



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



**Approved by AICTE, Recognized by UGC & Affiliated to Anna University
Accredited by NBA-AICTE, NAAC-UGC with 'A+' Grade**

Saravanampatti, Coimbatore-641035

CURRICULA AND SYLLABI REGULATION 2019 CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF AEROSPACE ENGINEERING

B.E. – AEROSPACE ENGINEERING



SNS COLLEGE OF TECHNOLOGY
(An Autonomous Institution)
COIMBATORE-35



REGULATION – 2019

SUGGESTED CURRICULUM AND SYLLABI

B. E. AEROSPACE ENGINEERING

Description / Semester	AICTE	SNSCT - Aerospace Suggested	CREDITS PER SEMESTER							
			I	II	III	IV	V	VI	VII	VIII
Humanities, Social Sciences and Management Courses (HSMC)	12	22	3	2	4	4	4	2	2	-
Basic Science (BSC)	25	23	8	8	3	3	-	-	2	-
Engineering Sciences (ESC)	24	22	8	12	2	-	-	-	-	-
Programme Core (PCC)	48	54	-	-	14	15	17	8	-	-
Programme Elective (PEC)	18	12	-	-	-	-	3	3	3	3
Open Elective (OEC)	18	12	-	-	-	-	-	5	5	2
Employability Enhancement Courses / Project / Seminar / Internship	15	24	3	1	1	2	1	2	2	12
Mandatory Courses (MC)	Non Credit									
TOTAL	160	169	22	23	24	24	25	20	14	17

SEMESTER I										
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category
Theory Courses										
1	19MAT101	Linear Algebra & Calculus	3	1	0	0	4	4	50/50	BSC
2	19MET101	Engineering Drawing	1	0	4	0	5	3	50/50	ESC
3	19EET101	Basics of Electrical and Electronics Engineering	3	0	0	0	3	3	50/50	ESC
Theory Integrated Practical Courses										
4	19CHB101	Chemistry for Engineers	3	0	2	0	5	4	60/40	BSC
5	19ENB101	Communicative English	2	0	2	0	4	3	60/40	HSMC
6	19GEB101	Design Thinking and Innovation	1	0	0	4	5	3	100/0	EEC
Practical courses										
7	19GEP101	Workshop Practices Laboratory	0	0	4	0	4	2	60/40	ESC
Mandatory Course										
8	19HST101	Induction Programme	3 Weeks					0	-	MC
9	19HST103	Indian Constitution	2	0	0	0	2	0	100/0	MC
	Total		15	1	12	4	32	22		

SEMESTER II										
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category
Theory Courses										
1	19ITT101	Programming in C and Data Structures	3	0	0	0	3	3	50/50	ESC
2	19MET102	Engineering Mechanics	3	1	0	0	4	4	50/50	ESC
3	19AST101	Introduction to Aerospace Engineering	3	0	0	0	3	3	50/50	ESC
Theory Integrated Practical Courses										
4	19MAB102	Integral Calculus and Laplace Transforms	3	0	2	0	5	4	60/40	BSC
5	19PYB103	Physics for Engineers	3	0	2	0	5	4	60/40	BSC
Practical courses										
6	19ENP101	Professional Communication	0	0	4	0	4	2	60/40	HSCM

7	19ITP101	Programming in C and Data Structures Laboratory	0	0	4	0	4	2	60/40	ESC
8	19ASP101	Mini Project-I	0	0	0	2	2	1	100/0	EEC
Mandatory Course										
9	19HST102	Environmental Sciences	2	0	0	0	2	0	100/0	MC
	Total		17	1	12	2	32	23		

SEMESTER III											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1	19MAT201	Transform and Partial Differential Equation	3	0	0	0	3	3	50/50	BSC	19MAT101
2	19AST201	Fluid Mechanics	3	0	0	0	3	3	50/50	PCC	
3	19AST202	Aircraft Production Technology	3	0	0	0	3	3	50/50	PCC	
4	19GET275	VQAR-I	2	0	0	0	2	2	50/50	HSMC	
Theory Integrated Practical Courses											
5	19ASB201	Aero Mechanics of Solids	3	0	2	0	5	4	60/40	PCC	
6	19ASB202	Aero Engineering Thermodynamics	3	0	2	0	5	4	60/40	PCC	
Practical courses											
7	19ITP202	Python Programming	0	0	4	0	4	2	60/40	ESC	
8	19ASP201	Mini Project-II	0	0	0	2	2	1	100/0	EEC	
9	19GEP275	Personality Development	1	0	2	0	3	2	60/40	HSMC	
	Total		18	0	10	2	30	24			

SEMESTER IV											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1	19MAT206	Numerical Methods	3	0	0	0	3	3	50/50	BSC	19MAT201
2	19AST203	Aircraft Structural Mechanics	3	0	0	0	3	3	50/50	PCC	19ASB201
3	19GET276	VQAR-II	2	0	0	0	2	2	50/50	HSMC	

4		Language Elective	1	0	2	0	3	2	60/40	HSMC	
Theory Integrated Practical Courses											
5	19ASB203	Aerodynamics	3	0	2	0	5	4	60/40	PCC	19AST201
6	19ASB204	Aerospace Propulsion	3	0	2	0	5	4	60/40	PCC	19ASB202
Practical courses											
7	19ASP202	Computer Aided Aircraft Drawing	0	0	4	0	4	2	60/40	PCC	
8	19ASP203	Internet of Things for Aerospace	0	0	4	0	4	2	60/40	PCC	
9	19ASP204	Internship - I	2 Weeks					2	100/0	EEC	
	Total		15	0	14	0	29	24			

SEMESTER V											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1	19AST301	Space Propulsion	3	0	0	0	3	3	50/50	PCC	19ASB204
2	19AST302	Flight Dynamics	3	0	0	0	3	3	50/50	PCC	
3		Professional Elective-I	3	0	0	0	3	3	50/50	PEC	
4		Career Course – I & II	-	-	-	0	4	4	-	HSMC	
Theory Integrated Practical Courses											
5	19ASB301	Composites Materials and Structures	2	0	2	0	4	3	60/40	PCC	19AST204
6	19ASB302	Finite Element Method for Aerospace	3	0	2	0	5	4	60/40	PCC	
Practical Courses											
7	19ASP301	Aero Simulation Lab	0	0	4	0	4	2	60/40	PCC	
8	19ASP302	Data Analytics in Aerospace	0	0	4	0	4	2	60/40	PCC	
9	19ASP303	Mini Project-III	0	0	0	2	2	1	100/0	EEC	
Mandatory Course											
10	19HST105	Essence of Indian Traditional Knowledge	2	0	0	0	2	0	100/0	MC	
	Total		16	0	12	2	34	25			

SEMESTER VI											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1		Professional Elective-II	3	0	0	0	3	3	50/50	PEC	
2		Open Elective - I	3	0	0	0	3	3	50/50	OEC	
3		Open Elective - II	2	0	0	0	2	2	50/50	OEC	
4		Career Course - III	2	0	0	0	2	2	100/0	HSMC	
Theory Integrated Practical Courses											
5	19ASB303	Aircraft Maintenance Engineering	3	0	2	0	5	4	60/40	PCC	
6	19ASB304	Computational Fluid Dynamics for Aerospace	3	0	2	0	5	4	60/40	PCC	19ASB203
Practical courses											
7	19ASP304	Internship - II	4 Weeks					2	100/0	EEC	
	Total		16	0	4	0	20	20			

SEMESTER VII											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1	19GET277	Biology for Engineers	2	0	0	0	2	2	50/50	BSC	
2		Professional Elective-III	3	0	0	0	3	3	50/50	PEC	
3		Open Elective-III	3	0	0	0	3	3	50/50	OEC	
4		Open Elective-IV	2	0	0	0	2	2	50/50	OEC	
5	19GET201	Professional Ethics and Human Values	2	0	0	0	2	2	50/50	HSMC	
Practical courses											
6	19ASP401	Project Phase-I	0	0	0	4	4	2	60/40	EEC	
	Total		12	0	0	4	16	14			

SEMESTER VIII											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1		Augmented Reality/Virtual Reality (MOOC/NPTEL)	2	0	0	0	4	2	50/50	OEC	
2		Professional Elective-IV	3	0	0	0	3	3	50/50	PEC	
Practical courses											
3	19ASP402	Project - II	0	0	0	24	24	12	60/40	EEC	
	Total		5	0	0	24	31	17			

Items	Credit
1 Hr. Lecture (L) per week	1
1 Hr. Tutorial (T) per week	1
1 Hr. Practical (P) per week	0.5
1 Hr. Field Work/ Project (J) per week	0.5

1. HUMANITIES, SOCIAL SCIENCES AND MANAGEMENT COURSES (HSMC)

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
1	19ENB101	Communicative English	2	0	2	0	3	I
2	19ENP101	Professional Communication	0	0	4	0	2	II
3	19GET275	VQAR-I	2	0	0	0	2	III
4	19GEP275	Personality Development	1	0	2	0	2	III
5	19GET276	VQAR - II	2	0	0	0	2	IV
6		Language Electives	1	0	2	0	2	IV
7		Career Course - I & II	-	-	-	-	4	V
8		Career Course - III	2	0	0	0	2	VI
9	19GET201	Professional Ethics and Human Values	2	0	0	0	2	VII
TOTAL			12	0	10	0	21	

LANGUAGE ELECTIVES

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
1	19GEB202	HINDI	1	0	2	0	2	IV
2	19GEB203	JAPANESE	1	0	2	0	2	IV

3	19GEB204	GERMAN	1	0	2	0	2	IV
4	19GEB205	FRENCH	1	0	2	0	2	IV

Career Courses (UG)

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
Track 1 Job (6 Credits)	19GEP375	Technical Interviewing	0	0	4	0	2	V
	19GEB375	Personnel Psychology	1	0	2	0	2	V
	19GEB379	Employable skill development	1	0	2	0	2	VI
Track 2 Entrepreneurship (6 Credits)	19GEB376	Entrepreneurship & Business Model Canvas	2	0	4	0	4	V
	19GET376	Economics, Finance & Accounting	1	0	0	0	1	VI
	19GET377	Intellectual Property Rights	1	0	0	0	1	VI
Track 3 Higher Education (6 Credits)	19GEB377	Advanced Verbal Quantitative Aptitude & Reasoning	2	0	2	0	3	V
	19GET375	Networking	1	0	0	0	1	V
	19GEB380	Higher Studies in Abroad & India	1	0	2	0	2	VI
Track 4 Govt. /RRB/ Bank (6 credits)	19GEB378	Foundation Course on Competitive Exams	2	0	4	0	4	V
	19GEB381	Personnel Psychology for Govt. Jobs	1	0	2	0	2	VI

