEC 2023)

Sr. No.	Activity	Dates
1.	Registration (M. Tech. / MS (by Research)/ MSc/ PGD/ Ph.D) Re-examination for Even semester courses Add/Drop Courses & Finalizing Electives and Orientation Programme	17th July - 28th July 2023 (All Students)
2.	Last date of Late Registration with late fee	31st Aug 2023
3.	Sending Certified list of courses (Regular, Self study, Audit etc) registered by the students - by Jt. Reg. (ACs) to COE	30th Sep 2023
4.	Classes including Preparation	17th July - 24th Nov. 2023 (19 weeks) for 1st year
5.	Project Work-2nd Year	17th July - 19th Nov. 2023 (18 Weeks)
6.	PhD progress review by DRMC	17th July - 31st July 2023
7.	Sending the Panel of Examiners to COE	8th Sep. 2023
8.	Last date of submission of Examination form and Admit Card to COE by the Students.	29th Sep. 2023
9.	End Semester Examination	27th Nov. - 8th Dec. 2023
10.	Oral Examination Committee approved by ViceChancellor to be sent to COE (Thesis first Phase evaluation)	15th Nov 2023
11.	Thesis first evaluation Phase I (M.Tech. 3rd Sem)	20th Nov. - 1st Dec. 2023
12.	Last date for submission of certified Statement of Marks to COE (Courses / Seminar / Lab / Thesis)	15th Dec. 2022
13.	Winter Vacation For Faculty and 1st year PG Students (Not Applicable for M.Tech. 2nd year students)	18th Dec. 2023 - 31st Dec. 2023 (2 Weeks)
14.	Result Declaration - Autumn Semester	29th Dec. 2023
15.	Outstation Instructional Tour (Optional)	During the period provided for classes without affecting any academic activities.

ACADEMIC CALENDAR 2023-24 (EVEN SEMESTER)
(Jan. 2024 - June 2024)

Sr. No.	Activity	Dates
1	Registration (M. Tech. / MS (by Research)/ MSc/ PGD/ PhD) Re-examination for Odd semester courses Add/Drop Courses & Finalizing Electives and Orientation Programme	1st Jan. - 12th Jan 2024 (2nd Semester) 18th Dec. 2023 - 31st Dec. 2023 (4th Semester)
2.	Last date of Late Registration with late fee	31st Jan. 2024
3.	Sending Certified list of courses (Regular, Self study, Audit etc) registered by the students - by Jt. Reg. (Acs) to COE.	1st Mar. 2024
4.	Classes (Phase I)/Dissertation/Project	1st Jan. -2nd Feb. 2024(2nd Semester) (5 weeks) 18th Dec. 2023 - 2nd Feb. 2024 (4th Semester) (7 Weeks)
5.	Sport/Cultural/NSS/Other student related activities	3rd Feb. -11th Feb. 2024 (1 week)
6.	Classes (Phase II) including Preparation/ Dissertation/Project	12th Feb. - 10th May 2024(2nd Semester) (13 Weeks) 12th Feb. 2024 - 26th April 2024 (4th Semester) (11 Weeks)
7.	PhD progress review by DRMC	1st Jan. - 31st Jan. 2024
8. 9.	Sending the Panel of Examiners to COE	8th Mar. 2024
10.	Last date of submission of Examination form and Admit Card to COE by the Students.	12th April 2024
11.	End Semester Examination/Submission of Marks-2nd Semester	(13th May - 29th May 2024)/31st May 2024
12.	Oral Examination Committee approved by Vice- Chancellor to be sent to COE(Thesis first Phase evaluation)	1st April 2024
13.	Thesis evaluation (M.Tech. 4th Sem)	29th April - 3rd May 2024
14.	Last date for submission of certified Statement of Marks to COE (4th Semester)	6th May 2024
.15.	Summer Vacation For Faculty and Students	3rd June- 30th June 2024 (4 weeks)
16	Result Declaration - Even Semester	5th July 2024
17	Outstation Instructional Tour (Optional)	During the period provided for classes without affecting any academic activities

Annexure:6

Fee Structure of M.Sc./M.Tech. Programs

48

FEE STRUCTURE OF MASTER OF SCIENCE, (DATA SCIENCE, APPLIED CHEMISTRY, APPLIED PHYSICS (PHOTONICS), MSc (TECH) PHOTONICS AND MATERIALS SCIENCE) W.E.F. AY 2023-24			
(Subject to revision as per BOM Decision)			
NON-SPONSORED			INDUSTRY SPONSORED/OTHER GOVT. ORGANISATIONS/AUTONOMOUS BODIES/DPSUs/PSU/ENGINEERING COLLEGES [GOVT. & PRIVATE], GOVT. INDUSTRY/TRI-SERVICES/ DRDO ETC.
	For GEN, OBC & EWS	For SC, ST, PWD	ALL CATEGORY
	(Amount in Rs)	(Amount in Rs)	(Amount in Rs)
Admission	1400	1400	0
Provisional Certificate	200	200	0
Students Welfare Fund	1000	1000	0
Modernisation	1000	1000	0
Identity Card	400	400	0
Sub Total	4000	4000	0
Per Semester Fee			
Tuition	5000	0	25000
Examination	1000	1000	1000
Registration	500	500	500
Gymkhana	500	500	500
Medical & Insurance	3000	3000	NA
Library	1000	1000	1000
Association & Culture	1000	1000	1000
Laboratory	3000	3000	6000
Total (Payable in each Semester)	15000	10000	35000
Alumni Life Membership fee & Caution money will be paid by student at the time of joining at DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY (DU)			
Alumni Life Membership	1000	1000	1000
Caution Money (Refundable)			
Caution Money	10000	10000	10000

