



**HINDUSTAN
UNIVERSITY**

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE

(Estd. u/s 3 of the UGC Act, 1956)

Padur, Kancheepuram District - 603 103.

**CENTRE FOR DEFENCE TECHNOLOGY STUDIES
(CDTS)**

**REGULATIONS, CURRICULUM
AND SYLLABUS
2013**

**M.B.A.
DEFENCE TECHNOLOGY MANAGEMENT**

ACADEMIC REGULATIONS
(M.TECH./ M.B.A. / M.C.A.) (Full - Time / Part - Time)
(Effective 2013-14)

1. Vision, Mission and Objectives

1.1 The Vision of the Institute is "To make every man a success and no man a failure".

In order to progress towards the vision, the Institute has identified itself with a mission to provide every individual with a conducive environment suitable to achieve his / her career goals, with a strong emphasis on personality development, and to offer quality education in all spheres of engineering, technology, applied sciences and management, without compromising on the quality and code of ethics.

1.2 Further, the institute always strives

- To train our students with the latest and the best in the rapidly changing fields of Engineering, Technology, Management, Science & Humanities.
- To develop the students with a global outlook possessing, state of the art skills, capable of taking up challenging responsibilities in the respective fields.
- To mould our students as citizens with moral, ethical and social values so as to fulfill their obligations to the nation and the society.
- To promote research in the field of science, Humanities, Engineering, Technology and allied branches.

1.3 Our aims and objectives are focused on

- Providing world class education in engineering, technology, applied science and management.

- Keeping pace with the ever changing technological scenario to help our students to gain proper direction to emerge as competent professionals fully aware of their commitment to the society and nation.

- To inculcate a flair for research, development and entrepreneurship.

2. Admission

2.1 The admission policy and procedure shall be decided from time to time by the Board of Management (BOM) of the Institute, following guidelines issued by Ministry of Human Resource Development (MHRD), Government of India. The number of seats in each branch of the (M.TECH / M.B.A. / M.C.A.) programme will be decided by BOM as per the directives from Ministry of Human Resource Development (MHRD), Government of India and taking into account the market demands. Some seats for Non Resident Indians and a few seats for foreign nationals shall be made available.

2.2 The selected candidates will be admitted to the (M.TECH / M.B.A. / M.C.A.) programme after he/she fulfills all the admission requirements set by the Institute and after payment of the prescribed fees.

2.3 Candidates for admission to the first semester of the Master's Degree Programme shall be required to have passed an appropriate Degree Examination recognized by Hindustan University.

2.4 In all matters relating to admission to the (M.TECH / M.B.A. / M.C.A.). Programme, the decision of the Institute and its interpretation given by the Chancellor of the Institute shall be final.

2.5 If at any time after admission, it is found that a candidate has not fulfilled any of the requirements stipulated by the Institute, the Institute may revoke the admission of the candidate with information to the Academic Council.

3. Structure of the programme

3.1 The programme of instruction will have the following structure

- i) Core courses of Engineering / Technology / Management.
- ii) Elective courses for specialization in areas of student's choice

3.2 The minimum durations of the programmes are as given below:

Program	No. of Semesters
M.Tech.(Full-Time)	4
M.Tech.(Part -Time)	6
M.B.A. (Full - Time)	4
M.B.A. (Part - Time)	6
M.C.A.(Full - Time)	6
M.C.A.(Part-Time)	8

Every (M.TECH / M.B.A. / M.C.A.) programme will have a curriculum and syllabi for the courses approved by the Academic Council.

3.3 Each course is normally assigned certain number of credits. The following norms will generally be followed in assigning credits for courses.

- One credit for each lecture hour per week per semester
- One credit for each tutorial hour per week per semester

- One credit for each laboratory practical of three hours per week per semester.
- One credit for 4 weeks of industrial training and
- One credit for 2 hours of project per week per semester.

3.4 For the award of degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. The curriculum of the different programs shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits specified below.

Program	Minimum prescribed credit range
M.Tech. (Full time / Part time)	75 - 85
M.B.A. (Full time / Part time)	85 - 95
M.C.A (Full time / Part time)	115 - 125

3.5 The medium of instruction, examination and the language of the project reports will be English.

4. Faculty Advisor

4.1 To help the students in planning their courses of study and for getting general advice on the academic programme, the concerned Department will assign a certain number of students to a Faculty member who will be called their Faculty Advisor.

5. Class Committee

5.1 A Class Committee consisting of the following will be constituted by the Head of the Department for each class:

- (i) A Chairman, who is not teaching the class.

- (ii) All subject teachers of the class.
- (iii) Two students nominated by the department in consultation with the class.

The Class Committee will meet as often as necessary, but not less than three times during a semester.

The functions of the Class Committee will include:

- (i) Addressing problems experienced by students in the classroom and the laboratories.
- (ii) Analyzing the performance of the students of the class after each test and finding ways and means of addressing problems, if any.
- (iii) During the meetings, the student members shall express the opinions and suggestions of the class students to improve the teaching / learning process.

6. Grading

6.1 A grading system as below will be adhered to.

Range of Marks	Letter Grade	Grade points
95-100	S	10
85 - 94	A	09
75- 84	B	08
65-74	C	07
55-64	D	06
50-54	E	05
< 50	U	00
	I (Incomplete)	–

6.2 GPA & CGPA

GPA is the ratio of the sum of the product of the number of credits C_i of course "i" and the grade points P_i earned for that course taken over all courses "i" registered by the student to the sum of C_i for all "i". That is,

$$GPA = \frac{\sum_i C_i P_i}{\sum_i C_i}$$

CGPA will be calculated in a similar manner, at any semester, considering all the courses enrolled from first semester onwards.

6.3 For the students with letter grade I in certain subjects, the same will not be included in the computation of GPA and CGPA until after those grades are converted to the regular grades.

6.4 Raw marks will be moderated by a moderation board appointed by the Vice-Chancellor of the University. The final marks will be graded using an absolute grading system. The Constitution and composition of the moderation board will be dealt with separately.

7. Registration and Enrollment

7.1 Except for the first semester, registration and enrollment will be done in the beginning of the semester as per the schedule announced by the University.

7.2 A student will be eligible for enrollment only if he/she satisfies regulation 10 (maximum duration of the programme) and will be permitted to enroll if (i) he/she has cleared all dues in the Institute, Hostel & Library up to the end of the

previous semester and (ii) he/she is not debarred from enrollment by a disciplinary action of the University.

7.3 Students are required to submit registration form duly filled in.

8. Registration requirement

8.1 (i) A Full time student shall not register for less than 16 credits or more than 26 credits in any given semester.

8.1 (ii) A part time student shall not register for less than 10 credits or more than 20 credits in any given semester.

8.2 If a student finds his/her load heavy in any semester, or for any other valid reason, he/she may withdraw from the courses within three weeks of the commencement of the semester with the written approval of his/her Faculty Advisor and HOD. However the student should ensure that the total number of credits registered for in any semester should enable him/her to earn the minimum number of credits per semester for the completed semesters.

9. Minimum requirement to continue the programme

9.1 For those students who have not earned the minimum required credit prescribed for that particular semester examination, a warning letter to the concerned student and also to his parents regarding the shortage of his credit will be sent by the HOD after the announcement of the results of the university examinations.

10. Maximum duration of the programme

The minimum and maximum period for the completion of various programs are given below.

Program	Min. No. of Semesters	Max. No. of Semesters
M.Tech (Full - time)	4	8
M.Tech (Part - time)	6	10
M.B.A. (Full Time)	4	8
M.B.A. (Part Time)	6	10
M.C.A. (Full - Time)	6	12
M.C.A (Part-Time)	8	14

11. Temporary discontinuation

11.1 A student may be permitted by the Director(academic) to discontinue temporarily from the programme for a semester or a longer period for reasons of ill health or other valid reasons. Normally a student will be permitted to discontinue from the programme only for a maximum duration of two semesters.

12. Discipline

12.1 Every student is required to observe discipline and decorum both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.

12.2 Any act of indiscipline of a student reported to the Director (Academic) will be referred to a Discipline Committee so constituted. The Committee will enquire into the charges and decide on suitable punishment if the charges are substantiated. The committee will also authorize the Director(Academic) to recommend to the Vice-Chancellor the implementation of the decision. The student concerned may appeal to the Vice-Chancellor whose decision will be final. The Director (Academic) will report the action taken at the next meeting of the Council.

12.3 Ragging and harassment of women are strictly prohibited in the University campus and hostels.

13. Attendance

13.1 A student whose attendance is less than 75% is not eligible to appear for the end semester examination for that semester. The details of all students who have attendance less than 75% will be announced by the teacher in the class. These details will be sent to the concerned HODs and Director (Academic).

13.2 Those who have less than 75% attendance will be considered for condonation of shortage of attendance. However a condonation of 10% in attendance will be given on medical reasons. Application for condonation recommended by the Faculty Advisor, concerned faculty member and the HOD is to be submitted to the Director (Academic) who, depending on the merits of the case, may permit the student to appear for the end semester examination. A student will be eligible for this concession at most in two semesters during the entire degree programme. Application for medical leave, supported by medical certificate with endorsement by a Registered Medical Officer, should reach the HOD within seven days after returning from leave or, on or before the last instructional day of the semester, whichever is earlier.

13.3 As an incentive to those students who are involved in extra curricular activities such as representing the University in Sports and Games, Cultural Festivals, and Technical Festivals, NCC/ NSS events, a relaxation of up to 10% attendance will be given subject to the

condition that these students take prior approval from the officer-in-charge. All such applications should be recommended by the concerned HOD and forwarded to Director (Academic) within seven instructional days after the programme/activity.

14. Assessment Procedure

14.1 The Academic Council will decide from time to time the system of tests and examinations in each subject in each semester.

14.2 For each theory course, the assessment will be done on a continuous basis as follows:

Test / Exam	Weightage	Duration of Test Exam
First Periodical Test*	10%	2 Periods
Second Periodical Test*	10%	2 Periods
Model exam	20%	3 hours
Seminar/ Assignments/Quiz	20%	
End - semester examination	50%	3 Hours

* Best out of the two tests will be considered.