2. BASIC SCIENCE COURSES (BSC)

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
1	19MAT101	Linear Algebra and Calculus	3	1	0	0	4	I
2	19CHB101	Chemistry for Engineers	3	0	2	0	4	I
3	19MAB102	Integral Calculus and Laplace Transforms	3	0	2	0	4	II
4	19PYB103	Physics for Engineers	3	0	2	0	4	II
5	19MAT201	Transform and Partial Differential Equation	3	0	0	0	3	III
6	19MAT206	Numerical Methods	3	0	0	0	3	IV
7	19GET277	Biology for Engineers	2	0	0	0	2	VII
TOTAL			20	1	6	0	24	

3. ENGINEERING SCIENCE COURSES (ESC)

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
1	19MET101	Engineering Drawing	1	0	4	0	3	I
2	19EET101	Basics of Electrical and Electronics Engineering	3	0	0	0	3	I
3	19GEP101	Workshop Practices Laboratory	0	0	4	0	2	I

4	19ITT101	Programming in C and Data Structure	3	0	0	0	3	II
5	19MET102	Engineering Mechanics	3	1	0	0	4	II
6	19AST101	Introduction to Aerospace Engineering	3	0	0	0	3	II
7	19ITP101	Programming in C and Data Structure Laboratory	0	0	4	0	2	II
8	19ITP202	Python Programming	0	0	4	0	2	III
TOTAL			13	1	16	0	22	

4. PROFESSIONAL CORE COURSES (PCC)

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
1	19AST201	Fluid Mechanics	3	0	0	0	3	III
2	19AST202	Aircraft Production Technology	3	0	0	0	3	III
3	19ASB201	Aero Mechanics of Solids	3	0	2	0	4	III
4	19ASB202	Aero Engineering Thermodynamics	3	0	2	0	4	III
5	19AST203	Aircraft Structural Mechanics	3	0	0	0	3	IV
6	19ASB203	Aerodynamics	3	0	2	0	4	IV
7	19ASB204	Aerospace Propulsion	3	0	2	0	4	IV
8	19ASP202	Computer Aided Aircraft Drawing	0	0	4	0	2	IV
9	19ASP203	Internet of Things for Aerospace	0	0	4	0	2	IV
10	19AST301	Space Propulsion	3	0	0	0	3	V
11	19AST302	Flight Dynamics	3	0	0	0	3	V
12	19ASB301	Composites Materials and Structures	2	0	2	0	3	V
13	19ASB302	Finite Element Method for Aerospace	3	0	2	0	4	V
14	19ASP301	Aero Simulation Lab	0	0	4	0	2	V
15	19ASP302	Data Analytics in Aerospace	0	0	4	0	2	V
16	19ASB303	Aircraft Maintenance Engineering	3	0	2	0	4	VI
17	19ASB304	Computational Fluid Dynamics for Aerospace	3	0	2	0	4	VI
TOTAL			38	0	32	0	54	

5. PROFESSIONAL ELECTIVE COURSES (PEC)

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
		Professional Elective - I						
1	19ASE301	Fundamentals of Drone Technology	3	0	0	0	3	V
2	19ASE302	Aircraft Materials and Applications	3	0	0	0	3	V
3	19ASE303	Industrial Aerodynamics	3	0	0	0	3	V
4	19ASE304	Heat Transfer	3	0	0	0	3	V
5	19ASE305	Theory of Elasticity	3	0	0	0	3	V
		Professional Elective - II						

1	19ASE306	Theory of Vibrations and Aero elasticity	3	0	0	0	3	VI
2	19ASE307	Advanced Flight Dynamics	3	0	0	0	3	VI
3	19ASE308	High Temperature Materials	3	0	0	0	3	VI
4	19ASE309	Experimental Techniques	3	0	0	0	3	VI
5	19ASE310	Fatigue and Fracture Mechanics	3	0	0	0	3	VI
		Professional Elective - III						
1	19ASE401	Space Mechanics	3	0	0	0	3	VII
2	19ASE402	Rocket and Missiles	3	0	0	0	3	VII
3	19ASE403	Helicopter Theory	3	0	0	0	3	VII
4	19ASE404	Air Traffic Control & Planning	3	0	0	0	3	VII
5	19MEE312	Principles of Management	3	0	0	0	3	VII
		Professional Elective - IV						
1	19ASE405	Avionics	3	0	0	0	3	VII
2	19ASE406	Control Engineering	3	0	0	0	3	VII
3	19ASE407	Aircraft Microprocessor and Applications	3	0	0	0	3	VII
4	19ASE408	Cryogenic Engineering for Aerospace	3	0	0	0	3	VII
5	19MEE304	Total Quality Management	3	0	0	0	3	VII

6. OPEN ELECTIVE COURSES (OEC)

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
		Open Elective – I & III Offered to Other Dept students						
1	19ASO301	Basic Aeronautical Engineering	3	0	0	0	3	VI
2	19ASO302	Aircraft Systems and Engines	3	0	0	0	3	VI
3	19ASO303	Fundamentals of UAV	3	0	0	0	3	VII
4	19ASO304	Aircraft Communication and Navigation System	3	0	0	0	3	VII
		Open Elective – II Offered to Parent Program						
1	19ASZ301	Robotics & Automation in Space	2	0	0	0	2	VI
2	19ASZ302	Boundary Layer Theory	2	0	0	0	2	VI
3	19ASZ303	Orbital Mechanics	2	0	0	0	2	VI
		Open Elective – IV Offered to Parent Program						
1	19ASZ401	3D Printing for Space Components	2	0	0	0	2	VII
2	19ASZ402	Introduction To V/STOL and Ground Effect Machines	2	0	0	0	2	VII
3	19ASZ403	Introduction to Satellite Technology	2	0	0	0	2	VII

7. EMPLOYABILITY ENHANCEMENT COURSES(EEC)

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
1	19GEB101	Design Thinking and Innovation	1	0	0	4	3	I
2	19ASP101	Mini Project-I	0	0	0	2	1	II
3	19ASP201	Mini Project-II	0	0	0	2	1	III
4	19ASP204	Internship - I	2 Weeks				2	IV
5	19ASP303	Mini Project - III	0	0	0	2	1	V
6	19ASP304	Internship - II	2 Weeks				2	V
7	19ASP401	Project - I	0	0	0	4	2	VII
8	19ASP402	Project-II	0	0	0	24	12	VIII
TOTAL			1	0	0	38	24	

8. MANDATORY COURSES (UG)

Course Code	Course Title	L	T	P	J	C	Sem
19HST101	Induction Programme	3 Weeks					I
19HST102	Environmental Sciences	2	0	0	0	0	II
19HST103	Indian Constitution	2	0	0	0	0	I
19HST105	Essence of Indian Traditional Knowledge	2	0	0	0	0	V

One Credit Courses

S.No	Course Code	Courses Offered	L	T	P	J	C
1	19ASOC1	Aerospace colloquium	1	0	0	0	1
2	19ASOC2	Computing for Aerospace Engineers	1	0	0	0	1
3	19ASOC3	Non - Destructive Testing	1	0	0	0	1
4	19ASOC4	Design of Machine Elements	1	0	0	0	1
5	19ASOC5	Geometric Design & Tolerance	1	0	0	0	1
6	19ASOC6	Failure Analysis of Advanced Composites	1	0	0	0	1

- CO1** Know about Eigen values and Eigen vectors and its role in the system of equations.
- CO2** Transform the real symmetric matrix from quadratic form to canonical form by means of orthogonal transformation.
- CO3** Determine the radius, centre and circle of curvature of any curve.
- CO4** Expand the given function as series and locate the maximum and minimum for multivariate function and also using mathematical software.
- CO5** Solve the second order linear differential equations with various methods and apply them in some physical situations.

UNIT I PROJECTION OF POINTS, LINES AND PLANE SURFACES 3+12

Projection of points - Projection of straight lines located in the first quadrant -Determination of true lengths and true inclinations - Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT II PROJECTION OF SOLIDS 3+12

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method

UNIT III SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 3+12

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other -Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids -Prisms, pyramids, cylinders and cones.

UNIT IV PICTORIAL PROJECTIONS AND FREE HAND SKETCHING 3+12

Principles of isometric projection -isometric scale -isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method (Not for Examination).

Free hand sketching:

Representation of Three Dimensional objects -Need for importance of multiple views and their placement -First angle projection -layout views -Developing visualization skills through free hand sketching of multiple views from pictorial drawing.

UNIT V BUILDING DRAWING 3+12

Drawing of a plan, Elevation and sectioning of security room and residential building (Two bed rooms, kitchen, hall, etc.)

L : 15 T: 0 P: 60 J: 0 Total: 75 PERIODS

TEXT BOOKS

1. N.D. Bhatt and V.M. Panchal, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2016.
2. K. R. Gopalakrishnan, "Engineering Drawing" (Vol.I & II), Subhas Publications, 2014.

REFERENCES

- 1 K.V.Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2015.
- 2 M.S.Kumar, "Engineering Graphics", D.D. Publications, 2011.
- 3 K.Venugopal & V.Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 2014.
- 4 M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education, 2011.
- 5 K.L. Narayanan and P. Kannaiah, "Engineering Drawing" SciTech Publications, 2nd edition, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Sketch the projections of a points, straight lines and plane surfaces.
- CO2** Illustrate top view and front view of the solids
- CO3** Sketch sectioned views and develop area required.
- CO4** Demonstrate knowledge about isometric, perspective and orthographic projections
- CO5** Design simple buildings with detailed plan and sectional elevation.