Note: - Every student shall be required to Re-register by submitting the duly completed Re-registration form along-with proof of payment of Semester Fee, at the beginning of each semester

Note: Hostel and other fee will be charged separately.

49

FEE STRUCTURE FOR MASTER OF SCIENCE (DEFENCE TECHNOLOGY) PROGRAMME FOR SPONSORED CATEGORY (MILIT) W.E.F AY 2023-24	
(Subject to revision as per BOM Decision)	
ONE TIME FEE	
Category	MILIT OFFICERS
Admission	-
Provisional Certificate	-
Students Welfare Fund	-
Modernisation	-
Identity Card	-
Sub Total	0
PER SEMESTER	
Tuition	500
Examination	-
Registration	-
Gymkhana	-
Medical & Insurance	-
Library	-
Association & Culture	-
Laboratory	-
Total	500
Caution Money [Refundable]	-
Alumni Life Membership	1000
Alumni Life Membership fee & Caution money will be paid by student at the time of joining at DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY (DU)	

Note: - Every student shall be required to Re-register by submitting the duly completed-registration form along-with proof of payment of Semester Fee, at the beginning of each semester
Note: Hostel and other fee will be charged separately.

50

FEE STRUCTURE FOR MASTER OF SCIENCE (INFORMATION TECHNOLOGY) PROGRAMME FOR SPONSORED CATEGORY (INS HAMLA)
W.E.F AY 2023-24

(Subject to revision as per BOM Decision)

Category	Service Officers (Navy) INS HAMLA
ONE TIME FEE	
Admission	-
Provisional Certificate	-
Students Welfare Fund	-
Modernisation	-
Identity Card	-
Sub Total	0
PER SEMESTER	
Tuition	5000
Examination	-
Registration	-
Gymkhana	-
Medical & Insurance	-
Library	-
Association & Culture	-
Laboratory	-
Total	5000
Caution Money [Refundable]	-
Alumni Life Membership	-

Alumni Life Membership fee & Caution money will be paid by student at the time of joining at DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY (DU)

Note: - Every student shall be required to Re-register by submitting the duly completed-registration form along-with proof of payment of Semester Fee, at the beginning of each semester
Note: Hostel and other fee will be charged separately.

51

Fee Structure for MSc Food Technology Programme w.e.f AY 2017-18

(Subject to revision as per BOM Decision)

Category	M.Sc Food Technology	
	DRDO Sponsored / Service Officers	Industry Sponsored
	All Category	
	One Time fee	
Admission	-	1400
Provisional Certificate	-	200
Students Welfare Fund	-	1000
Modernisation	-	1000
Identity Card	-	400
Sub Total	0	4000
	Per Semester Fee	
Tuition	39000	54000
Examination	1000	1000
Registration	1000	1000
Gymkhana	1000	1000
Medical & Insurance	NA	NA
Library	1500	1500
Association & Culture	2000	2000
Laboratory	4500	4500
Total	50000	65000
Caution Money [Refundable]	10000	10000
Alumni Life Membership	1000	1000

Alumni Life Membership fee & Caution money will be paid by student at the time of joining at DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY (DU)

Note: - Every student shall be required to Re-register by submitting the duly completed-registration form along-with proof of payment of Semester Fee at the beginning of each semester

Note: Hostel and other fee will be charged separately.

52

FEE STRUCTURE FOR SELF-FINANCED M. TECH STUDENTS W.E.F ACADEMIC YEAR 2022-23

Fee Details	
One Time Fee	
Admission	1400
Provisional Certificate	200
Student Welfare Fund	1000
Modernization	1000
Identity Card	400
Total	4,000
Per Semester Fee	
Tuition	13000
Examination	1,000
Registration	1,000
Gymkhana	1,000
Library	1,000
Association & Culture	2,000
Medical & Insurance	3,000
Laboratory	22,000
Total (Payable in all semesters)	44,000
Caution Deposit (Refundable) (only in 1st Semester)	10,000

Note 1: Alumni Life Membership fee of Rs.1,000/- will be paid by all scholarship/Gate students (irrespective of any category) at the time of clearance at DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY (DU) ALUMNI ASSOCIATION (DIAT) office.