14.3 For practical courses, the assessment will be done by the subject teachers as below:

- (i) Weekly assignment/Observation note book / lab records - weightage 60%.
- (ii) End semester examination of 3 hours duration including viva - weightage 40%

15. Make up Examination/model examination

15.1 Students who miss the end-semester examinations / model examination for valid reasons are eligible for make-up examination /model examination. Those

who miss the end-semester examination / model examination should apply to the Head of the Department concerned within five days after he / she missed examination, giving reasons for absence.

- 15.2** Permission to appear for make-up examination / model exam will be given under exceptional circumstances such as admission to a hospital due to illness. Students should produce a medical certificate issued by a Registered Medical Practitioner certifying that he/she was admitted to hospital during the period of examination / model exam and the same should be duly endorsed by parent / guardian and also by a medical officer of the University within 5 days.

16. Project evaluation

- 16.1** For Project work, the assessment will be done on a continuous basis as follows:

Review / Examination	Weightage
First Review	10%
Second Review	20%
Third Review	20%
End semester Examination	50%

For end semester exam, the student will submit a Project Report in a format specified by the Director (Academic). The first three reviews will be conducted by a Committee constituted by the Head of the Department. The end - semester examination will be conducted by a Committee constituted by the Controller of Examinations. This will include an external expert.

17. Declaration of results

- 17.1** A candidate who secures not less than 50% of total marks prescribed for a course with a minimum of 50% of the marks prescribed for the end semester examination shall be declared to have passed the course and earned the specified credits for the course.

- 17.2** After the valuation of the answer scripts, the tabulated results are to be scrutinized by the Result Passing Boards of PG programmes constituted by the Vice-Chancellor. The recommendations of the Result Passing Boards will be placed before the Standing Sub Committee of the Academic Council constituted by the Chancellor for scrutiny. The minutes of the Standing Sub Committee along with the results are to be placed before the Vice-Chancellor for approval. After getting the approval of the Vice-Chancellor, the results will be published by the Controller of Examination/ Registrar.

- 17.3** If a candidate fails to secure a pass in a course due to not satisfying the minimum requirement in the end semester examination, he/she shall register and re-appear for the end semester examination during the following semester. However, the sessional marks secured by the candidate will be retained for all such attempts.

- 17.4** If a candidate fails to secure a pass in a course due to insufficient sessional marks though meeting the minimum requirements of the end semester examination, wishes to improve on his/ her sessional marks, he/she will have to register for the particular course and

attend the course with permission of the HOD concerned and the Registrar. The sessional and external marks obtained by the candidate in this case will replace the earlier result.

17.5 A candidate can apply for the revaluation of his/her end semester examination answer paper in a theory course within 2 weeks from the declaration of the results, on payment of a prescribed fee through proper application to the Registrar/Controller of Examinations through the Head of the Department. The Registrar/ Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for project work.

17.6 The weightage for internal marks in finalizing results and grades shall be waived off after completion of 5 semesters.

18. Grade Card

18.1 After results are declared, grade sheet will be issued to each student, which will contain the following details:

- (i) Program and branch for which the student has enrolled.
- (ii) Semester of registration.
- (iii) List of courses registered during the semester and the grade scored.
- (iv) Semester Grade Point Average (GPA)
- (v) Cumulative Grade Point Average (CGPA).

19. Class / Division

19.1 Classification is based on CGPA and is as follows:

- CGPA \geq 8.0 : **First Class with distinction**
- 6.5 \leq CGPA < 8.0 : **First Class**
- 5.0 \leq CGPA < 6.5 : **Second Class.**

19.2 (i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance within the minimum duration of the programme.

(ii) The award of 'First Class' is further subject to the candidate becoming eligible to the award of the degree having passed the examination in all the courses within the below mentioned duration of the programme.

Program	No. of Semesters
M.Tech.(Full-Time)	5
M.Tech.(Part -Time)	7
M.B.A. (Full - Time)	5
M.B.A. (Part - Time)	7
M.C.A.(Full - Time)	7
M.C.A.(Part -Time)	9

(iii) The period of authorized discontinuation of the programme (vide clause 11.1) will not be counted for the purpose of the above classification.

20. Transfer of credits

20.1 Within the broad framework of these regulations, the Academic Council, based on the recommendation of the transfer of credits committee so constituted by the Chancellor may permit students to earn part of the credit requirement in other approved institutions of repute and status in the country or abroad.

21. Eligibility for the award of (M.TECH / M.B.A. / M.C.A.) Degree

21.1 A student will be declared to be eligible for the award of the (M.TECH / M.B.A. / M.C.A.). Degree if he/she has

- i) registered and successfully credited all the core courses,
- ii) successfully acquired the credits in the different categories as specified in the curriculum corresponding to the discipline (branch) of his/her study within the stipulated time,
- iii) has no dues to all sections of the Institute including Hostels, and

iv) has no disciplinary action pending against him/her.

The award of the degree must be recommended by the Academic Council and approved by the Board of Management of the University.

22. Power to modify

22.1 Notwithstanding all that has been stated above, the Academic Council has the right to modify any of the above regulations from time to time subject to approval by the Board of Management.

**MBA
DEFENCE TECHNOLOGY MANAGEMENT
CURRICULUM & SYLLABUS**

Objective of the Programme:

This programme intends to provide wide ranging knowledge about Defence Technologies and Management. The prime objective is to create a cadre of Defence Management experts with technological background. The focus on Defence Industries and Research Organizations would provide an opportunity to develop professional skills in respective domain essential to achieve the National goal of Self-Reliance in Defence.

HINDUSTAN UNIVERSITY
MBA DEFENCE TECHNOLOGY
CURRICULUM & SYLLABUS

SEMESTER I

S.No	Course Code	Course Title	L	T	P	C	TCH
Theory							
1.	CD1611	Principles of Defence Management	3	0	0	3	3
2.	CD1612	Accounting for Defence Management	3	0	0	3	3
3.	CD1613	Defence Acquisition	3	1	0	4	4
4.	CD1614	Defence Procurement	3	1	0	4	4
5.	CD1615	Human Resources and Communication Management	3	0	0	3	3
6.	CD1616	Organizational Behaviour for Defence Forces	3	0	0	3	3
Practical							
7.	CD1617	Computational Lab	0	0	3	2	3
		Total				22	23

SEMESTER II

S.No	Course Code	Course Title	L	T	P	C	TCH
Theory							
1.	CD1621	Strategic Management in Defence Establishments	3	1	0	4	4
2.	CD1622	International Conflict Management	3	1	0	4	4
3.	CD1623	Internal Security Management	3	1	0	4	4
4.	CD1624	South Asian Security and conflict Management	3	1	0	4	4
5.	CD1625	Fundamentals of System Engineering	3	1	0	4	4
6.	—	Elective - I	3	1	0	4	4
Practical							
7.	CD1628	Seminar / Case Study	0	0	3	2	2
		Total				26	27

List of Elective for Elective I of Semester II

S.No	Course Code	Course Title	L	T	P	C	TCH
1.	CD1626	Cryptography and Network Security	3	1	0	4	4
2.	CD1627	Cyber Crime & Security	3	1	0	4	4

SEMESTER III

S.No	Course Code	Course Title	L	T	P	C	TCH
Theory							
1.	CD1631	System Integration	3	1	0	4	4
2.	CD1632	Weapon Systems Evaluation and Performance Assessment	3	1	0	4	4
3.	-----	Elective II	3	1	0	4	4
4.	-----	Elective III	3	1	0	4	4
5.	-----	Elective IV	3	1	0	4	4
Practical							
1.	CD1639	Seminar / Case Study	0	0	3	2	3
		Total				22	23

SEMESTER IV

S.No	Course Code	Course Title	L	T	P	C	TCH
1.	CD1650	Project	-	-	24	12	24
		Total				12	24

TOTAL CREDITS = 82

List of Elective for Elective II, III & IV

S.No	Course Code	Course Title	L	T	P	C	TCH
1.	CD1633	Military Operations Research	3	1	0	4	4
2.	CD1634	Armoured Fighting Vehicles	3	1	0	4	4
3.	CD1635	Naval Platforms	3	1	0	4	4
4.	CD1636	Airborne Platforms	3	1	0	4	4
5.	CD1637	Missile Technology	3	1	0	4	4
6.	CD1638	Military Use of Nuclear Power	3	1	0	4	4

HINDUSTAN UNIVERSITY
M.B.A., DEFENCE TECHNOLOGY MANAGEMENT
SEMESTER I

CD1611 PRINCIPLES OF DEFENCE MANAGEMENT

3 CREDITS

GOAL

To Cover the Current Defence Organizations setup, their role, functions and management approaches.

OBJECTIVES

The course should enable the students:

- To have an knowledge of Higher Defence Organizations setup.
- To know the basic premises of Defence planning.
- To have an overview of Role and functions of Armed Forces, DRDO and Defence production organizations.
- To know the various levels and integration among the DRDO & Defence production.

OUTCOME

The student should be able to:

- Understand the Higher defence organizations setup of the Country.
- Know the components of Defence planning.
- Understand the process of management involving various Defence agencies.
- Understand the cross functional mechanisms of Defence production, DRDO and services.

UNIT I GOALS AND FUNCTIONS OF DEFENCE MINISTRY 9

Historical overview of the Ministry of Defence - Origins - Pre Independence status - Post independence Re - organization - Role and working - Obtaining policy directions of the Government on all defence and security related matters - Communication of these policy directives for implementation to the Services Headquarters, Inter-Services Organizations, Production Establishments and Research and Development Organizations - Departments under the Ministry of Defence.

UNIT II ROLE OF ARMED FORCES 8

Current day Organization and Command structure - Mission and objectives - Constituent services - Army, Navy, Air Force, Coast Guard, Para Military Forces, - Personnel and Training - Peace keeping and Overseas missions - Counter insurgency and anti piracy role - Doctrinal aspects - Role of the Integrated Defence Staff - Basics of Planning Process.

UNIT III FUNDAMENTALS OF DEFENCE PRODUCTION 8

Organization and Role of the Department of Defence Production - matters pertaining to defence production, indigenization of imported stores, equipment and spares, planning and control of

departmental production units of the Ordnance Factories Board and for Defence Public Sector Undertakings (DPSUs). - Role of Indian Ordnance Factories - technology and manufacturing capabilities.