19EET101	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	J	C
	(Common to all Non circuit branches)	3	0	0	0	3
UNIT I	ELECTRICAL CIRCUITS & MEASUREMENTS					9
Elementary concepts of electric circuits - Ohm's Law – Kirchoff's Laws – Introduction to AC Circuits – Peak value and RMS values – Power and Power factor Operating Principles of Moving coil and Moving iron instruments (Ammeters and Voltmeters), Dynamometer type wattmeter, Energy meter						
UNIT II	ELECTRICAL MACHINES					9
Construction, Principle of operation, Basic equations and applications of DC Generator, DC Motor- Elementary treatment of Single phase Transformer , Single and three phase Induction Motors						
UNIT III	WIRING, GROUNDING AND SAFETY					9
Wiring: General Rules, materials and accessories, Types of wiring - Conduit wiring – Wiring layout of Residential building, Grounding: Importance of grounding, Types of grounding - Safety: Causes of accidents, Accident prevention. Design of residential wiring using DT concept.						
UNIT IV	ANALOG ELECTRONICS					9
Construction, working principle and VI characteristics of Diode, Zener diode, BJT, MOSFET, Applications: Half wave and Full wave Rectifiers , Voltage regulators, UPS						
UNIT V	LINEAR AND DIGITAL ELECTRONICS					9
Ideal OP-AMP characteristics, Inverting and Non-inverting Amplifiers, Applications: summer, clipper and clamper Boolean Algebra-Theorems-Logic Gates - Half Adder and Full Adders - Flip flops, A/D and D/A Conversion (Any one concept)						
		L : 45	T: 0	P:0	J: 0	Total: 45 PERIODS

TEXT BOOKS

- 1 Muthusubramanian R, Salivahanan S, "Basic Electrical and Electronics Engineering", Tata McGraw Hill Publishers,(2009).
2. Bhattacharya. S.K, "Basic Electrical and Electronics Engineering", Pearson Education, (2017).

REFERENCES

- 1 V. Mittle "Basic Electrical Engineering", Tata McGraw Hill Publishers, (2017)
- 2 Mehta V K, Mehta Rohit, "Principles of Electrical Engineering and Electronics", S.Chand & Company Ltd, (2010)
- 3 Black & Decker , "The complete guide to Electrical Wiring" , S.Chand & Company Ltd,(2012)
- 4 Nagrath. I.J, "Electronics: Analog and Digital", Prentice Hall India Pvt. Ltd., (2013),
- 5 Mehta V K, Mehta Rohit, "Principles of Electronics", S.Chand & Company Ltd, (2005)

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Familiarize the elementary concept of electric circuits and measuring instruments
- CO2** Understand the construction , operation and applications of electrical machines
- CO3** Apply the concept of wiring and acquire the importance of grounding and safety
- CO4** Gain knowledge on electronic devices and its applications
- CO5** Acquire knowledge on basics of linear and digital electronics

UNIT I CORROSION AND ITS CONTROL 9

Corrosion: Classification- Chemical corrosion (Oxidation corrosion), Electrochemical corrosion-mechanism.-Corrosion control-Corrosion inhibitors- Cathodic protection (Sacrificial anodic protection, Impressed current cathodic protection) – Protective coating- Paint and Electroplating (Au)

UNIT II NANO CHEMISTRY 9

Basics-Distinction between nanoparticles and bulk materials-Top down and Bottom up approach- -Sol gel method-Chemical vapour deposition- -Types (Nano clusters, Nano rods, Nanotubes and Nanowires)-Application of nanomaterials.

UNIT III FUELS AND COMBUSTION 9

Fuels-types-Coal-Classification-manufacture of metallurgical coke by Otto-Hoffmann method-Petroleum -Synthetic petrol-Fischer and Bergius method- Knocking-Octane number and Cetane number - Gaseous fuels-Biogas, CNG and LPG.-Combustion- Calorific value-Gross and Net calorific value (Definition only) -Flue gas analysis by Orsat Apparatus.

UNIT IV WATER AND INSTRUMENTAL ANALYSIS 9

Water - Water quality parameters pH, TDS, chloride, sulphate, iron, fluoride, nitrate, BOD, COD and heavy metals - Hardness-Types - Water softening method -External treatment-Demineralization-Desalination – Reverse osmosis- Municipal water treatment - Principle and instrumentation of UV-Vis AAS and Flame photometry. (Block Diagram only).

UNIT V ALLOYS AND ENGINEERING MATERIALS 9

Alloys-classification - Ferrous alloys (Nichrome and stainless steel only)-Non-ferrous alloys (brass and bronze) Heat treatment of steel-Refractory bricks – Classification –Manufacture of refractory bricks-Glass – types of glasses- Soft glass, hard glass and pyrex glass - Manufacture of glass- Cement –Types –Portland cement-Chemical composition of Portland cement- Functions and Limitations of cement ingredients.

LIST OF EXPERIMENTS(ANY FIVE) 30

1. Estimation of alkalinity by indicator method
2. Determination of Total and permanent hardness by EDTA method
3. Estimation of DO by winkler's method
4. Determination of corrosion rate of mild steel by weight loss method
5. Synthesis of nanomaterials by wet chemical technique
6. Estimation of strength of iron by spectrophotometry
7. Separation of components by column chromatography technique
8. Estimation of copper in brass by EDTA method
9. Estimation of calcium in milk powder by EDTA method

10. Estimation of Iodine in common salt by Iodometry

L :45 T: 0 P: 30 J: 0 T:75 PERIODS

TEXT BOOKS

- 1 O.G.Palanna, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi.2017.
- 2 Wiley, "Engineering Chemistry", John Wiley & Sons, Inc, USA (2014]

REFERENCES

- 1 B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2009).
- 2 R. Sivakumar and N Sivakumar, "Engineering Chemistry" Tata McGraw-Hill, Pub.Co.Ltd. New Delhi.2009
- 3 Dr.Sivanesan and Nandagopal, "Engineering Chemistry-I" V.K.Pub.Pvt.Ltd. 2011.
- 4 P.C.Jain & Monicka Jain, "Engineering Chemistry", Dhanapat Rai Publishing Company Pvt.Ltd. 2017.
- 5 Engineering chemistry (NPTEL e-Web book) by B.L.Tembe, Kamaluddin and M.S.Krishnan

COURSE OUTCOMES :

At the end of the course student should be able to:

- CO1** Develop new strategy for protection of metals and to improve engineering design
- CO2** Design environmentally benign method for nanoparticle synthesis
- CO3** Acquire knowledge on various types of fuels and applications of engineering materials.
- CO4** Develop innovative and eco-friendly method for water purification .
- CO5** Develop analytical proficiency through lab skill sets to demonstrate in professional practice

SYNTAX & COMPREHENSIVE SKILLS**UNIT I FUNCTIONAL GRAMMAR 12**

Vocabulary building – (Word formation –Prefixes & Suffixes, root words, One word substitution) – Parts of speech - Tenses - Voice - Concord (Subject & Verb agreement) – Articles – Prepositions – Cause and Effect Expressions – ‘If’ Conditionals.

UNIT II READING 10

Reading techniques – SQ3R– Reading and understanding the Context - Cloze exercises – Reading & note-making –Transfer of information (bar chart, flowchart & Pie chart) – Reading and reviewing Books/Articles.

UNIT III WRITING 13

Syntax and Sentence construction - Permission letter (for Industrial Visit & In-plant training) - Expository writing – Discourse markers – Technical writing – (Recommendation – Report Writing) – Checklist.

UNIT IV AUDITORY AND ORATORICAL SKILLS LISTENING 10

Listening for general content – Listening for specific information - Listening to telephonic Conversation – Listening and note-taking – Listening and synthesizing information.

UNIT V ORAL COMMUNICATION 15

Greetings, Formal and informal introduction of self and others – Stress and Intonation – Word stress & Sentence stress – Describing an object or an event – Presentation skills(General topic) – Conversational skills – four types of speeches – Extempore, Manuscript, Impromptu, Memorized.

L : 30 T: 0 P:30 J: 0 Total: 60 PERIODS

TEXT BOOKS

- 1 Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2011.
- 2 Rizvi, Ashraf. M. Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2005.

REFERENCES

- 1 Muralikrishna, & Sunita Mishra. Communication Skills for Engineers. Pearson, New Delhi. 2011
- 2 Mitra K. Barun, “Effective Technical Communication – A Guide for Scientists and Engineers”, Oxford University Press, New Delhi, 2006.
- 3 Leo Jones, Richard Alexander, New International Business English, updated Edition, Cambridge University Press, NY, USA.
- 4 Smith—Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA.
- 5 Sharon J. Gerson, Steven M. Gerson, “Technical Writing – Process & Product”. 3rd Edition, Pearson Education (Singapore) (P) Ltd., New Delhi.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Use their active and passive vocabulary and construct basic sentence structures.
- CO2** Become active readers who comprehend ambiguity and complexity, and can articulate their own interpretations.
- CO3** Write effectively and flawlessly avoiding grammatical errors for a variety of professional and social settings.
- CO4** Make learners acquire listening skills in both formal and informal contexts.
- CO5** Exhibit their skills for effective communication in personal and official conversations/ situations.

19GEB101	DESIGN THINKING AND INNOVATION	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	1	0	0	4	3

UNIT I INTRODUCTION TO DESIGN THINKING 3+12

A brief insight to Design Thinking and Innovation- People Centered Design & Evoking the 'right problem'- Purpose of Design Thinking- Design Thinking Framework.

UNIT II PROCESS IN DESIGN THINKING (EMPATHY, DEFINE) 3+12

Design Thinking Process – Empathy – Uncovering and Investigating Community Concerns - Define: Examine and Reflect on the problem.

UNIT III CONCEPTING AND BUILDING (IDEA, CREATE) 3+12

Generating Ideas-Identifying top three ideas-Bundling the Ideas and create concepts-Rapid Prototyping

UNIT IV TESTING, REFINING AND PITCHING THE IDEAS 3+12

Importance & Testing the Design with People-Retest and Redefine Results-Creating a Pitch for the design.

UNIT V VALUE PROPOSITION DESIGN 3+12

Business Vs Startup-Briefing the Problem-Problem Validation and User Discovery- Challenge Brief.

L :15 T: 0 P: 0 J: 60 T:75 PERIODS

TEXT BOOKS

- 1 Robert A Curedale, Design Thinking Process & Methods 4th Edition, December 2017, Design Community College Inc.
- 2 Andrew Pressman, Design Thinking: A Guide to Creative Problem Solving for Everyone, First Edition, Nov 2018, Routledge.