Note 2: Every student shall be required to Re-register by submitting the duly completed Re-registration form along-with proof of payment of Semester Fee, at the beginning of each semester

Note 3: -Hostel and other fees will be charged separately.

53

FEE STRUCTURE FOR SELF-FINANCED M. TECH STUDENTS-VLSI & EMBEDDED SYSTEMS W.E.F ACADEMIC YEAR 2022-23

Fee Details	
One Time Fee	
Admission	1400
Provisional Certificate	200
Student Welfare Fund	1000
Modernization	1000
Identity Card	400
Total	**4,000**
Per Semester Fee	
Tuition	13000
Examination	1,000
Registration	1,000
Gymkhana	1,000
Library	1,000
Association & Culture	2,000
Medical & Insurance	3,000
Laboratory	57,250
Total (Payable in all semesters)	79,250
Caution Deposit (Refundable) (only in 1st Semester)	**10,000**

Note: VLSI & Embedded Systems students need to pay III & IV Semester fees at NIELIT, Calicut of Rs. 70,500/- per semester and Rs. 8,750/- per semester (III & IV) at DIAT (DU)

Note 1: Alumni Life Membership fee of Rs.1,000/- will be paid by all scholarship/Gate students (irrespective of any category) at the time of clearance at DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY (DU) ALUMNI ASSOCIATION (DIAT) office.

Note 2: - Every student shall be required to Re-register by submitting the duly completed Re-registration form along-with proof of payment of Semester Fee, at the beginning of each semester

Note 3: -Hostel and other fees will be charged separately.

54

Defence Institute of Advanced Technology, Pune

(Deemed to be University)

(Funded by Department of Defence R & D, Ministry of Defence, Govt. of India)

Department of Applied Mathematics,

School of Computer Engineering & Mathematical Sciences

M.Sc. (Data Science) Course Structure

Semester I:

Sl. No.	Course Code	Course Name	Contact hours / week			Credits
			L	T	P	C
1.	AMMSCD501	Computational Linear Algebra	3	1	0	4
2.	AMMSCD502	Probability & Statistical Methods with R	3	0	0	3
3.	AMMSCD503	Data Science with Python	3	0	0	3
4.	CSMSCD506	Advanced Database Management Systems	3	1	0	4
5.	CSMSCD507	Computer Organization and Architecture	3	1	0	4
6.	AMMSCD504	Data Science with Python Lab	0	0	4	2
7.	AMMSCD505	Probability & Statistical Methods with R Lab	0	0	4	2
		TOTAL	15	03	08	22

Semester II:

Sl. No.	Course Code	Course Name	Contact hours /week			Credits
			L	T	P	C
1.	AMMSCD521	Optimization Techniques	3	1	0	4
2.	AMMSCD522	Time Series Analysis & Forecasting Methods	3	1	0	4
3.	AMMSCD523	Machine Learning and Deep Learning	3	0	0	3
4.	AMMSCD524	Data Structures & Algorithms	3	0	0	3
5.	CSMSCD530	Big Data Analysis and Algorithms	3	1	0	4
6.	AMMSCD525	Data Structures & Algorithms with Python / C Lab	0	0	4	2
7.	AMMSCD526	Machine Learning and Deep Learning Lab	0	0	4	2
		TOTAL	15	03	08	22

Semester III:

Sl. No.	Course Code	Course Name	Contact hours / week			Credits
			L	T	P	C
1.	AMMSCD531	Regression Analysis and Predictive Modelling	3	1	0	4
2.	CSMSCD540	Artificial Intelligence	3	1	0	4
3.		Elective - 1	3	1	0	4
4.		Elective - 2	3	1	0	4
5.		Elective - 3	3	1	0	4
6.		M. Sc. Dissertation (Mini Project)	08**			04
		TOTAL	15	05	08**	24

Semester IV:

Sl. No.	Course Code	Course Name	Contact hours / week		Credits
			L	T / P	
	AMMSCD 570	M. Sc. Dissertation Final	28**		14
		TOTAL	28		14

**Contact Hours / week: -

✓ Lecture – L (Theory) / Tutorial (T) means - one contact hour for one credit
Practical (P) (Lab session) / means two contact hours for one credit.

List of Electives:

Sl. No.	Course Code	Course
1.	AMMSCD532	Multivariate Data Analysis
2.	AMMSCD533	Digital Image Processing
3.	AMMSCD534	Reinforcement Learning
4.	AMMSCD535	Data Mining Techniques
5.	AMMSCD536	Mathematical Cryptography
6.	CSMSCD541	Natural Language Processing
7.	CSMSCD542	Pattern Recognition
8.	CSMSCD543	Cloud Computing
9.	CSMSCD544	Computer Vision
10.	CSMSCD545	Computer Forensics
11.	CSMSCD546	IoT Analytics
12.	CSMSCD547	Distributed Databases
13.	TMMSCD550	Business Economics and Financial Analysis
14.	MOOC / NPTEL (4 credit Level to be opted)	