UNIT IV OBJECTIVES OF DRDO

8

Organization and Role of the Defence Design and Research Organization- enhancing self-reliance in Defence Systems - design & development leading to production of world class weapon systems and equipment in accordance with the expressed needs and the qualitative requirements laid down by the three services - technology span including aeronautics, armaments, combat vehicles, electronics, instrumentation engineering systems, missiles, materials, naval systems, advanced computing, simulation and life sciences.

UNIT V PLANNING, ORGANIZING, DIRECTING AND CONTROLLING

12

Steps involved in Planning Process - Process of Managing by Objectives - Formal and informal organization - Line and Staff authority - Benefits and Limitations - De-Centralization and Delegation of Authority - Creativity and Innovation - Leadership - Types of Leadership Motivation - Hierarchy of needs - Motivation theories - Motivational Techniques -- Barriers and Breakdown - Effective Communication - Requirements for effective control - The Budget as Control Technique - Productivity - Problems and Management - Control of Overall Performance - Direct and Preventive Control - Reporting - The Global Environment - Globalization and Liberalization - International Management and Global theory of Management.

TOTAL: 45

TEXT BOOKS

1. Defence Management: An Introduction, Edited by Bucur-Marcu, H, Fluri P, Tagarev T, ISBN Number: 978-92-9222-089-1 2006
2. Cranfield Defence Management Series (Book Series) published by Routledge and the Taylor & Francis Group.

REFERENCES

1. Peter Drucker, The Practice of Management - Tata Mc Graw Hill Mumbai 2012
2. Tripathy & Reddy PN, Principles of Management, Tata McGraw-Hill Mumbai 1999.
3. Defence Journal of College of Defence Management, Secunderabad 2010
4. Harold Koontz & Heinz Weihrich "Essentials of Management", Tata McGraw-Hill, New Delhi 1998
5. Joseph L Massie "Essentials of Management", Prentice Hall of India, (Pearson) Mumbai Fourth Edition, 2003.
6. Decenzo David, Robbin Stephen A, "Personnel and Human Resources Management", new Delhi Prentice Hall of India, 1996
7. JAF Stomer, Freeman R. E and Daniel R Gilbert, "Management", Pearson Education, New Delhi Sixth Edition, 2004.

CD1612 ACCOUNTING FOR DEFENCE MANAGEMENT

3 CREDITS

GOAL

To cover the basic financial accounting and financial management in defence domain.

OBJECTIVES

The course should enable the students:

- To have an overview of the basic financial accounting and Financial Management in Indian context.
- To have an understanding of the important terminologies used.
- To have knowledge to prepare and analyze the financial statements and records.

OUTCOME

The student should be able to:

- Gain knowledge on Financial Accounting & Financial Management.
- Apply the knowledge gained to improve the skills required in financial management in work place.
- Apply knowledge gained to prepare and analyze the financial statements and records in work place.

UNIT I ACCOUNTING

9

Importance & Scope of accounting, Accounting concepts & conventions, Accounting standards, IFRS, Accounting equations, Users of accounting statements. Accounting terminologies in the Defence industry - Offsets a basic coverage.

Preparation of Books of Original Records: Journals, Subsidiary books, Ledgers & Trial balance.

Preparation of Final Accounts / Statements: Basic adjustments, Preparation of financial statements. Depreciation Fixed Asset Accounting, Inventory valuation.

UNIT II CORPORATE ACCOUNTING

9

Accounting of Joint Stock Companies: Overview of Share Capital and Debentures. Accounting for Issue and forfeiture of Shares, Issue of Bonus Share. Issue of Debentures, Financial Statements of Companies: Income Statement and Balance Sheet in Schedule VI.

Provisions of the Companies Act: Affecting preparation of Financial Statements, Creative Accounting, Annual Report, Presentation and analysis of Audit reports and Directors report. (Course takers are exposed to reading of Annual Reports of Companies both detailed and summarized version).

UNIT III FINANCIAL PERFORMANCE MEASUREMENT

9

Funds Flow & Cash Flow Statement: Preparation & Analysis. Financial Statement Analysis. Analysis of Financial Performance of a firm; Use of Different Tools, Ratio Analysis - Different Types of Ratios.

CASE ANALYSIS as appropriate for each module in terms of Balance sheet reading and statement of accounts analysis.

UNIT IV INVESTMENT DECISIONS

9

Capital Budgeting- Investment evaluation techniques; Estimation of cash flow for new project, Replacement projects, Risks in capital budgeting, Sensitivity. Analysis, Decision Tree Analysis.

Cost of Capital: Factors affecting cost of capital, Retained Earnings, WACC. Capital structure decisions: Theories of Capital Structure, Designing Capital Structure, Joint venture financing.

UNIT V WORKING CAPITAL MANAGEMENT

9

Factors influencing working capital requirements, Current asset policy and current asset finance policy. Determination of operating cycle and cash cycle. Estimation of working capital requirements of a firm. Cash budgeting, long term cash forecasting, optimal cash balance, investment of surplus fund.

Inventory Management, need for inventory, order quantity, EOQ model, monitoring and control of inventory, Receivables Management, Meaning and objective, cost and benefit of receivable management, factors influencing the size of investment in receivables, credit evaluation of individual accounts, monitoring accounts receivable.

TOTAL = 45

TEXT BOOKS

1. Financial Accounting for Management, Ambrish Gupta, 2010 Pearson New Delhi
2. Fundamentals of Financial Management, Brigham & Houston 2001, Cengage Delhi

REFERENCE BOOKS:

1. Financial and Management Accounting, Satpathy/Sahoo, Vrinda 2010 Vikas Mumbai
2. Financial Accounting for Management, D Khatri, 2000 McGraw Hill Mumbai
3. Accounting for Management, M.N.Arora, 2003 Himalaya Books Bangalore
4. Financial Management, I.M. Pandey, 2006 Vikas Book House Mumbai
5. Financial Accounting, Warren, Reves, 2001 Cengage Delhi
6. Basic Financial Accounting for Management, Shah, 2006 Oxford Chennai

CD1613 DEFENCE ACQUISITION

4 CREDITS

GOAL

To impart up to date knowledge on the categories of defence acquisition and its management.

OBJECTIVES

The course should enable the students:

- To have an overview of categories of acquisition and the Procurement processes.
- To have an understanding of the roles and functions of DPSU vis-a-vis Private sector, Small and medium enterprises.
- To focus on the financial dimensions considered for effective Defence Acquisition process.

OUTCOME

The student should be able to:

- Gain knowledge of contemporary issues and approaches in Defence acquisition / Procurement process.
- Apply the knowledge gained to improve the skills required in the work place.
- Apply the financial considerations judiciously for Defence Acquisition and arrive at solutions to meet the self-reliance goal in defence sector.

UNIT I INTRODUCTION TO CATEGORIES OF DEFENCE ACQUISITION 12

Distinction between Defence Acquisition and Defence Procurement - Cost benefits aspects - Buy Vs Make considerations - Synchronization with National Security Objectives - Subcategories of Defence Acquisition.

UNIT II ROLE OF DEFENCE PSUS 12

Overview of Defence PSU Organization - Roles and functions of Ordnance factories - Public sector shipyards - Aircraft Manufacture in Public Sector - Special Technology Establishments.

UNIT III NEED FOR PRIVATE SECTOR IN DEFENCE INDUSTRY 12

Capacity and competence aspects - Demand supply gap in public sector undertakings consequent impact of Time and Cost Over runs - Infrastructure Aspects - Modernization and Up gradation.

UNIT IV CONTRIBUTION OF SMALL AND MEDIUM ESTABLISHMENTS 12

Concepts of Platforms, Systems, Sub systems, Equipment and Components - Role of Tier I, II and III Vendors - Advantages and Disadvantages of MSMES - Desirability and Viability of MSME Clusters.

UNIT V FINANCIAL DIMENSIONS 12

Capital Investments - Project Life Cycle Costing - Warranty and Guarantee Costs. - Need for Institutional Financial Support - Need for Streamlining of Accounting Procedures.

Total = 60

TEXT BOOKS:

1. Dynamics of Indian Defence Technology: Indianisation, Indigenisation, Industrialisation, Integration, by Venkat Bharathan and Arun Sahgal, Journal of Defence Studies, April 2011, Volume: 5, Issue: 2
2. India's Defence Public Sector Undertakings: A Performance Analysis - Laxman K Behra, Journal of Defence Studies, October 2009, Volume: 3, Issue: 4

REFERENCE BOOKS:

1. Enhancing Role of SMEs in India - Ernst and Young Publication in association with CII
2. Indian Defence Acquisition and Emerging Opportunities - A Market Report on Capital Procurement for the OEMs. - Q - Tech Synergy Publications.

CD1614 DEFENCE PROCUREMENT**4 CREDITS****GOAL**

To impart up to date knowledge in the defence procurement policy guidelines and implementation..

OBJECTIVES

The course should enable the students:

- To have knowledge on the procurement policy guidelines for acquisition of defence equipment and systems.
- To have an understanding of various issues involved and expectations of various organs of defence establishment, both India and abroad.
- To focus on the concept of indigenization/skill/capacity upgradation needed in defence industries.

OUTCOME

The student should be able to:

- Gain knowledge in the application of policy framework for defence procurement
- Apply the knowledge gained to improve upon the skills required for successful procurement of defence stores in the work place.
- Apply the knowledge gained for successful implantation in work place for effective indigenization.

UNIT I INTRODUCTION TO DEFENCE PROCUREMENT POLICY**12**

Conceptual Framework for Defence Procurement - Overview of Defence Procurement - Organization for Defence Procurement - Elements of Defence Procurement

UNIT II SELF RELIANCE IN DEFENCE DOMAIN	12
Stake holders in the Defence Domain - Effects of Technology Control Requirements - Capacity and competence building for self reliance in defence	
UNIT III OFFSET CLAUSES	12
Definition of Offsets - Applicability of Offsets -Monitoring of satisfaction of Offsets obligations	
UNIT IV ROLE OF ORIGINAL EQUIPMENT MANUFACTURERS	12
Responsibilities of OEMs -FunctionalQuality - Reliability and Maintainability -Life Cycle Support	
UNIT V INDIGENIZATION OF DEFENCE CAPABILITIES	12
Concepts of Indigenisation - Capacity to absorb technology imports - Skill Up gradation	
	Total = 60

TEXT BOOKS:

1. Defence Procurement and Industry Policy - A small country perspective, Edited by Stefan Markowski, Peter Hall, Robert Wylie, Published 3rd July 2009 by Routledge
2. Indian Defence Procurement Opportunities - A Guide, Published by Confederation of Indian Industries, 2008

REFERENCE BOOKS:

1. Indigenisation of Defence Production - Public Private Partnership- Report of Standing Committee on Defence (2008 - 2009) (Fourteenth Lok Sabha).