REFERENCES

- 1 Idris Mootee, Design Thinking for Strategic Innovation - What They Can't Teach You at Business or Design School, First Edition, 2017, Wiley.
- 2 Yves Pigneur, Greg Bernarda, Alan Smith, Trish Papadakos Alex Osterwalder, Value Proposition Design: How to Create Products and Services Customers Want, 2015, Wiley.
- 3 Brown, Tim, and Barry Katz. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, 2009, Harper Business.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Learn new approach-design thinking—that enhances innovation activities in terms of market impact, value creation, and speed.
- CO2** Feel the Empathy and can define their problems based on the Community Concerns
- CO3** Strengthen their individual and collaborative capabilities to identify customer needs, create sound concept hypotheses, collect appropriate data, and develop a prototype that allows for meaningful feedback in a real-world environment
- CO4** Translate broadly defined opportunities into actionable innovation possibilities and recommendations for client organization
- CO5** Become an Entrepreneurs

19GEP101	WORKSHOP PRACTICES LABORATORY	L	T	P	C
	(Common to All B.E. / B. Tech. Courses)	0	0	4	2
	LIST OF EXPERIMENTS				
GROUP A (CIVIL & MECHANICAL)					30
CIVIL ENGINEERING					12
Study of plumbing tools and Components					
Preparation of threads in pipes					
Preparation of single and multi-tap connections for domestic					
Study of carpentry tools and its applications					
Preparation of Cross Lap and Dove Tail Joints.					
MECHANICAL ENGINEERING					18
Study of different types of Welding and its applications					
Preparation of Butt, Lap and Tee joints					
Study of sheet metal and its applications					
Preparation of Rectangular, Square Trays and Funnel					
Demonstration of Lathe and Drilling Operations					
Demonstration of Smithy and Foundry tools.					
GROUP B (ELECTRICAL AND ELECTRONICS)					30
ELECTRICAL ENGINEERING PRACTICE					18
Residential house wiring using switches, fuse, miniature circuit breaker, indicator, Lamp and energy meter.					
Fluorescent lamp wiring.					
Stair-case wiring.					
Measurement of electrical quantities –voltage, current, power & power factor in RL Circuit.					
Measurement of energy using single phase energy meter.					
Measurement of insulation resistance to earth of electrical equipment.					
Measurement of single and three phase voltages.					
Study of Iron Box, Emergency Lamp and Fan.					
ELECTRONICS ENGINEERING PRACTICE					12
Study of Electronic components and equipments –Resistor, color coding, measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.					
Verification of logic gates: AND, OR, Ex-OR and NOT.					
Generation of Clock Signal.					
Soldering practice –Components Devices and Circuits Using general purpose PCB.					
Characteristics of a PN Junction diode					
		L : 0	T : 0	P: 60	J: 0
		Total:60 PERIODS			

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Demonstrate plumbing system and Carpentry for the required applications.
- CO2** Relate the basic machining operations with engineering problems.
- CO3** Apply different types of Welding processes and Sheet metal processes for the Industrial applications.
- CO4** Illustrate Residential House wiring and simple wiring circuits.
- CO5** Employ knowledge on measuring electrical quantities and usage of energy meters.

STRUCTURE FOR STUDENT INDUCTION PROGRAM**STUDENT INDUCTION PROGRAM - PURPOSE & CONCEPT**

Purpose of the Student Induction Program is to help new students adjust and feel comfortable in the new environment, inculcate in them the ethos and culture of the institution, help them build bonds with other students and faculty members, and expose them to a sense of larger purpose and self exploration. The term induction is generally used to describe the whole process whereby the incumbants adjust to or acclimatize to their new roles and environment. In other words, it is a well planned event to educate the new entrants about the environment in a particular institution, and connect them with the people in it. Student Induction Program engages with the new students as soon as they come into the institution; regular classes start only after that. At the start of the induction, the incumbants learn about the institutional policies, processes, practices, culture and values, and their mentor groups are formed. Then the different activities start, including those which are daily.

Here is a list of activities:

- Physical Activity
- Creative Arts and Culture
- Mentoring & Universal Human Values
- Familiarization with College, Dept./Branch
- Literary Activity
- Proficiency Modules
- Lectures & Workshops by Eminent People
- Visits in Local Area
- Extra-Curricular Activities in College
- Feedback and Report on the Program

The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. These are included under Proficiency Modules.

There will be a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

DAILY ACTIVITY

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

PHYSICAL ACTIVITY

This would involve a daily routine of physical activity with games and sports. There would be games in the evening or at other suitable times according to the local climate. These would help develop team work besides health. Each student could pick one game and learn it for the duration of the induction program and hopefully, continue with it later.

CREATIVE ARTS

Every student would chose one skill related to the arts whether visual arts or performing arts. Examples are painting, music, dance, pottery, sculpture etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, flow into engineering design later.

MENTORING AND UNIVERSAL HUMAN VALUES

Mentoring and connecting the students with faculty members is the most important part of student induction. Mentoring takes place in the context and setting of *Universal Human Values*. It gets the student to explore oneself and experience the joy of learning, prepares one to stand up to peer pressure and take decisions with courage, be aware of relationships and be sensitive to others, understand the role of money in life and experience the feeling of prosperity. Need for character building has been underlined by many thinkers, universal human values provide the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but by getting the students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values.

The teachers must come from all the departments rather than only one department like HSS or from outside of the Institute. Experiments in this direction at IIT(BHU) are noteworthy and one can learn from them. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the

Induction program. Besides drawing the attention of the student to larger issues of life, it would build relationships between teachers and students which last for their entire 4-year stay and possibly beyond.

OTHER ACTIVITY

Activities that are not there on a daily basis, but are conducted for 3-4 days (typically in the afternoons) and change thereafter.

FAMILIARIZATION WITH COLLEGE, DEPARTMENT/BRANCH

The incoming students should be told about the credit and grading system, and about the examinations. They should be informed about how study in college differs from study in school. They should also be taken on a tour of the college and shown important points such as library, canteen, and other facilities. They should be shown their department, and told what it means to get into the branch or department. Describe what role the technology related to their department plays in society and after graduation what role the student would play in society as an engineer in that branch. A lecture by an alumnus of the Dept. would be very helpful in this regard. They should also be shown the laboratories, workshops and other facilities. The above should be done right in the first two days, and then over the afternoons thereafter, as appropriate.

LITERARY ACTIVITY

Literary activity would encompass reading a book, writing a summary, debating, enacting a play etc.

PROFICIENCY MODULES

The induction program period can be used to overcome some critical lacunas that students might have, for example, English, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially. We hope that problems arising due to lack of English skills, wherein students start lagging behind or failing in several subjects, for no fault of theirs, would, hopefully, become a thing of the past.

LECTURES & WORKSHOPS BY EMINENT PEOPLE

Lectures by eminent people should be organized, say, once a week. It would give the students exposure to people who are eminent, in industry or engineering, in social service, or in public life. Alumni could be invited as well. Motivational lectures about life, meditation, etc. by Ramakrishna Mission, Art of Living, Vivekananda Kendra's, S-VYASA, etc. may be organized. Workshops which rejuvenate or bring relief to students would also be welcome, such as, Art of Living workshops (3 sessions, 9 hours).

VISITS IN LOCAL AREA

A couple of visits to the local landmarks including historical monuments should be organized. This would familiarize the students with the area together with bonding with each other, like in a picnic. Visits should also be organized to a hospital, orphanage or a village. These would expose them to people in suffering or to different lifestyles. This might also sensitize them to engineering needs in these areas.

EXTRA-CURRICULAR ACTIVITIES IN COLLEGE

The new students should be introduced to the extra-curricular activities at the college university. They should be shown the facilities and informed about activities related to different clubs etc. This is when selected senior students involved in or leading these activities can give presentations, under faculty supervision.

FEEDBACK AND REPORT ON THE PROGRAM

Students should be asked to give their mid-program feedback. They should be asked to write their opinions about the program at the end of the first week or so. The feedback should be used to make any mid-course correction, if any. Finally, at the end of the program, each group (of 20 students) should be asked to prepare a single report on their experiences of the program. On the second last day, each group should present their report in front of other groups. Immediately after their presentation, they should submit their written report. This will also serve as a closure to the program. Finally, a formal written or online anonymous feedback should be collected at the end of the program.

UNIT I INTRODUCTION**6**

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

UNIT II STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT**6**

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III STRUCTURE AND FUNCTION OF STATE GOVERNMENT**6**

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

UNIT IV CONSTITUTION FUNCTIONS**6**

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries – Assessment of working of the Parliamentary System in India.

UNIT V ELECTION COMMISSION**6**

Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

L :30 T: 0 P: 0 J: 0 T:30 PERIODS**TEXT BOOKS**

- 1 Durga Das Basu, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi.
- 2 R.C.Agarwal, "Indian Political System", S.Chand and Company, New Delhi. (1997)

REFERENCES

- 1 Maciver and Page, "Society: An Introduction Analysis", Mac Milan India Ltd., New Delhi.
- 2 K.L.Sharma, "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi. (1997)
- 3 Sharma, Brij Kishore, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi.
- 4 U.R.Gahai, "Indian Political System", New Academic Publishing House, Jalaendhar.
- 5 R.N. Sharma, "Indian Social Problems", Media Promoters and Publishers Pvt. Ltd.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand the functions of the Indian government
- CO2** Know the structure and functioning of central government.
- CO3** Understand functioning of Indian constituent.
- CO4** Analyze the functions of the Indian government
- CO5** Summarize the functioning of election commission.

SEMESTER II

19ITT101	PROGRAMMING IN C AND DATA STRUCTURES	L	T	P	J	C
	(Common to Aero, Agri, Auto, Civil, FT, Mech, MCT)	3	0	0	0	3
UNIT I	INTRODUCTION TO C					8
Basic blocks of computers – Algorithm, Pseudo code, Flowchart - Structure of C program- Data types - Variables - Constants, Operators - Input and Output Statements						
UNIT II	DECISIONS STATEMENTS AND FUNCTIONS					11
Decision making and Branching statements - Looping statements, Functions, Call by value, Call by reference						
UNIT III	ARRAYS AND INTRODUCTION TO DATA STRUCTURES					10
Arrays - One dimensional arrays - Two dimensional Arrays - Structures – Pointers Introduction to Data structures - Types of Data structures - ADT						
UNIT IV	STACK AND QUEUE					9
Stack ADT - Queue ADT - Array implementation of Queue and Stack ADT - Infix to Postfix conversion - Postfix expression evaluation						
UNIT V	TREES					7
Trees - Binary Tree - Binary Search Tree - Insertion and Deletion Operation - Tree Traversal						
L : 45 T: 0 P:0 J: 0 Total: 45 PERIODS						

TEXT BOOKS

- 1 Kamthane Ashok, "Programming in C, Pearson Education India 3/e, 3rd Edition, 2015.
- 2 Aaron M. Tenenbaum, Yedidyah Langsam, Moshe Augenstein, "Data Structures Using C", Prentice-Hall of India, 2003

REFERENCES

- 1 A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, 2nd Edition, 2007. (Unit III-V)
- 2 A. M. Tenenbaum, Y. Langsam and M. J. Augenstein, "Data Structures using C", Pearson Education, 2nd Edition, 1998.(Unit III-V)
- 3 E. Balagurusamy, "Fundamentals of Computing and Computer Programming", Tata McGraw-Hill Publishing Company Limited, (2011). (UNIT I, II)

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand and describe the role of front-end development in modern web applications
- CO2** Act like a professional front-end developer.
- CO3** Able to analyze problems, seek for needed information, apply a solution, verify it
- CO4** See the alternative ways for creating a front-end
- CO5** Able to discuss and take into use more front-end technologies.