**CD1615 HUMAN RESOURCES AND COMMUNICATION MANAGEMENT
3 CREDITS**

GOAL

To cover major aspects of Human Resource Management.

OBJECTIVES

The course should enable the students:

- To identify Military capability with the human and technology elements working together.
- To identify Organizational Hierarchy and coherence
- To identify the various challenges of integrating Human components with capability management.

OUTCOME

The student should be able to:

- To define components of Human Resource Management and Human factors.
- Identify methods and strategies on how Human factors are exerted across a range of Defence Acquisition approaches.

- Grasp the various aspects of Human Resource Management with emphasis on Training and Development.

UNIT I CAPABILITY MANAGEMENT 7

Importance of Human resource planning - forecasting human resource requirement - Defining the human component of capability. Importance of through Life Capability Management. Human capability trade-off across the Lines of Development

UNIT II MANPOWER AND PERSONNEL ISSUES 8

Organization Teaming, Authority, Work Management hierarchies, coherence. Enabling the integration of Human Factors within systems development. Context of use and scenario development. Early Human Factors Analysis - risk based approaches

UNIT III TRAINING & HUMAN RESOURCE DEVELOPMENT 10

Definitions - Creating an HRD Plan- Training Needs Analysis-Training Methods. Initiating and exploiting Human Sciences research

UNIT IV PERFORMANCE EVALUATION AND CONTROL PROCESS 10

Methods of Performance evaluation - feedback processes how are they monitored without compromising confidentiality - evaluation surveys - industry practices.

Implications of Job rotation and Job change. The control process - Grievance Redressal and methods

UNIT V HUMAN FACTORS 10

Specifying Human Factors Requirements. Demonstrating Compliance - Importance of Human factors in day to day environments. Role in Organizational hierarchy.

TOTAL = 45

TEXT BOOKS:

1. Wickens, C. D., Lee, J. Liu, Y. D., & Gordon-Bekcer, S. (2004). An introduction to humanfactors engineering (2nd Ed.). Upper Saddle River, New Jersey: Prentice Hall.
2. Performance Management by Robert Bacal 2007 Tata McGraw Hill Mumbai

REFERENCE BOOKS:

1. Managing Human Resources by Belcourt, Bohlander, Snell 2011 Nelson Education Publishers New York
2. Human Resource Management Eugence Mckenna and Nic Beach 2006 edition Pearson education New Delhi

CD1616 ORGANIZATIONAL BEHAVIOUR FOR DEFENCE FORCES
3 CREDITS

GOAL

To cover aspects of Organizational Behaviour with an orientation to the Defence culture

OBJECTIVES

The course should enable the students:

- To identify Human Behaviour, Personality, Motivational characteristics and Group Behaviour.
- To study Essential leadership qualities and styles of leadership.
- To grasp the various factors affecting organization climate in the armed forces and the various determinants that effect behavior.

OUTCOME

The student should be able to:

- To lay out the framework of behavioral patterns of individuals in the Armed Forces.
- Define the influence of group and development of leadership capabilities in the Services.
- Distinguish different personality traits and the factors that influence personality

UNIT I FOCUS AND PURPOSE 9

Definition, need and importance of organizational behavior - Nature and scope - Framework for men in armed forces - Organizational behavior models.

UNIT II INDIVIDUAL BEHAVIOUR 9

Types of Personality - Factors influencing personality - Theories of learning and learning process - Adjustment in combat and peace situation - Motivation and commitment to the cause of uniform service

UNIT III GROUP BEHAVIOUR 9

Organization structure of unit - formation - Group influence & Group dynamics - Emergence of leadership quality in services - Group decision making techniques - Effective communication in peace and war situation

UNIT IV LEADERSHIP AND POWER 9

Essentials of leadership quality - Importance of leadership - Styles of leadership - Leadership and morale - Sources of power centre

UNIT V DYNAMICS OF ORGANIZATIONAL BEHAVIOURS 9

Organization climate - Factors affecting organizational climate in armed forces - Determinants and influence on behavior - Impact of organization changes on men in uniform - Organizational development and team building

TOTAL : 45

TEXT BOOKS:

1. Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India, 9th edition, 2001
2. Hellriegel, Slocum and Woodman, Organizational Behaviour, South-Western, Thomson Learning, 9th edition, 2001.

REFERENCES:

1. Schermerhorn, Hunt and Osborn, Organizational behaviour, John Wiley, 7th edition, 2001.
2. Jit S. Chand, Organizational Behaviour, Vikas publishing House Pvt. Ltd. 2nd edition, 2001.
3. Fred Luthans, Organizational Behaviour, McGraw Hill Book Co., 1998.
4. Newstrom & Davis, Organizational Behaviour, McGraw Hill, 2001.
5. Jaffa Harris and Sandra Hartman, Organizational Behaviour, Jaico, 2002

CD1617 COMPUTATIONAL LAB**2 CREDITS****GOAL**

Familiarizing the students with basic computer concepts and emerging computer technology, so as to enable them to use computer resources efficiently for making effective decision

OBJECTIVES

The course should enable the students:

- To provide hands on training to the students on MS-Office tools
- To provide an exposure towards database management
- To introduce the concept of in-house development of software packages

OUTCOME

The student should be able to:

- The student should be able to productively use various features of MS-Office package
- The student should be able to confidently operate database management packages
- The student shall reflect an exposure towards the process of in-house development of a software package.

UNIT I BUSINESS APPLICATION SOFTWARE 20

MS office - MS Excel, MS Power Point, MS Word, MS Access, MS Front Page, MS Project, Accounting packages, Statistical Packages, Operations Research Package, Packages in functional areas of management.

UNIT II DATABASE MANAGEMENT PACKAGES 20

Sql server or oracle or ingress; front-end tool - Visual basic or Developer 2000.

UNIT III INHOUSE DEVELOPMENT OF A PACKAGE**Total : 60**

SEMESTER - II

CD1621 STRATEGIC MANAGEMENT IN DEFENCE ESTABLISHMENTS

4 CREDITS

GOAL

To provide a comprehensive understanding of the Strategic Planning process and its implementation.

OBJECTIVES

The course should enable the students:

- To gain a complete knowledge of the Strategic Planning process and different strategies adopted by the industry.
- To understand the process of Implementation and control amongst strategies.
- To get an indepth knowledge of the Internal and External environment of a Firm.

OUTCOME

The student should be able to:

- To relate to common terminologies such as Market share, Distinctive competencies and the building blocks of competitive advantage.
- Apply the different strategies to real life situations and relate the same to the cases discussed.
- Apply the different control and evaluation techniques to real life situations

UNIT I STRATEGY AND PROCESS

8

Concept of strategy, Vision, Mission, Goal, Objective, Strategic Management Process, Corporate Planning -an overview, SBU, Modes of strategic decision making, Strategic intent, Hierarchy of strategy.

Conceptual framework for strategic management, the Concept of Strategy and the Strategy Formation Process - A formal Strategic Planning Process - Corporate Governance and Social responsibility.

UNIT II COMPETITIVE STRATEGIES RELEVANT TO DEFENCE INDUSTRIE

8

Working models of Defence industries worldwide. External Environment - Porter's Five Forces Model- Strategic Competitive Changes during Industry Evolution-Globalisation and Industry Structure - Capital Purchase negotiations and related pricing strategies. Low cost and differentiation Generic Building Blocks of Competitive Advantage- Distinctive Competencies-Resources and Capabilities durability of competitive Advantage- Knowledge partners and alliances

UNIT III STRATEGIES

8

Building competitive advantage through functional level strategies- Business level strategy- Strategy in the Global Environment-Corporate Strategy-Vertical Integration-Diversification and StrategicAlliances-Building and Restructuring the corporation-Choice of Strategies-Balance Score Card.

UNIT IV STRATEGY IMPLEMENTATION & EVALUATION 8

Designing organizational structure- Designing Strategic Control Systems- Matching structure and control to strategy-Implementing strategic change-Politics-Power and Conflict-Techniques of strategic evaluation & control.

UNIT V STRATEGY FORMULATION AND OTHER STRATEGIC ISSUES 8

Managing Technology and Innovation- Entrepreneurial Ventures and Small Business Strategic issues for non- profit organizations. Value chain analysis, Mckinsey's 7s frame work, Strategic alliance, merger and acquisition, Divestment, Business Portfolio analysis- BCG & GEC matrix - Strategic Choice Strategic evaluation and control(including techniques).

CASES IN STRATEGIC MANAGEMENT 5

TOTAL : 45

TEXT BOOKS

1. A History of Air Warfare / John Andreas Olsen (Ed.) - 2010
2. The Rise of Indian Military Power : Evolution of an Indian Strategic Culture / G.D. Bakshi - 2009

REFERENCES

1. The Defence Industry in the 21st century Richard Hooke- Global Aerospace and Defence Leader -PricewaterhouseCoopers publication 2011
2. Charles W.L. Hill & Gareth R. Jones - 'Strategic Management Theory, An Integrated approach' - Cengage Learning.2012
3. 4. Thomas L. Wheelen, J. David Hunger - 'Strategic Management' Addison Wesley Longman Singapore Pvt., Ltd., 6th Edition, 2000.
4. Defence Procurement and Industry Policy -A small country perspective By Stefan Markowski, Peter Hall, Robert Wylie. Mc Millan Publishers Chennai
5. Strategic Management & Business Policy, Kazmi, 2001 Cengage Learning Chennai 2012 Global aerospace and defense industry outlook A tale of two industries - A Deloitte Publication 2010 Mumbai
6. Arnaldo C.Hax, Nicholas S. Majluf - 'The Strategy Concept and Process' - A Pragmatic Approach - Pearson Education Publishing Company, New Delhi Second Edition, 2005

CD1622 INTERNATIONAL CONFLICT MANAGEMENT

4 CREDITS

GOAL

The Aim of the course is to provide knowledge about Conflict Management, Conflict Resolution and Conflict Prevention and develop the knowledge on issues and concerns of Conflict Resolution.