UNIT I BASICS & STATICS OF PARTICLES**9+3**

Introduction -Units and Dimensions -Vectorial representation of forces and moments -Coplanar Forces -Laws of Mechanics -Lame's theorem, Parallelogram and triangular Law of forces - Resolution and Composition of forces -Equilibrium of a particle - Principle of transmissibility - Single equivalent force - Free body diagram

UNIT II EQUILIBRIUM OF RIGID BODIES**9+3**

Types of supports and their reactions -requirements of stable equilibrium -Moments and Couples- Moment of a force about a point and about an axis -Vectorial representation of moments and couples - Scalar components of a moment -Varignon's theorem -Equilibrium of Rigid bodies in two dimensions -Forces in space -Equilibrium of a particle in space - Equivalent systems of forces - Equilibrium of Rigid bodies in three dimensions -Examples

UNIT III PROPERTIES OF SURFACES AND SOLIDS**9+3**

Determination of centroid of areas, volumes and mass - Pappus and Guldinus theorems - moment of inertia of plane and areas- Parallel axis theorem and perpendicular axis theorem, radius of gyration of area- product of inertia- mass moment of inertia.

UNIT IV DYNAMICS OF PARTICLES**9+3**

Displacements, Velocity and acceleration, their relationship - Relative motion -Curvilinear motion - Newton's law -Work Energy Equation of particles -Impulse and Momentum -Impact of elastic bodies.

UNIT V FRICTION AND RIGID BODY DYNAMICS**9+3**

Friction force - Laws of sliding friction - equilibrium analysis of simple systems with sliding friction - wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies - Velocity and acceleration - General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

L : 45 T: 0 P: 15 J: 0 Total: 60 PERIODS**TEXT BOOKS**

1. Ferdinand P.Beer, E.Russell Johnston Jr "Vector Mechanics for Engineers", 11th Edition, McGraw-Hill Education, (India) Pvt Ltd, 2016.
2. J.L.Meriam & L.G. Karidge, "Engineering Mechanics: Dynamics", 8th edition, Wiley student edition, 2016.

REFERENCES

- 1 Vela Murali, "Engineering Mechanics", Oxford University Press ,2010
- 2 D.P.Sharma "Engineering Mechanics", Dorling Kindersley (India) Pvt. Ltd, New Delhi,2010.
- 3 Dr.I.S Gujral "Engineering Mechanics",Second edition, , Lakshmi Publication (P).Ltd,2011.
- 4 Arthur P.Boresi and Richard J.Schmidt, "Engineering Mechanics : Statics and Dynamics",Thomson Asia Private Limited, Singapore, 2010.
- 5 Hibbeller, R.C., "Engineering Mechanics", 14th edition, Prentice hall ,2016.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Recognize the basics of equilibrium of particles in 2D and 3D
- CO2** Review the requirements of equilibrium of rigid bodies in 2D and 3D
- CO3** Compute the center of mass and moment of inertia of surfaces and solids
- CO4** Predict displacement, velocity and acceleration of dynamic particles
- CO5** Solve for friction force and rigid body dynamics

19AST101	INTRODUCTION TO AEROSPACE ENGINEERING	L	T	P	J	C
		3	0	0	0	3
UNIT I	HISTORY OF FLIGHT					9

Balloon, Ornithopters – History and Types of Aircraft– Biplanes and monoplanes - Major components of an airplane – Helicopter and their functions – Developments in aerodynamics – Aircraft materials – Structures and propulsion over the years – Case study on Boeing Aircraft.

UNIT II	SPACE VEHICLES	9
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International Standard Atmosphere – History of spaceflight – configuration of space vehicle – Gravitational field on space vehicle - Mach number – bluff bodies v/s streamlined body – Airfoil – Aerodynamic forces, pressure – Lift and drag generation.

UNIT III	GAS DYNAMICS	9
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Gas dynamics – Theory of propulsion – Operating principles of piston engines – Illustration working of gas turbine engine – characteristics of turboprop, turbofan and turbojet – Actual and theoretical PV diagrams – Thrust equation – Thrust augmentation – spacecraft's and aircraft performance.

UNIT IV	MATERIALS OF AIRCRAFT	9
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Structural layout of Aircraft – Wing Structure – Fuselage Structure –Sandwich structure – Reinforced and honeycomb structures – Aerospace materials – Metallic and non metallic materials – Composite materials – Case study on ASTM materials.

UNIT V	AIRCRAFT INSTRUMENTATION	9
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Electronics instrumentation – Sensing devices – Computer based optical devices – Measurements in aerodynamics – Principles of navigation – Navigational and guidance requirements for orbital – planetary – RADAR - SONAR.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

1. Pallet, E.H.J., “Aircraft Instruments & Principles”, Pitman & Co 1933.
2. Richard S. Shevell, “Fundamentals of Flight”, Pearson Education, 2nd Edition – 2004.

REFERENCES

1. Kermode, A.C., “Flight without Formulae”, McGraw Hill, 1997.
2. Rolls Royce, "Jet Engine", 5th Edition, Rolls Royce Technical Publications, 2005.
3. Klaus Hunecke, “Jet Engines – Fundamentals of theory, design and operation”, 1st Edition, the Corkwood Press Ltd, 2010.
4. S.M.Yahya “Turbines, Compressors and Fans” Tata McGraw Hill Education Pvt Ltd 4th Edition, 2015.
5. Robert D.Zucker ,Oscar Biblarz, “Fundamentals of Gas Dynamics” 2nd Edition ,John Wiley & Sons Inc, Print 2011.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the history of aircraft & developments over the years.
- CO2** Understand the types & classifications of components and configuration of spaceflight.
- CO3** Understand the basic concepts of propulsion and power plants.
- CO4** Understand the types of fuselage, constructions and materials.
- CO5** Understand the different types of navigation and instruments for flight.

19MAB102	INTEGRAL CALCULUS & LAPLACE TRANSFORMS	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	3	0	2	0	4
UNIT I	MULTIPLE INTEGRALS					9
Double integration (Cartesian co-ordinates) – Change of order of integration – Applications of double integral (Area) – Triple Integration (Cartesian co-ordinates) – Applications: Volume as triple integrals and solids of revolution.						
UNIT II	VECTOR CALCULUS					9
Derivatives: Gradient of a scalar field. Directional derivative – Divergence of a vector field – Curl of a vector field – Solenoidal and Irrotational of a vector – Theorems in divergence of Gauss, Stoke's and Greens (statements only) – Verification of theorem.						
UNIT III	COMPLEX VARIABLES					9
Derivatives of $f(z)$ – Analytic function – Cauchy-Riemann Equations – Harmonic function – Harmonic conjugate – Construction of Analytic function – Conformal Mapping – Conformality of $w = z + c$, cz , $1/z$ – Mobius transformations – Application to flow problems.						
UNIT IV	COMPLEX INTEGRATION					9
Cauchy's integral theorem – Cauchy's integral formula – Taylor's series – Zeros of an analytic function – singularities – Laurent's series – Residues – Cauchy Residue theorem.						
UNIT V	LAPLACE TRANSFORMS					9
Conditions – Transforms of elementary functions – Properties - Transform of derivatives and integrals – Unit step function (Heaviside function) –Dirac's Delta function – Laplace transform of periodic functions – Inverse Laplace transforms - Convolution theorem – Partial fraction method – Applications to solution of linear ordinary differential equations of second order with constant coefficients – Simultaneous linear equations with constant coefficients.						
List of SCILAB / MATLAB Programmes:						30
1. Introduction to SCILAB / MATLAB.						
2. Determining the roots of polynomial equations.						
3. Basic integration problems.						
4. Evaluating double & triple integrals.						
5. Calculating area using double integration.						
6. Calculating volume – Simple problems.						
7. Curve fitting.						
8. Graph with 2D & 3D plots.						

L : 45 T: 0 P:30 J: 0 Total: 75 PERIODS

TEXT BOOKS

- 1 B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2015.
- 2 Dennis G.Zill and Michael P. Cullen, Advanced Engineering Mathematics, 2nd Edition, CBS Publishers, 2012.

REFERENCES

- 1 Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2018.
- 2 G.B.Thomas, Calculus, 12th Edition, Pearson Education India, 2015.
- 3 T.Veerarajan, Engineering Mathematics, 3rd Edition, Tata McGraw-Hill, 2011.
- 4 N.P. Bali and Manish Goyal A, Advanced Engineering Mathematics, 7th Ed, Laxmi Publications, 2010.
- 5 Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill, 2017.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Evaluate area and volume in Cartesian coordinates using double and triple integrals and also using mathematical software.
- CO2** Evaluate gradient, divergence and curl and solve engineering problems involving cubes, rectangular parallelepipeds by applying various integral theorems. Apply mathematical software to find gradient, divergence and curl.
- CO3** Test the analyticity, construct the analytic function and transform complex functions from z -plane to w -plane graphically by using conformal mapping.
- CO4** Evaluate real and complex integrals over suitable closed path using various integral theorems.
- CO5** Apply Laplace transform techniques, transform functions in time domain to frequency domain and solve ordinary differential equation by using mathematical software.

UNIT I CRYSTAL PHYSICS**9**

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures.

UNIT II QUANTUM PHYSICS**9**

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jean's Law from Planck's theory – Compton effect. Theory and experimental verification – Properties of Matter waves – G.P Thomson experiment-Physical significance of wave function - Schrödinger's wave equation – Time independent and time dependent equations– Particle in a one dimensional box –Electron microscope-Tunnelling electron microscope.

UNIT III ELASTICITY**9**

Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT IV NON-DESTRUCTIVE TESTING**9**

Introduction- Types of defects-Methods of NDT-Visual inspection- Liquid/Dye penetrant testing- Magnetic particle testing-Eddy current testing- Ultrasonic inspection method-Advantages-X-Ray radiography- X-ray fluoroscopy-Comparison of conventional and real time radiography.

UNIT V VACUUM TECHNOLOGY**9**

Introduction-Units of Vacuum- Vacuum ranges- Production of Vacuum- Classification of Vacuum pumps-Rotary Oil pumps-Diffusion oil pump-turbomolecular pump-cryopumps-Vacuum gauges-thermocouple gauge- vacuum technology-Application of vacuum-High vacuum systems- Thin film deposition.