OBJECTIVES

The course intends to enable students:

- To provide a broad understanding of conflict theories.
- To understand the process of managing conflicts.
- To Analyse various methods of conflict resolution.
- To understand the de-escalation and negotiation methods.

OUTCOME

The student should be able to:

- Understand the basic conflict theories of conflict management.
- To be able to analyze this cause of conflicts.
- Develop the ideas and methods of conflict resolution.
- To gain knowledge about methods of de-escalation and negotiations.

UNIT I INTRODUCTION TO CONFLICT RESOLUTION 12

Introducing international relations - What is conflict - Conflict Structure - Conflict Theories - Sources of conflict evaluation.

UNIT II CONFLICT ANALYSIS 12

Evolution -Main concepts of conflict analysis - Tools of conflict analysis - Conflict Prevention and Conflict Management.

UNIT III INTERNATIONAL LAW AND CONFLICT MANAGEMENT 12

Processes of conflict management - Mediation, Prevention and Intervention - Human rights/Refugee Laws - Case studies (as chosen by the faculty).

UNIT IV CONFLICT MANAGEMENT PRACTICE 12

Complexities in Conflict Management - Use of technology to manage conflicts - From ceasefire to mediation - the process of conflict management - Case studies

UNIT V FROM MANAGEMENT TO PEACE BUILDING 12

Truth and reconciliation commission - New issues in conflict management - Case studies - Future of the field (as chosen by the faculty)

TOTAL : 60

TEXT BOOKS

1. Chester A. Crocker, Fen Osler Hampson, and Pamela Aall, eds. Turbulent Peace: The Challenges of Managing International Conflict, Washington, United States Institute of Peace, 2001
2. Gil Loescher and James Milner, Protracted Refugee Situations, Adelphi Paper 375 John Burton. Conflict: Resolution and Prevention. New York: St. Martin's Press. Kriesberg, Louis, Constructive Conflicts: From Escalation to Resolution, Rowman & Littlefield, Maryland, 1998
3. Peter Wallensteen, Understanding Conflict resolution, Sage Publications, 2003

REFERENCES

1. Alex J. Bellamy and Paul D. Williams, Understanding Peacekeeping, Polity Press, UK, 2010
2. Crocker, Chester A., Fen Osler Hampson and Pamela Aall, (eds.,) Managing Global Chaos: Sources of and Responses to International Conflict Washington, D.C., USIP, 1996
3. Deutsch, Morton, The Resolution of Conflict: Constructive and Destructive Processes, New Haven, Yale University Press, 1973
4. Gerard Prunier, Darfur: The Ambiguous Genocide, Ithaca: Cornell University Press, 2005.
5. Myra Warren Isenhardt, Michael Spangle, Sage Publications, USA, 2000
6. Peter Harris, Ben Reilly, eds., Democracy and Deep-rooted conflict: Options for negotiators, IDEA, 1998

CD1623 INTERNAL SECURITY MANAGEMENT

4 CREDITS

GOAL

The goal of programme is to equip the students with the knowledge of National Security, Possible threats and challenges. And also to be able to construct a response to the perceived threats.

OBJECTIVES

The course intends to provide students:

- An understanding of National Security, Concept, Scope and definition.
- To understand the variety of threats to the state.
- To be able to analyze the various challenges to Internal Security.
- To gain knowledge about Role of the State in Security Governance.

OUTCOME

The student should be able to:

- To understand the Nation- State with security and importance of National Interest.

- To develop the knowledge about various types of threats.
- To gain the knowledge and analyze the visible and invisible challenges to the state / Country.
- To comprehend the Role of State in Security Governance.

UNIT I ELEMENTS OF NATIONAL SECURITY 12

Concept of National Security - Definition Meaning and Scope - Internal Security as Integral form of National Security - Vital National Assets/Installations - Elements of Power - Concept of Home land security management.

UNIT II TYPES OF THREATS 12

Traditional and Non - Traditional Threats - External and Externally Fostered Internal Threats - Threats from Land, Air and Sea - Cyber & Economic Threats

UNIT III CHALLENGES TO INTERNAL SECURITY 12

Cross Border Terrorism - Low Intensity Conflicts - Insurgency - Maoism/ Left Wing Extremism - Societal Challenges - Border Security Management.

UNIT IV GOVERNANCE IN INTERNAL SECURITY 12

Role of Security Forces - Role of Policy and Doctrine - Role of Intelligence Agencies

UNIT V ROLE OF STATE 12

Structure of Internal Security Management System in Union of India & State Governments - Law Enforcement - Policies of Union & State Governments - Role of Armed Forces in Internal Security Management.

Total = 60

TEXT BOOKS

1. Management of Internal Security: Freedom from Fear By Ranjit Sen Gupta, Lancer publishers, 1994.
2. India's Internal Security Crisis: A Comprehensive Strategy for Reforming an Ineffective Conflict Management Structure, By Richard Bradley, University of Texas at Austin, 1993 - 528 pages.

REFERENCES

1. Conceptualizing Security for India In The 21st Century, Gautam Sen, University of Poona. Dept. of Defence and Strategic Studies. National Centre of International Security and Defence Analysis, Atlantic publishers and distributors, New Delhi, 2007.
2. National Security Problem in India: A Case Study of the Insurgency Problem, By Longjam Randeep Singh, published by S.B. Nangia, A.P.H. Publishing Corporation, New Delhi, 2000.
3. India's Internal Security: Issues & Perspectives, Shrikant Paranjpe, Kalinga Publications, 2009 - 196 pages.

CD1624 SOUTH ASIAN SECURITY AND CONFLICT MANAGEMENT
4 CREDITS

GOAL

The goal of the course is to enable the students to learn and understand root cause of conflicts in the region. Also students should be able to analyze various issues and concerns towards a solution for lasting peace in South Asian Region.

OBJECTIVES

The course is designed for students to gain knowledge of conflict in South Asia and to be able to:

- Understand about Characteristics of South Asia.
- Understand various causes of conflicts.
- To comprehend the means to managing or prevent the conflict.
- To gain the knowledge of various means of cooperation among the South Asian countries.
- To understand the meaning and importance of lasting peace in the South Asian Region.

OUTCOME

The student should be able to:

- To gain knowledge of South Asia with Characteristics and Geo-Strategic importance.
- To understand and analyze the cause of conflicts and its possible prevention.
- To learn the Methods of Conflict Resolution.
- To gain knowledge about the various peace process and Stability in the region.

UNIT I CHARACTERISTICS OF SOUTH ASIAN STATES 12

Geo-political structure of South Asia - Geo-Strategic significance of South Asia. - System of Governance
- Social and Cultural Structure

UNIT II CONFLICTS IN SOUTH ASIA 12

Management of Ethnic Conflicts - Religious Conflicts - Terrorism in South Asia - Sub nationalism -
Insurgency

UNIT III CONFLICT MANAGEMENT 12

Initiatives of Individual States in Conflict Management - Efforts of NGO's - Bi-Lateral initiatives -
Multilateral Conflict Management Mechanisms - Role of International Organizations.

UNIT IV COOPERATION IN SOUTH ASIA 12

Confidence Building Measures- Scope & Relevance - Political, Economic, Security Cooperation -
Role of SAARC - Track II Diplomacy - Role of Media and People to People contacts

UNIT V PEACE AND SECURITY IN SOUTH ASIA**12**

Defence and Foreign Policies of Respective South Asian Countries - Prevention of Nuclear Conflict - Management of Nuclear Deterrence - Limited War - Policy Dialogues/Peace Processes - Ethnic Conflicts - Role of United Nation

TOTAL : 60**TEXT BOOKS**

1. Problems of governance in South Asia, Centre for Policy Research (New Delhi, India), Konark Publishers, 2000 - Political Science - 479 pages.
2. The Geopolitics of South Asia: From Early Empires to the Nuclear Age Graham Chapman, Ashgate Publishing, Ltd., 2003 - 333 pages

REFERENCES

1. Cooperation And Conflict In South Asia, Partha Sarathy Ghosh Technical Publications, 1989 - 265 pages
2. South Asian Security and International Nuclear Order: Creating a Robust Indo-Pakistani Nuclear Arms Control Regime, Mario Esteban Carranza, Ashgate Publishing, Ltd., 14-Sep-2009 - 198 pages
3. Stability in South Asia, Ashley J. Tellis, Rand Corporation, Arroyo Centre, United States. Army, RAND, 1997 - History - 80 pages..

CD1625 FUNDAMENTALS OF SYSTEM ENGINEERING**4 CREDITS****GOAL**

To focus on the fundamentals principles, procedures and practices of system engineering in defence context.

OBJECTIVES

The course should enable the students:

- To have an overview of fundamentals principles, procedures for system engineering in the defence context.
- To have an overview of practices of system engineering adapted by services, procurement and logistics agencies.
- To know about system engineering practices by DRDO, Defence production industry in general and public & private sectors in particular.

OUTCOME

The student should be able to:

- Know about the concepts of system engineering.

- Know about the principles, procedures, practices for system engineering adapted by armed forces.
- Know the impact of system engineering practiced in DRDO, DPSU in general and private sector in particular.

UNIT I INTRODUCTION TO SYSTEMS ENGINEERING 12

Introduction to Systems Engineering - distinguishing between systems and complex systems - recognition of problems associated with complex systems - design of cost effective, timely and effective complex systems - adoption of a systems approach for solving complex systems problems.

UNIT II ANALYSIS OF DEFENCE SYSTEMS FOR APPLICATION OF SYSTEMS ENGINEERING PRINCIPLES 12

Use of systems engineering methods to explore defence lifecycle issues - application of systems knowledge and systems thinking to the decision making process in relation to systems' problems in a defence environment comprising people, doctrine, technology, time and budget.