LIST OF EXPERIMENTS(ANY FIVE)

1. Determination of Young's modulus of the material – uniform bending.
2. Tensional Pendulum - determination of rigidity modulus of wire and moment of inertia of disc.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
4. Determination of viscosity of liquid – Poiseuille's method.
5. Determination of thickness of a thin wire – Air wedge method.
6. Determination of Band gap of semiconductor material.

L :45 T: 0 P: 30 J: 0 T: 75 PERIODS**TEXT BOOKS**

- 1 Gaur R.K. And Gupta S.L., "Engineering Physics", Dhanpat Rai publishers, 2013
- 2 Dr.M.N.Avandhanulu, Dr.P.G.Kshirsagar, "A Text book of Engineering Physics", S.Chand,

REFERENCES

- 1 Rajendran.V, Engineering Physics,Tata Mcgraw-Hill Publishing Company Limited, New Delhi.2017
- 2 Engineering Physics, Wiley, 2013
- 3 A.S.Vasudeva, "Modern Engineering Physics", S.Chand, 2001
- 4 B.K.Pandey Chaturvedi, "Engineering Physics", Cengage Learning, 2012
- 5 Charles Kittel, "Solid State Physics", Wiley(2009),

COURSE OUTCOMES :

At the end of the course student should be able to:

- CO1** Understand the properties of the crystalline materials.
- CO2** Understand the basics of quantum mechanics
- CO3** Analyze the elastic properties of the materials.
- CO4** Understand various Non-Destructive testing methods.
- CO5** Understand various Non-Destructive testing methods.

19ENP101	PROFESSIONAL COMMUNICATION	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	0	0	4	0	2
UNIT I	INTRODUCTION TO COMMUNICATION					10
Introduction to communication, The process of communication, Barriers to communication – Verbal & Nonverbal communication, Body language.						
UNIT II	READING AND LISTENING SKILLS					10
Reading and Summarizing – Precis writing – Phrase Reading – Listening to TED Talks – Listening to conversations.						
UNIT III	PROFESSIONAL WRITING					10
Resume & cover letter – Proposal writing (Project/Business proposal) - Business Letter (Quotations, Clarification, Placing orders & Complaint letter).						
UNIT IV	SPEAKING					15
Persuasive Speaking – Public Speaking – Negotiation Skills – Telephone Etiquettes – Group Discussion - Team building – Interview skills.						
UNIT V	SOFT SKILLS					15
Time Management - Stress Management – Inter & Intra personal skills – Professional ethics - Professional Networking & Social Skill.						
		L : 0	T: 0	P:60	J: 0	Total: 60 PERIODS

TEXT BOOKS

- 1 Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2011.
2. Professional Communication - Aruna Koneru—Oxford University Press, New Delhi.

REFERENCES

- 1 A Modern Approach to Verbal and Non-verbal Reasoning-R.S.Agarwal- S.Chand & Co., New Delhi.
- 2 Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA. 2007.
- 3 Mitra K. Barun, “Effective Technical Communication – A Guide for Scientists and Engineers”, Oxford University Press, New Delhi, 2006.
- 4 Jeff Butterfield, “Soft skills for everyone”, Cengage Learning, New Delhi, 2011.
- 5 Leo Jones, Richard Alexander, New International Business English, updated Edition, Cambridge University Press, NY, USA.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Perceive the importance of verbal and non-verbal communication in the professional world along with its uses.
- CO2** Develop reading skills and listening skills by familiarizing them with different strategies.
- CO3** Acquire letter writing skills for effective communication both in formal and informal situations.
- CO4** Speak clearly, confidently, comprehensively, and communicate with one or many listeners using appropriate communicative strategies.
- CO5** Face the challenges of the globalized world with confidence and with the best communicative skills.

19ITP101

**PROGRAMMING IN C AND DATA
STRUCTURES LABORATORY**
(Common to Aero, Agri, Auto, Civil, FT, Mech, MCT)

L	T	P	J	C
0	0	4	0	2

LIST OF EXPERIMENTS

1. Algorithms and Flow Chart
 - i) Sequential
 - ii) Branching and Looping
2. Operators & Expressions
 - i) Arithmetic
 - ii) Logical
 - iii) Relational
3. Condition Statements
 - i) Nested if else
 - ii) Else-if Ladder
4. Looping
 - i) For
 - ii) While
 - iii) Do-while
5. Functions
 - i) With and without arguments
 - ii) With and without return type
 - iii) Call by value and Call by reference
6. Arrays
 - i) Searching element in one dimensional array
 - ii) Matrix multiplication
7. Structures
8. Pointers
9. Implementation of Stack ADT
10. Implementation of Queue ADT
11. Implementation of Tree Traversal
12. Implementation of Binary Search Tree ADT

L:0 T: 0 P: 60 J: 0**Total:60 PERIODS****HARDWARE / SOFTWARE****(For a Batch of 30 Students)**

- | | |
|-----------------|---|
| Hardware | <input type="checkbox"/> 30 PCs with Processor-2.0 GHz or Higher
<input type="checkbox"/> RAM-1 GB or Higher
<input type="checkbox"/> Hard disk-20 GB or Higher |
| Software | <input type="checkbox"/> TURBO C version 3 (or) GCC version 3.3.4
<input type="checkbox"/> OS-Windows 2000/Windows XP/NT |

COURSE OUTCOMES

At the end of the course students should be able to

- | | |
|------------|--|
| CO1 | Develop algorithm and draw flow chart to solve problem. |
| CO2 | Write simple programs using basic concepts and control statements in C language. |
| CO3 | Write programs using arrays, structures and pointers. |
| CO4 | Implement stack and queue data structure. |
| CO5 | Implement binary search tree ADT. |

Guidelines

1. The scope of the project work is to enable the students in convenient groups (not more than 4 members) involving theoretical and experimental studies through Design Thinking approach.
2. The aim of the project work is to deepen comprehension of principles by applying them to a new problem based on the courses such as Engineering Drawing, Basics of Electrical and Electronics Engineering, Chemistry for Engineers, Design Thinking and Innovation, Workshop Practices Laboratory, Engineering Mechanics, Principles of Flight, Physics for Engineers studied by the students in the first year of study but not limited to.
3. Project periods shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.
4. Create a model/fabricate a model/conduct experiment/simulate mechanical system/implement the same. Analyze data, evaluate the results and conclude the appropriate solution, suggestion for feature work.
5. The continuous assessment shall be made according to the regulation which is tabulated below.
6. The progress of the project is evaluated based on a minimum of two reviews.
7. The review committee may be constituted by the Head of the Department
8. Each student shall finally produce a comprehensive report covering background information, empathy, problem statement, project work details, result and conclusion.
9. This final report shall be typewritten form as specified in the guidelines.

L : 0 T: 0 P: 0 J: 30 Total: 30 PERIODS

UNIT I ECOSYSTEM

6

Ecosystem- Foodchains, Foodwebs and Ecological pyramids - (a) Forest ecosystem (b) Aquatic ecosystems (Ponds & Oceans).

Field study of simple ecosystems– pond, river, hill slopes.

UNIT II BIODIVERSITY

6

Introduction to biodiversity– Values of biodiversity– threats to biodiversity–endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds, etc.,

UNIT III ENVIRONMENTAL POLLUTION

6

Definition–causes, effects and control measures of:(a) Air pollution(b) Water pollution (c) Soil pollution (d) Noise pollution (e) Nuclear hazards.

Field study of local polluted site–Urban/ Rural / Industrial/ Agricultural.

UNIT IV ENERGY RESOURCES

6

Introduction – (a) Solar energy (b) Wind energy (c) Tidal energy (d) Geothermal energy (e) Nuclear Energy

Field study of local area.

UNIT V ENVIRONMENTAL MANAGEMENT

6

Sustainable development - Role of information technology in environment and human health – environmental protection Acts -Solid waste management and Rain water harvesting - E -waste and Concepts of Green Chemistry-Radiation hazards- Case studies.

L :30 T: 0 P: 0 J: 0 T: 30 PERIODS

TEXT BOOKS

- 1 Dr.A.Ravikrishnan, “Environmental Science & Engineering” Sri Krishna Hitech Pub.Co.Pvt.Ltd.2013
- 2 Benny Joseph, “Environmental Science & Engineering” Tate McGraw-Hill Pub.Co.Ltd, New Delhi.2009

REFERENCES

- 1 G.Tyler Miller, “Environmental Science” Cengage Learning India Pvt.Ltd.New Delhi.2011
- 2 Dr.DebangSolanki, “Principles of Environmental Chemistry” Prateeksha Pub. Jaipur.2011.
- 3 Gilbert M. Masters and Wendell. P.Ela, “Introduction to Environmental Engineering and Science” PHI Learning Pvt. Ltd. New Delhi.2010
- 4 Deeksha Dave and S.S. Katewa, “Environmental Science & Engineering” Learning India Pvt.Ltd.New Delhi.2011
- 5 Benny Joseph “Environmental Science & Engineering” Tata McGraw-Hill Pub.Co.Ltd, New Delhi. 2009

COURSE OUTCOMES :

At the end of the course student should be able to:

CO1 Gain basic knowledge of Ecosystem.

CO2 Understand the role and conservation of biodiversity

CO3 Gain competency in solving environmental issues of pollution

CO4 Adopt the methodologies in find the changes in renewable energy

CO5 Understand the development and improvement in standard of living has led to serious Environmental management.

SEMESTER III

19MAT201	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	3	0	0	0	3

UNIT I FOURIER SERIES **9**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORMS **9**

Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS **9**

Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second order with constant coefficients (Homogeneous Problems).

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **9**

Classification of partial differential equations -Solutions of one dimensional wave equation – One dimensional equation of heat Conduction – Steady state solution of two-dimensional equation of heat conduction (Excluding Infinite plate & Insulated edges).

UNIT V Z -TRANSFORMS **9**

Z-transforms – Elementary properties – Inverse Z - Transform – Convolution theorem –Formation of difference equation –Solution of difference equations using z-transforms.

L : 45 T:0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Grewal, B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2017.
2. Ramana, B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2014.

REFERENCES

- 1 Bali, N.P. and Manish Goyal, "A Textbook of Engineering Mathematics", Fifth Edition, Laxmi Publications (P) Ltd., 2014.
- 2 Glyn James, "Advanced Modern Engineering Mathematics", Fourth Edition, Pearson Education, 2013.
- 3 Erwin Kreyszig, "Advanced Engineering Mathematics", Tenth Edition, Wiley India, 2015.
- 4 Dr. Sanjay Sharma., "Signals and Systems", S.K.Kataria & Sons, Publisher of Engineering & Computer Books, New Delhi, 2012.
- 5 Whlie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics" Tata Mcgraw Hill Education Pvt.Ltd, 6th Edition, New Delhi, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- CO2** Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
- CO3** Form partial differential equations and solve certain types of partial differential equations.
- CO4** Know how to solve one dimensional wave equation, one dimensional heat equation and two dimensional heat equation in steady state using Fourier Series.
- CO5** Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

UNIT I BASIC CONCEPT AND FLOW PROPERTIES**9**

Fluid Units and dimensions - Properties of fluids - Incompressible flows- Compressible flows - Hydrostatics- Buoyancy, forces on submerged bodies- Pressure measurements by Manometers and pressure gauges-Kinematics of fluid flow

UNIT II DIMENSIONAL ANALYSIS AND SIMILITUDE**9**

Need for dimensional analysis - Methods of dimensional analysis - Similitude - Dimensionless parameters – Types of forces acting on a moving body- Application of dimensionless Parameters- Non Dimensional numbers – Scale effect in Model study - Model analysis

UNIT III FLOW OVER FLAT PLATE AND FLOW THROUGH CIRCULAR CONDUITS**9**

Hydraulic and energy gradient - Laminar flow through circular conduits and circular annuli - Boundary layer concepts -Types of boundary layer thickness -Darcy Weisbach equation –Friction factor - Commercial pipes - Minor losses -Flow through pipes in series and parallel.

UNIT IV TURBINES & PUMPS**9**

Classification of turbines - Velocity triangles - Working principles - Draft tube - Specific speed - Impact of jets - Centrifugal pumps - work done by the impeller - Reciprocating pump

UNIT V ONE DIMENSIONAL AND TWO DIMENSIONAL FLOWS**9**

Dynamics of fluid flow and its equations - Velocity of sound - Adiabatic steady state flow Equations - Flow through converging, diverging passages - Basic flows - Their combinations - Kutta Joukowski 's theorem - D'Alembert Paradox - Magnus effects.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

1. White, Frank M. Fluid Mechanics. 8th ed. McGraw-Hill, 2017. ISBN: 9780077422417
2. K Som, G Biswas, Suman Chakraborty, Introduction to Fluid Mechanics and Fluid machines, Tata McGraw Hill Edition, 2017

REFERENCES

1. A Textbook of Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Lakshmi Publications Pvt. Limited, New Delhi, 2010.
2. Bruhn E F, "Analysis and Design of Flight Vehicle Structures", Tri-State Off-set Company, USA, 1985.
3. Kumar, K.L., "Engineering Fluid Mechanics", 8th Edition, S. Chand, New Delhi, 2008.
4. William A Nash, "Strength of Materials". Tata McGraw Hill, 2008
3. Munson, Bruce R., Young, Donald F., Okiishi, Theodore H., Huebsch, Wade W. "Fundamentals Of Fluid Mechanics", Seventh Edition, John Wiley & Sons, Inc. 2016
4. John J.Bertin,"Aerodynamics for Engineers" Fourth Edition, Pearson Education Inc.
5. A textbook by L.J.Clancy,"Aerodynamics" Sterling Book

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Analyze the statically determinate and indeterminate structures.
- CO2** Analyze the columns with different end conditions.
- CO3** Describe the stresses and possible modes of failure of the structures subjected to external loads.
- CO4** Ability to apply knowledge of science and engineering principles to solve Aeronautical engineering problems.
- CO5** Ability to design and conduct experiments as well as Analysis and interpret experimental data.

19AST202	AIRCRAFT PRODUCTION TECHNOLOGY	L	T	P	J	C
		3	0	0	0	3
UNIT I	METAL CASTING & JOINING PROCESSES					9

General principles of various Casting Processes – Sand casting - die-casting - centrifugal casting - investment casting and shell molding types. Defects and remedies. Temporary & permanent joints – riveting process - arc welding - gas welding, resistance welding, Laser welding, Electron Beam welding, Soldering and brazing techniques testing - defects & remedies

UNIT II	METAL FORMING & MACHINING PROCESSES	9
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Metal forming – punching – blanking – shearing - super plastic forming and diffusion bonding - Bending - stretch forming, spinning, drawing- sheet metal development – nesting –defects in sheet metal Material Removal Processes: General Principles and working of milling, turning, grinding and drilling processes- cutting tools & accessories - CNC machining and programming. Case studies on Machining of aerospace components.

UNIT III	POWDER METALLURGY AND UNCONVENTIONAL MACHINING	9
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Powder metallurgy in Aerospace – Process – finishing methods advantages and applications Principles of working and applications of Mechanical Energy Process-Ultrasonic Machining, water and Abrasive jets, Electrochemical Machining process -Electrochemical Machining, Electrochemical Deburring and Grinding, Thermal Energy process -Electric Discharge process, Electron Beam Machining, Laser beam Machining. Case studies on Application of powder metallurgy and non – conventional machining process in aerospace

UNIT IV	ADDITIVE MANUFACTURING IN AEROSPACE	9
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Rapid Prototyping & Tooling - Additive manufacturing – concept – slicing – format - classification – liquid based methods: SLA – Powder based methods: SLS, 3D printing – filament-based methods: FDM – DFAM- Additive manufacturing materials - Additive manufacturing applications in aerospace – Generative design – Software in AM - current trends. Case studies on AM applications in Aerospace Industry

UNIT V	HEAT TREATMENT – SURFACE ENGINEERING - INSPECTION	9
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Iron carbon diagram – tempering – annealing - Heat treatment of Aluminum alloys - titanium alloys, steels - case hardening. Surface engineering - Corrosion prevention, protective treatment for aluminum alloys, steels, anodizing of titanium alloys, organic coatings -CVD & PVD process - thermal spray coatings – high temperature materials for aerospace application NDT and Other Inspection Techniques: Dye Penetrant Test, X-ray, magnetic particle and ultrasonic testing. Acoustic holography. Case studies on surface treatments for aerospace bodies

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

1. Kalpakjian, S., “Manufacturing Engineering and Technology”, Pearson education India, 4th edition, 2018.
2. Ian Gibson David Rosen, Brent Stucker, Mahyar Khorasani, “Additive Manufacturing Technologies” 2020.

REFERENCES

1. P. N. Rao, Manufacturing Technology Vol I & II Tata-McGraw-Hill Publishing Ltd, 2018.
2. Chua, C K., Leong, K F and Lim, C S., “Rapid Prototyping: Principles and Applications”, John Wiley, New York, 2003.
3. P. N. Rao, “Manufacturing Technology, Metal cutting and Machine Tools”, Tata McGraw Hill, 2000.
4. Sharma, P.C., A textbook of Production Technology – Vol I and II, S. Chand & Company Ltd., New

Delhi, 1996.

5. Jain. R. K., Production Technology, Khanna Publishers, New Delhi, 2001.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Appreciate the various production processes involved in making of the components of Aeronautical and Aerospace industry.
- CO2** Identify the defects, errors and their remedies.
- CO3** Identify the various metal working methods and their applications to aero industry.
- CO4** Appreciate the advantage of using Additive Manufacturing processes in the manufacture of aero components.
- CO5** Comprehend the various heat treatment methods and the importance of surface roughness

UNIT I QUANTITATIVE ABILITY I**8**

Number theory- Shortcuts, Divisibility rule- Unit place deduction-LCM &HCF, Square root and Cube Root, Decimal & Fraction Percentage, Profit, loss and discount, Simple and compound interest, Ratio & Proportions, Mixtures & Allegation, Partnership.

UNIT II QUANTITATIVE ABILITY II**6**

Problems on Ages, Average, Clocks, Calendar, Data Interpretation- Bar chart- Pie chart- Line chart- Tables chart.

UNIT III VERBAL REASONING I**7**

Analytical reasoning– Linear and circular arrangement, Blood relation, Direction Problems, Puzzles. Logical reasoning - Number and Alpha series, Odd man out, Element series and Logical series, Coding and decoding, Analogy, Classification, Logical sequence of words.

UNIT IV LINGUISTICS SKILLS I**6**

Parts of Speech- Noun, Verb, Participle, Articles, Pronoun, Preposition, Adverb, Conjunction. Logical sequence of words, Tense & Voice, Comparison.

UNIT V LINGUISTICS SKILLS II**3**

Comprehension - Comprehend and understand a paragraph, Paragraph writing.

L :30 T: 0 P: 0 J: 0 T: 30 PERIODS

TEXT BOOKS

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 John Eastwood, "Oxford Practice Grammar", Oxford.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited.
- 3 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO 1** Apply the number system for solving application orientated concepts in quantitative aptitude.
- CO 2** Apply the financial ability for solving application orientated concepts in quantitative aptitude and in the data interpretation techniques.
- CO 3** Analyze the analytical reasoning and logical reasoning in verbal aptitude applications.
- CO 4** Apply appropriate grammar in both speaking and writing.
- CO 5** Analyze the given content and write a creative content.

UNIT I AXIAL DEFORMATION OF BARS**9+6**

Rigid bodies and deformable bodies – Strength, stiffness and stability – Normal stress and normal strain - Shear stress and shear strain – Hooke's law - Axial deformation of prismatic bar - Stepped bar – Tapered bar – Determinate and indeterminate bars – Poisson's ratio - Mechanical properties of materials - Elastic constants and their relationships – Factor of safety.

Lab Experiments:

- Tension test on mild steel specimen using Universal Testing Machine
- Verification of Lami's theorem.

**UNIT II BEAMS – SHEAR FORCE AND BENDING MOMENT –
SYMMETRIC BENDING****9+6**

Types of beams, loads and reactions – Determinate beams: Cantilever, Simply supported and Overhanging beams - Shear force diagram and Bending moment diagram – Relationship among loads, shear forces and bending moments – Symmetric bending – Bending normal stress – Bending shear stress.

Lab Experiments:

- Calculation of Shear force and Bending Moment using open software
- Deflection test on a cantilever beam

UNIT III DEFLECTION OF BEAMS AND BUCKLING OF COLUMNS**9+6**

Deflection of determinate beams: Cantilever, Simply supported and Overhanging beams - Differential equations of the deflection curve – Double integration method – Macaulay's method – Buckling of long columns – Euler's theory – Long columns with different end conditions – Rankine's formula.

Lab Experiments:

- Deflection test on a simply supported beam
- Buckling of long columns and construction of Southwell plot

UNIT IV TORSION**9+6**

Torsional deformations of a circular shaft – Torsional shear stress – Angle of twist – Transmission of power by circular shafts – Solid and hollow shafts – Stepped shaft - Application to close-coiled helical springs – Axial loading – Design of close-coiled helical springs.