UNIT III RISK ASSESSMENT IN COMPLEX DEFENCE SYSTEMS 12

Concepts of risk assessment and management - risks in defence systems - concepts of cost of failure - assessment of suitable resources to mitigate risk and uncertainty in complex defence systems - Assessment of suitable resources to mitigate risk and uncertainty in complex systems -

UNIT IV SELECTED CASE STUDIES 12

Development of a model, tailored, whole system, through-life approach to explore a complex problem, in the Indian defence domain using appropriate methods and tools -

UNIT V APPRAISAL OF THE QUALITY OF SYSTEMS ENGINEERING PRACTICES 12

Study of systems engineering practices applied by industry and government in the defence environment in India - development of a model for assessment of quality of systems engineering practices - application of this model to the system developed in Unit IV.

TOTAL : 60

TEXT BOOKS

- 1 Handbook of Systems Engineering and Management Andrew P Sage, William B Rouse Pub: John Wiley & Sons (2009) ISBN 978-0-470-0835-6
- 2 Decision Making in Systems Engineering and Management Gregory S Parnell, Patrick J Driscoll Pub: John Wiley & Sons (2011) ISBN 978 - 0 - 470 - 93471 - 5

REFERENCES

1. Systems Engineering Fundamentals (Pub) Defense Acquisition University Press 2001
2. Modern Methods of Systems Engineering Joe Jenney Pub: Amazon books (2011) ISBN 146 - 3777 - 35

ELECTIVES - I
CD1626 CRYPTOGRAPHY AND NETWORK SECURITY
4 CREDITS

GOAL

To Cover the fundamental aspects of mathematics of cryptography, Number theory concepts and network security practices.

OBJECTIVES

The course should enable the students:

- To know about the classical algorithm, classical cryptography and introduction to finite field - Shannon's Theory.
- To know the symmetric key Ciphers.
- To understand the aspects of public key cryptography, Authentication and Hash functions.
- To understand the aspects of Network security practices.

OUTCOME

The student should be able to:

- Gain knowledge on classical algorithm, classical cryptography and introduction to finite field - Shannon's Theory.
- Gain knowledge on symmetric key Ciphers .
- Gain knowledge on public key cryptography, Authentication and Hash functions.
- Apply the knowledge gained to improve the skills in the work place within the frame work of Network security practices.

UNIT I INTRODUCTION AND MATHEMATICAL FOUNDATIONS 12

Introduction-Classical Encryption algorithms - Cryptanalysis of Classical Cryptosystems-Introduction to finite field-Shannon's Theory

UNIT II SYMMETRIC KEY CIPHERS 12

Stream Cipher - Modern Block Cipher: DES - triple DES - RC5- AES -Linear Cryptanalysis - Differential Cryptanalysis-Overview on S-Box Design Principles - Modes of operation of Block Ciphers.

UNIT III PUBLIC KEY CRYPTOGRAPHY 12

Number Theory Concepts - RSA Cryptosystem - Primarily Testing - Factoring - Other attacks on RSA and Semantic Security of RSA - The Discrete Logarithm Problem (DLP) and the DiffieHellman Key Exchange algorithm - The ElGamal Encryption Algorithm-Cryptanalysis of DLP- Elliptic curve cryptography.

UNIT IV AUTHENTICATION AND HASH FUNCTIONS 12

Message Authentication and Hash functions - Birthday attacks -MD5 -SHA1 - HMAC-Digital Signatures -DSS- Public Key Certificate.

UNIT V NETWORK SECURITY PRACTICE

12

Secret Sharing Schemes - Kerberos - Pretty Good Privacy (PGP)-S/MIME- IPSec - Secure Socket Layer (SSL) - Intruders and Viruses-Firewalls

TOTAL : 60

TEXT BOOKS

1. William Stallings, "Cryptography and Network Security: Principles and Practice", 5th Edition, Pearson Education, 2010
2. Douglas Stinson, "Cryptography Theory and Practice", 3rd Edition, Chapman & Hall/CRC.

REFERENCES

1. Wade Trappe, Lawrence C Washington, " Introduction to Cryptography with codingtheory", 2nd ed, Pearson, 2007
2. W. Mao, "Modern Cryptography - Theory and Practice", Pearson Education, Second Edition, 2007.
3. Charles P. Pfleeger, Shari Lawrence Pfleeger - Security in computing Third Edition -Prentice Hall of India, 2006

CD1627 CYBER CRIME & SECURITY

4 CREDITS

GOAL

The Goal of this course is to impart the knowledge about security dimensions of cyber threat and crime, and also to prepare students to apply their mind for prevention of such threats.

OBJECTIVES

The course should enable the students:

- To understand basics of Information Systems, Network and Military Sensors.
- To gain knowledge about various types of Cyber Crime and Cyber Threats to National Security.
- To have knowledge about the Impact of Cyber threats to the nation-state and also to know about Cyber Laws.
- To gain knowledge about detection and prevention methods through modern technology.

OUTCOME

The student should be able to:

- Understand the basics of Cyber technology and its use by the adversaries against the nation/ state.
- To develop the skills to comprehend various types of Cyber threats and crime against the nation-state.
- To be able to analyze the impact of Cyber threats and to evolve methods of its prevention.

- To be able to learn the existing Cyber laws to different types of Cyber threats and crime in national and international perspective.

UNIT I INTRODUCTION TO CYBER TECHNOLOGIES 12

Information Systems - Networks/LAN/WAN - Military Sensors

UNIT II TYPES OF CYBER CRIME 12

Hacking - Password Cracking - Insecure Network Connection - Theft at Tele Communication Services

UNIT III IMPACT OF CYBER CRIME ON NATIONAL SECURITY 12

Impact on Armed Forces & Law enforcement Agencies' Information Systems - Impact on National Economy/Market - Impact on Citizen Security

UNIT IV DETECTION AND PREVENTION METHODOLOGIES 12

Risk Identification - Levels of Protection - Cyber Defensive Measures

UNITY V CYBER LAWS 12

Overview of General Laws and Procedures in India - Introduction to Indian Cyber Law - Cyber Crime and Digital Evidence- Indian Perspective

TOTAL : 60

TEXT BOOKS

1. Cyber Security - the Essential body of knowledge by Dan Shoemaker and Wm Arthur Conklin, published by Cengage Learning - ISBN - 978 - 1 - 4354 - 8169 - 5
2. Cyber Security and Homeland Security - edited by Lin V Choi - ISBN - 1 - 59454 - 728 - 9
3. Cyber Security - Public Sector threats and responses edited by Kim Andreasson, published by CRC Press , ISBN - 978 -1 - 4398 - 4663 - 6

REFERENCES

1. Cyber Security - the Essential body of knowledge by Dan Shoemaker and Wm Arthur Conklin, published by Cengage Learning - ISBN - 978 - 1 - 4354 - 8169 - 5
2. Cyber Security and Homeland Security - edited by Lin V Choi - ISBN - 1 - 59454 - 728 - 9
3. Cyber Security - Public Sector threats and responses edited by Kim Andreasson, published by CRC Press , ISBN - 978 -1 - 4398 - 4663 - 6

SEMESTER III

CD1631 SYSTEMS INTEGRATION

4 CREDITS

GOAL

To Cover the concepts of Systems Integration for the design and development of weapon systems involving various technology discipline.

OBJECTIVES

The course should enable the students:

- To understand the concept of system integration in defence weapons systems involving various technology disciplines.
- To know about the importance of documentation, test equipments and quality man power etc., for system integration.
- To have an overview of management of system engineering.

OUTCOME

The student should be able to:

- Appreciate the applications and benefit of system engineering concept for complex defence weapons systems.
- Gain knowledge on the process of documentation and development of quality man power discipline wise and testing equipments.
- Apply the knowledge gained to improve the skills required in the work place for development of systems and its integration.

UNIT I CONCEPTS OF SYSTEM INTEGRATION

12

Introduction to Systems Integration - Concepts of Systems, sub systems, equipment, components - utilization of a variety of techniques such as computer networking, enterprise application integration, business process management or manual programming - skills required for systems integration - include software and hardware engineering, interface protocols, and general problem solving skills - application of systems integration to military equipment - role of a military systems integrator - case studies of systems integration processes in a weapon platform - naval systems - air borne systems - land systems

UNIT II RELEVANCE OF DOCUMENTATION

12

Role of documentation in systems integration - hierarchy of documentation - design documentation - manufacturing documentation - exploitation documents and user manuals - maintenance and repair technical documents - quality assurance documents

UNIT III ROLE OF TEST EQUIPMENT

12

Importance of testing during the process of systems integration - hierarchy of testing - types of test

equipment - Built in test equipment - Automatic Test equipments - Drawing up of test schedules - validation of testing

UNIT IV NEED OF QUALIFIED MANPOWER 12

Linkage between levels of integration, associated documentation and test equipment - coordination needs during systems integration - agencies involved - manufacturers, users, system integrators - facilities needed - infrastructure and services - managerial skills, professional knowledge, communication skills - team work

UNIT V MANAGEMENT OF SYSTEM INTEGRATION 12

Understanding of critical role of system integration - broad engineering discipline that integrates the fields of engineering, systems thinking, systems engineering, management, project planning - understanding of overall mission objectives - system performance and limitations - impact of time and cost overruns - development of accountability matrices - clarity of deliverables and responsibilities

TOTAL : 60

TEXT BOOK

1. Handbook of systems engineering and management - Andrew P Sage, William B Rouse, 1999, ISBN 9780470083536 - Published by J Wiley & Sons,

REFERENCES

1. Introduction to Systems Engineering - Andrew P Sage, James E Armstrong, 2000, ISBN 9781601190499- Published by J Wiley & Sons
2. System management : Planning, enterprise identity, and deployment - Jeffrey O Grady - 2010, ISBN 9781439820131 - Published by Boca Raton : CRC Press/Taylor & Francis,

**CD1632 WEAPONS SYSTEMS EVALUATION AND PERFORMANCE ASSESSMENT
4 CREDITS**

GOAL

To provide information on weapon systems and performance effectiveness required for the armed forces as well as to focus on the management of field trails for evaluation and performance assessment.

OBJECTIVES

The course should enable the students:

- To know about various dimensions and working of weapons systems in use / of future.
- To focus on the requirement of armed forces in respect of weapon system performance effectiveness.
- To provide knowledge on field trails.
- To provide information on various organizations involved in management and system evaluation and performance assessment.

OUTCOME

The student should be able to:

- Gain knowledge on various types of weapon systems in use / of future and their usage.
- To know about the user requirement of weapon system performance & effectiveness.
- To have a comprehensive understanding of field trials for assessing the weapon system performance and effectiveness.
- To understand the cross functional aspects of defence organizations for management of weapon system evaluation / performance assessment.

UNIT I INTRODUCTION TO STAFF QUALITATIVE REQUIREMENTS 12

Need for defining military systems requirements in qualitative terms - basic elements of "Staff qualitative requirements" - Purpose or "why is the system or equipment needed" - operational details or what should the equipment or system be capable of delivering - operational environment and restrictions thereof - physical dimensions - reliability and maintainability parameters - inter-operability aspects - organisational aspects of drawing up SQRs - procedural aspects - common lapses in drawing up of SQRs - effect of such lapses - need for professionalism in drawing up SQRs

UNIT II ROLE OF QUALITY ASSURANCE ORGANIZATION (DGQA) 12

Role and function of DGQA - Quality Assurance - Control of quality during design - Conformance of quality during productions - Assurance of reliable performance during service period - Development of indigenous production of defence stores - documentation - technical consultancy and guidance services - organization of DGQA - Headquarter Technical Directorates - Authorities Holding Sealed Particulars - Field Quality Assurance Estts

UNIT III CONCEPTS OF AUTHORITY HOLDING SEALED PARTICULARS (AHSP) 12

Organisational structure and Responsibilities of Authority Holding Sealed Particulars (AHSP) - maintaining all India standards of inspection by laying down necessary procedures and criteria - preparation, maintenance and supply of the necessary technical information pertaining to military systems and equipment - collecting, collating, developing, amending and updating the entire history and technical data and information of the stores and equipment -

UNIT IV CATEGORIES OF TRIALS FOR WEAPON SYSTEMS 12

Overview of System evaluation and Performance assessment - commencement of quality assurance at the design stage - adherence to specifications - grant of Deviation/relaxation where necessary for the acceptance after carrying out the necessary evaluation of the stores/equipment - Factory Acceptance trials - Field trials in case of Army systems - Harbour and Sea trials for Naval systems - Flight trials for airborne systems

UNIT V CONDUCT OF TRIALS 12

Role of Field Quality Assurance Establishments - coordination with Ordnance Factories or the Public Sector Undertakings or Private sector industries - bulk inspection including laboratory testing and proof of samples - Role of Proof Establishments - carrying out proofing of weapons, filled and empty

ammunition and explosives manufactured by ordnance factories, private sector firms or procured from foreign sources - Trials of weapons equipment in different terrains - underwater ranging and noise trials in case of submarines.

TOTAL : 60

TEXT BOOK

1. Handbook of systems engineering and management - Andrew P Sage, William B Rouse, 1999, ISBN 9780470083536 - Published by J Wiley & Sons,

REFERENCES

1. Introduction to Systems Engineering - Andrew P Sage, James E Armstrong, 2000, ISBN 9781601190499- Published by J Wiley & Sons.
2. System management : Planning, enterprise identity, and deployment - Jeffrey O Grady - 2010, ISBN 9781439820131 - Published by Boca Raton : CRC Press/Taylor & Francis.

ELECTIVE COURSES
CD1633 MILITARY OPERATIONAL RESEARCH

4 CREDITS

GOAL

To cover the methods and techniques of Operational Research for studies on threat Perception, and to arrive at requirements of equipments and weapon systems for armed forces.

OBJECTIVES

The course should enable the students:

- To understand the concept of Operational Research.
- To focus on latest weapons systems, equipments and logistic requirement.
- To have an understanding of methods and techniques of Operational Research applicable for armed forces.
- To focus on decision making process based on the Operational Research.

OUTCOME

The student should be able to:

- Understand the basic approaches in Operational Research.
- Gain knowledge to conceptualize the threat perception based on battle field scenario studies and requirements of equipments and weapon systems.
- Gain knowledge on the methods & techniques of Operational Research application for armed forces.
- Apply the gained knowledge for evolving strategic / tactical decision based on the results of Operational Research.

UNIT I INTRODUCTION TO OPERATIONAL RESEARCH TECHNIQUES

12

Introduction to operations research (O.R.) - discipline of applying advanced analytical methods to help make better decisions - usage of techniques such as mathematical modeling to analyze complex situations - ability to make more effective decisions and build more productive systems - importance of complete data - consideration of all available options - Careful predictions of outcomes and estimates of risk - latest decision tools and techniques - problems addressed by OR - operations, scheduling, staffing, transportation, logistics

UNIT II DISCRETE AND CONTINUOUS SIMULATION

12

Overview of simulation modelling paradigms - conceptual models (activity cycle diagrams, causal loop diagrams and stock/flow diagrams) - Input modelling (the selection and fitting of appropriate probability distributions for stochastic simulations) - Output analysis (methods for comparing and analysing the results of simulation experiments) - DES principles and types of software - Developing and experimenting with DES models using appropriate software packages

UNIT III DECISION ANALYSIS

12

Introduction to role and scope of decision analysis in supporting decision making - concepts of Pay-

off Matrices - Structuring decision problems using pay-off matrices - analysis of pay-off matrices under conditions of uncertainty and risk - concepts of Decision Trees - : Structuring and analysing decision problems using decision trees - modelling assumptions and development, example applications and software introduction to Game Theory - judgements as part of the decision making process - introduction to Delphi technique, the analytic hierarchy process and an associated consensus methodology - Multiple Criteria Decision Analysis- use of appropriate software for Decision Analysis:

UNIT IV WAR GAMING AND COMBAT MODELING

12

Introduction to the methods used in combat modelling and their application in support of defence decision-making and training - Combat Simulation - Basic principles of discrete event Monte Carlo simulations of combat - use of a simple engagement model. Extension of the concepts to allow more realistic representation of the battlefield. - introduction to Lanchester's Equations and application of Lanchester's equations in current models of combat - Concepts of War Gaming/Interactive Simulation

UNIT V LOGISTICS MODELING

12

Importance of logistics in the defence environment - appreciation of logistics management as a force multiplier - logistics methodologies - application of OR to logistics - Modelling distribution networks with Linear Programming approaches - Inventory Control - Reliability, availability and maintenance modeling - Simulation of logistics systems.

TOTAL : 60

TEXT BOOK

1. Military Operations Research : Quantitative decision making - N.K. Jaiswal - 1997 - ISBN 9780792398585 - Published by Kluwer Academy, Boston

REFERENCES

1. Methods of Operations Research: Philip McCord Morse, George Elbert Kimball, 2003, ISBN 9780486432342 Published by Morse and Kimball
2. Methods for conducting military operational analysis : Andrew G Loerch - 2007 - ISBN 9780930473136 - Published by Military Operations Research society.

CD1634 ARMoured FIGHTING VEHICLES

4 CREDITS

GOAL

To Cover all aspects viz: Role, Characteristics, design, development, technology and production of Armoured Fighting Vehicles.

OBJECTIVES

The course should enable the students:

- To have an overview of different types of Armoured Fighting Vehicles and roles.
- To know all about the various assemblies/sub assemblies constituting the Armoured Fighting Vehicles as a weapon systems.

- To understand the technology of Armoured Fighting Vehicles current & future.
- To understand the production aspects of Armoured Fighting Vehicles.

OUTCOME

The student should be able to:

- Gain knowledge on historical background Armoured Fighting Vehicles development, role and functions.
- Gain knowledge on Armoured Fighting Vehicles as weapon systems and their assemblies / sub assemblies.
- Gain knowledge on Armoured Fighting Vehicles technologies and their development status.
- Gain knowledge on the manufacturing trend in Armoured Fighting Vehicles, both India and Abroad

UNIT I WARFARE ON LAND - EVOLUTION OF THE 'BATTLE TANK' AS A WEAPON PLATFORM 12

Introduction to 'ground warfare' - diversity of terrain, climate, methods, and wherewithal including skills - brief historical perspective - main elements of 'ground warfare' - Infantry, Artillery and Armoured vehicles - characteristics of Armoured Fighting Vehicles - overview of 'tank combat'.

UNIT II ROLE AND CLASSIFICATION OF AFVS 12

Classification of AFVs by role and type - Main battle tank - Armoured car - Infantry fighting vehicle - Self propelled artillery

UNIT III COMPONENT ELEMENTS OF AFVS 12

Housing - propulsion - weaponry - sensors - design aspects - mobility considerations - vulnerability aspects - mortars - rocket launchers

UNIT IV TECHNOLOGY ASPECTS OF AFVS 12

Guns and Ammunition Systems - Introduction to Materials and Terminal Ballistics - Vehicle propulsion and Dynamics - Weapon Dynamics and Control - Structural design - Reliability and system effectiveness - Advanced materials - Vehicle systems integration

UNIT V MANUFACTURING OF AFVS 12

Infrastructure - quality assurance - field trials - non-weapon related control systems such as Turret Control, Power Distribution and Vehicle Controls and Displays.

TOTAL : 60

TEXT BOOK

1. The Greenhill armoured fighting vehicles data book - Ian V Hogg - 2000 - ISBN - 9781853673917 - Published by Greenhill books

REFERENCES

1. Armoured fighting vehicles - Philip Trewhitt - 1999 - ISBN - 9781840843286 - Published by Dempsey Parr
2. Tanks - The World's Greatest - Ian Graham - 2006 - ISBN - 9781410920874 - Published by Raintree.

CD1635 NAVAL PLATFORMS

4 CREDITS

GOAL

To provide knowledge about navel platform / weapon systems and design aspects for maritime operations and strategy for achieving self-reliance.

OBJECTIVES

The course should enable the students:

- To attain knowledge on evolution of 'Blue Water' Force to secure National Maritime - past& present.
- To know about theconstituent combatant units of Indian Navy.
- To know about systems&technology of modern naval weapons platforms.
- To know the need for strategic transformers to build indigenous capability.

OUTCOME

The student should be able to:

- Gain knowledge historical evolution of naval forces to the current level.
- Gain knowledge on Indian Navy combatant units.
- Gain knowledge on the naval systems and technology of modern weapon platforms.
- Apply the knowledge gained to improve skill needed in the work place and attain theself-reliance goalto build indigenous capability.

UNIT I INDIAN NAVY - EVOLUTION OF A 'BLUE WATER' FORCE

12

Primary objective of the navy - to secure national maritime borders - additional objectives - enhance international relations through joint exercises, port visits and humanitarian missions, including disaster relief - Role of Sea lanes of communication - historical perspective - Chola, Maratha and Kerala influence - impact of colonialisation - post independence modernisatin and consolidation - impact of 1971 operations - twenty first century compulsions

UNIT II CONSTITUENT COMBATANT UNITS OF THE INDIAN NAVY

12

Organisation of the modern Indian Navy - Command structure - combatant units - surface ships - submarines - naval aviation - roles of various platforms - destroyers - frigates - amphibious warfare vessels - roles of supporting organizations - dockyards - materiel support - training institutions

UNIT III SYSTEMS OF A MODERN NAVAL WEAPON PLATFORM

12

Functions of a naval platform - float, move and fight - Float aspects - stability considerations - Move aspects - main propulsion - auxiliaries - Machinery control systems - Platform management systems - Fight aspects - Weapons and sensors fitted on a modern naval platform - surface to surface - surface to air - underwater weapons - radar - sonar - communication equipment - Integrated Fire Control Systems

UNIT IV TECHNOLOGY ASPECTS OF A NAVAL PLATFORM 12

Design considerations - speed, range, endurance, survivability - stealth technologies - Radar Cross Section - Noise and vibration - EMI, EMC considerations - repair and maintenance considerations - need for qualified technological human resources.

UNIT V TRANSITION FROM A 'BUYER'S NAVY TO A 'BUILDER'S NAVY' 12

Creation of a modern Navy - induction processes - acquisition from abroad -Draw backs of dependence on foreign imports - building warships in India - necessary resources - ship building infra structure - design capabilities - plant and machinery - dry dock facilities - synchro lifts - industrial base - managerial capabilities.

TOTAL: 60

TEXT BOOK

1. Principles of Naval Weapon systems - David R Frieden, Gene P Bender - 1985 -- ISBN 9780870215377 - Published by Naval Institute Press, Annapolis.

REFERENCES

1. The Maritime Engineering Reference Book - Anthony F. Molland - 2008 - ISBN-13: 978-0-7506-8987-8 - Published by Butterworth-Heinemann.
2. Introduction to naval architecture - EC Tupper - 2004 - ISBN 9780750665544 - Published by Elsevier, Butterworth Heinemann.

CD1636 AIRBORNE PLATFORMS

4 CREDITS

GOAL

To provide fundamentals on the various types of airborne platforms and the application ensuring defence capability in the Country.

OBJECTIVES

The course should enable the students:

- To understand the strategic importance of airborne platforms on defence capability.
- To know the various categories of military aircraft and theoretical aspects of airborne platforms.
- To understand the significance of aerospace management, in deciding the defence capability.

OUTCOME

The student should be able to:

- Gain knowledge on the strategic dimensions of airborne platform.
- Gain knowledge on the various categories of military aircraft and airborne platform.
- Gain knowledge in the Aerospace management on vital area to enhance the defence capability.

UNIT I AERIAL WARFARE - THE THIRD DIMENSION	12
Introduction to aerial warfare - strategic air power - tactical air power - close air support - evolution of Indian Air Force - naval aviation - ground support - aerial surveillance - aero space management	
UNIT II CATEGORIES AND CLASSIFICATIONS OF MILITARY AIRCRAFT	12
Broad division of military aircraft - role - lift - propulsion - usage - fighters - bombers - transport - fixed wing - rotary wing - propeller driven - jet aircraft -	
UNIT III MANUFACTURING ASPECTS OF MILITARY AIRCRAFT	12
Design and construction aspects -aerodynamics - materials technology - manufacturing methods - balance between performance, reliability and cost - air frames - fuselage - avionics - weapons and sensors	
UNIT IV MILITARY AIRCRAFT - REPAIR AND MAINTENANCE ASPECTS	12
Importance of Maintenance, Repair and Overhaul (MRO) services- ability to conduct support services within minimal timescales, but to maximum effect - effect of extensions to life-cycle of many older and ageing fixed wing legacy aircraft - impact of new aircraft procurement and development which is being undertaken in fighter, transport and special operations aircraft - requirement of more intensive and specialised MRO - ideal MRO organization for a modern Air Force	
UNIT V MILITARY AIRCRAFT - CERTIFICATION	12
Distinction between certification for civil and military aircraft - need for stringency in military aircraft certification - airworthiness aspects - organization and regulations in force for military aircraft certification - Concepts of Maintenance, Repair, Overhaul (MRO) for military aircraft - procedures and practices - infrastructure needed - skills and competence.	

TOTAL : 60

TEXT BOOK

1. Advanced Aircraft systems - David A Lombardo - 1993 - ISBN 007038603X - McGraw Hill

REFERENCES

1. Aircraft design - Ajoy Kumar Kundu - 2010 - ISBN 978 - 0 -521 - 88516 - 4 - Cambridge University Press
2. Airworthiness - a introduction to Aircraft certification - Filippo di Florio - 2010 - ISBN 9780080968032 -Burlington Elsevier Science.

CD1637 MISSILES TECHNOLOGY

4 CREDITS

GOAL

To provide fundamentals of Missiles its classifications, technologies and strategic dimensions of manufacturing capability.

OBJECTIVES

The course should enable the students:

- To have basic knowledge on Missiles and guided weapon systems.
- To have an overview of different types of Missile and technologies involved.
- To have knowledge on the strategic importance of having Missile manufacturing capabilities.

OUTCOME

The student should be able to:

- Gain knowledge on various Missiles and guided weapon systems.
- Gain knowledge in the Missile systems, sub systems and technology involved.
- Gain knowledge on strategic importance of having Missile manufacturing capabilities in the Country.

UNIT I OVERVIEW OF GUIDED MISSILES 12

Introduction to guided missiles - five principle components - targeting, guidance, flight, propulsion, and warhead - basic roles and classification - surface to surface - surface to air - air to surface -

UNIT II INDIA'S INTEGRATED GUIDED MISSILE PROGRAMME 12

Overview of India's IGMP - historical perspective - need to cater to national offensive and defensive capabilities - tactical and strategic stand off platforms - test requirements - operational deployment with Indian Armed Forces

UNIT III CRUISE MISSILES - TECHNOLOGY ASPECTS 12

Purpose of cruise missiles - land attack operations - anti shipping role - launch platforms - elaboration of targeting and guidance systems - warhead aspects

UNIT IV BALLISTIC MISSILES - TECHNOLOGY ASPECTS 12

Definition of 'ballistic' missiles - conventional and nuclear armed war heads - use as strategic deterrence - technology differentiators

UNIT V STRATEGIC APPROACH TO MISSILE MANUFACTURE 12

Strategic approach - dovetailing into national strategic defence plan - induction of cutting edge technology - need to develop indigenous technology - financial aspects - human resource aspects

TOTAL: 60

TEXT BOOKS

1. Modern Missile Guidance Rafael Yanushevsky (2008) CRC Press, Taylor and Francis Group ISBN - No: 978 - 1 - 4200 - 6226 -7
2. Missile Guidance and Control Systems George M Siouris (2004) Stringer ISBN - No - 978 - 0 - 3870 - 0726 - 7

REFERENCE

1. Integrated Guided Missile Development Programme - Published by DESIDOC (2008).

CD1638 MILITARY USE OF NUCLEAR POWER

4 CREDITS

GOAL

To Cover the defence applications of Nuclear energy and introduce the existing nuclear safe guards.

OBJECTIVES

The course should enable the students:

- To know the fundamentals of nuclear energy both civil & military applications.
- To have an understanding of nuclear propulsion systems for various military applications.
- To have an overview of nuclear weapons and technologies involved.
- To have an overview of nuclear safety issues.

OUTCOME

The student should be able to:

- Gain knowledge on nuclear energy application to civil & military fields.
- To know about the nuclear power propulsion system for various military applications.
- To know fundamentals about the nukes, its components and design.
- To know about the safety issues pertaining to nuclear applications for civil and defence.

UNIT I INTRODUCTION TO NUCLEAR TECHNOLOGY

12

Fundamentals of nuclear technology - fission and fusion - nuclear materials - basic applications of nuclear technology - division into civilian and military usage - nuclear power - nuclear medicines - industrial applications - commercial applications - weapons - classification of nuclear weapons

UNIT II NUCLEAR PROPULSION

12

Use of nuclear reactions as a source of energy for propulsion - aircraft - space craft - surface ships - submarines - historical perspective - origins of the Submarine Thermal Reactor (STR) with the Admiral Rickover led programme in 1953 - components of a nuclear powered propulsion plant - the nuclear reactor - primary and secondary systems - characteristics of military propulsion plants - ruggedness, resilience, maneuverability - safety considerations - decommissioning and defueling aspects

UNIT III NUCLEAR WEAPONS**12**

Introduction to nuclear weapons - components of a nuclear weapon - categories of nuclear weapons - basics of nuclear weapon design - fuel - propulsion - guidance - detonation - design laboratories - warhead design aspects - explosive testing - production facilities - safety aspects

UNIT IV GUIDANCE TECHNOLOGIES**12**

Historical perspective - categories of guidance systems - concepts of active, passive and pre-set guidance - inertial, terrestrial and celestial guidance systems - components of a Go-onto-target (GOT) system - target tracking - missile tracking - guidance computer - remote control and homing guidance

UNIT V NUCLEAR SAFETY REGULATIONS**12**

Overview of nuclear safety issues - hazards of nuclear materials - power plant safety considerations - safety culture and human errors - safety considerations in handling nuclear weapons - inspection procedures and organisation - roles and responsibilities

TOTAL : 60**TEXT BOOKS**

1. Nuclear weapons by William Lambers - fourth edition - 2006 - ISBN 0972462945 - Lambers Publications.
2. Nuclear Energy by: Raymond L. Murray - 6th Edition - 2008 - ISBN-13: 978-0-12-370547-1 - Publisher: Butterworth-Heinemann

REFERENCES

1. Principles of Naval Weapons Systems by Craig Payne 2006 - ISBN 1-59114 - 658 - 5 - US Naval Institute
2. Nuclear Safety - Gianni Petrangeli - 2006 - ISBN 13 - 978 - 0 - 7506 - 6723 - 4 - Elsevier Publisher: Butterworth Heinemann.