Lab Experiments:

- Stiffness of a close-coiled helical spring by tension and compression test
- Torsion test on mild steel

UNIT V ANALYSIS OF STRESSES IN TWO DIMENSIONS**9+6**

Plane stress – Principal planes - Principal stresses and maximum shear stress –Mohr's circle for plane stress – Stresses in thin-walled pressure vessels – Stresses and deformations in thin cylindrical and spherical shells subjected to internal pressure.

Lab Experiments:

- Stresses in thin-walled cylindrical shell subjected to internal pressure

L : 45 T: 0 P: 30 J: 0 Total: 75 PERIODS**TEXT BOOKS**

1. Rajput, R.K., "Strength of Materials", S. Chand and Company Ltd., 7th Ed. New Delhi, 2018
2. Barry J. Goodno, James M. Gere, "Mechanics of Materials", 9th edition, 2018, Cengage Learning

REFERENCES

1. Ferdinand P. Beer, Russell Johnston, John T. DeWolf, David F. Mazurek, "Mechanics of Materials", 8th edition, 2020, McGraw Hill Education
2. R. C. Hibbeler, "Mechanics of Materials", 10th edition, 2016, Pearson

3. Bansal, R. K., "Strength of Materials", Laxmi Publications (P) Ltd., 2016
4. Jindal U.C., "Strength of Materials", Asian Books Pvt Ltd., New Delhi, 2012
5. Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, 2016

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Describe the fundamentals about the simple stresses, strains and deformation in components due to external loads.
- CO2** Draw the shear force and bending moment diagrams for various beams.
- CO3** Determine the deflection of the beams and buckling of columns.
- CO4** Explain the effect of torsion on shaft and springs.
- CO5** Analyze two-dimensional complex stress systems.

UNIT I BASICS OF THERMODYNAMICS**9+6**

Definition of thermodynamics – Concept of ideal and real gases – Work and modes of work – Zeroth law – First law – Aeronautics applications of SFEE – Second law of thermodynamics – Clausius Inequality – Concept of entropy.

Lab Experiments:

- Performance test on a 4-stroke Diesel engine
- Valvetiming of a 4-stroke engine and port timing of a 2-stroke engine
- Determination of the Coefficient of discharge of given Venturimeter.

UNIT II GAS AND VAPOUR POWER CYCLES**9+6**

Air standard efficiency – Mean effective pressure – Carnot Cycle – Otto Cycle – Diesel Cycle – Dual Cycle – Stirling and Ericsson cycle – Brayton cycle – Rankine cycle.

Lab Experiments:

- Experiment on natural convection heat transfer.
- Experiment on forced convection heat transfer.
- Determination of friction factor for a given set of pipes.

UNIT III PROPERTIES OF PURE SUBSTANCE**9+6**

Formation of steam – Properties of pure substances – Solid, liquid and Vapour phases – phase rule – P-V, P-T, T-V, T-S, H-S diagrams – PVT surfaces – Dryness fraction – Wetness fraction – Mollier Chart

Lab Experiments:

- Heat transfer from pin-fin under natural and forced convection
- Determination of Stefan – Boltzmann constant.
- Conducting experiments and drawing the characteristic curves of reciprocating pump.

UNIT IV GAS MIXTURES**9+6**

Mass fraction – Mole fraction – Avogadro's law – Maxwell relations – Tds equations – Difference and ratio of heat capacities – Energy equation – Joule Thomson Coefficient – Claypeyron equation

Lab Experiments:

- Determination of Flash Point and Fire Point of various fuels / lubricants
- Performance test on a two stage Reciprocating Air compressor
- Conducting experiments and drawing the characteristic curves of centrifugal pump/ submergible pump.

UNIT V PSYCHOMETRY AND REFRIGERATION**9+6**

Psychrometric properties – Property calculations by using chart – sensible heating and cooling – humidification and dehumidification – evaporative cooling and adiabatic mixing – Principles of Refrigeration – Air conditioning – Vapour compression and Vapour absorption – Coefficient of performance

Lab Experiments:

- Conduction heat transfer in a composite wall.
- Determination of Coefficient of Performance of a vapour compression refrigeration system and Air-Conditioning system
- Conducting experiments and drawing the characteristics curves of Pelton/Francis turbine

L : 45 T: 0 P: 30 J: 0 Total: 75 PERIODS**TEXT BOOKS**

1. Nag.P.K., "Engineering Thermodynamics", 6th Edition, Tata McGraw Hill (2017), New Delhi
2. Natarajan, E., "Engineering Thermodynamics: Fundamentals and Applications", 2nd Edition (2014),

REFERENCES

1. Cengel, Y and M. Boles, Thermodynamics - An Engineering Approach, Tata McGraw Hill, 8th Edition, 2015.
2. Chattopadhyay, P, "Engineering Thermodynamics", 2nd Edition Oxford University Press, 2016.
3. Rathakrishnan, E., "Fundamentals of Engineering Thermodynamics", 2nd Edition, Prentice Hall of India Pvt. Ltd, 2006.
4. Claus Borgnakke and Richard E. Sonntag, "Fundamentals of Thermodynamics", 7th Edition, Wiley Eastern, 2009.
5. Venkatesh. A, "Basic Engineering Thermodynamics", Universities Press (India) Limited, 2007

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the basics of thermodynamics.
- CO2** Understand the concept of gas and vapor power cycles.
- CO3** Understand the concept of pure substances.
- CO4** Understand the basics of gas mixtures.
- CO5** Understand the concept of Psychometric and refrigeration.

UNIT I INTRODUCTION TO PYTHON**12**

Features of Python- Fundamentals of Python – Variables – Data Types

Suggested Experiments

1. Use interactive Shell to print the Hello Example : print 'Hello World'
2. Write a Python Program Using String Variable
3. Write a Python program to store data in list and then try to print them
4. Write a Python Program to display the following messages "Hello World, Python is High level, General-purpose Programming language"

UNIT II CONTROL FLOW & ARRAYS**12**

Conditional Statements – Iteration - List and Arrays

Suggested Experiments

1. Write a Python program to find SUM and MULTIPLICATION of any three numbers.
2. Write a Python program to find the average of any five numbers.
3. Write a Python program to find simple interest.
4. Scenario: A courier company has number of items to be delivered to its intended customers through its salesman. The salesman visits following cities to deliver the respective items:

S. NO.	CITIES	NO. OF ITEMS
1	Aligarh	18
2	Agra	25
3	Baroda	13
4	Banaras	43
5	Chennai	8
6	New Delhi	67
7	New Jalpaiguri	29
8	Howrah	11
9	Kolkata	56
10	Mumbai	33

Solve the following problems based on the above mentioned scenario using Python:

- a) Write a Python program to store and display the above mentioned cities and corresponding items using arrays.
- b) Write a Python program to display name of cities where salesman has delivered maximum and minimum number of items.
- c) Write a Python program to search the number of items to be delivered for a user
- d) Suppose the cover price of a book is Rs 240.95, but bookstores get a 40% discount. Shipping costs Rs 30 for the first copy and 75 cents for each additional copy. What is the total wholesale cost for 60 copies? Calculate using Python Code.

UNIT III CLASSES & FUNCTIONS**12**

Classes – Built-in Functions – Type Conversion – User Defined Functions – Flow of Execution

Suggested Experiments

Scenario: A university has different entities such as Department, Programs and Student whose data members and member functions are given below:

Teacher- { Data Members: Name, department, hours, programs Taught; Member Function: setDetails(), getDetails() }

Program- {Data Members: Name, department, duration; Member Functions: setDetails(), getDetails()}
Student- {Data Members: Name, RollNo, Program, Department; Member Function: setDetails(), getDetails()}

Solve the following problems based on the above mentioned scenario using Python:

1. Write a Python program to create Teacher, Program and Student Classes with above mentioned data members and member functions.
2. Add following functionalities in the above program, the default department of Teacher, Program and Student should be Computer Science, however a different department could be assigned at run time.
3. Write a Python program to overload “+” operator to add the hours of two teachers.

Write a Python program to create two subclasses Residential Student and Non Residential Student inherited from Student class. Residential Student would have a data member Hall of Residence and Non-Residential Student would have Address as its data member.

UNIT IV FILE HANDLING

12

Files and exception: text files, reading and writing files, handling exceptions

Suggested Experiments

1. Write a Python program to print number of days in a month.
2. Write a Python program to find the area of triangle
3. Write a Python program which takes a character as input from the keyboard and convert it into capital letter, if it is a small letter and Vice-Versa.
4. Write a Python program to find those numbers which are divisible by 7 and multiple of 5, between 1500 and 2700 (both included)

Write a Python program that asks the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user

UNIT V TEMPLATES

Function Template – Class Template – Infinite Recursion in Python

1. Write a function in Python to swap two numbers using function template. The numbers could be Integer or float that depends on the user inputs
2. Create a class Matrix with data members and member functions. Write a program in Python to perform Matrix operations (2-D array implementation), Add and Multiplication using class template
3. Write a Program Python to check whether the given number is Armstrong number or not
4. Write a Python Program to print factorial of a number
5. Write a Python Program to generate first n Fibonacci terms recursively
6. Write a Python Program to compute factorial of an integer n recursively

L :0 T: 0 P: 60 J: 0 Total: 60 PERIODS

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Write clear and effective python code
- CO2** Create applications using python programming
- CO3** Define Python functions and call them
- CO4** Use Python data structures — lists, tuples, dictionaries
- CO5** Understand the object oriented features using Python

Guidelines

1. The scope of the project work is to enable the students in convenient groups (not more than 4 members) involving theoretical and experimental studies through Design Thinking approach.
2. The aim of the project work is to deepen comprehension of principles by applying them to a new problem based on the courses such as Fluid Mechanics, Aircraft Production Technology, Aero Mechanics of Solids, Aero Engineering Thermodynamics, Python Programming, studied by the students in the second year of study but not limited to.
3. Project periods shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.
4. Create a model/fabricate a model/conduct experiment/simulate mechanical system/implement the same. Analyze data, evaluate the results and conclude the appropriate solution, suggestion for future work.
5. The continuous assessment shall be made according to the regulation which is tabulated below.
6. The progress of the project is evaluated based on a minimum of two reviews.
7. The review committee may be constituted by the Head of the Department
8. Each student shall finally produce a comprehensive report covering background information, empathy, problem statement, project work details, result and conclusion.
9. This final report shall be typewritten form as specified in the guidelines.

L : 0 T : 0 P : 0 J: 30 Total: 30 PERIODS

UNIT I**SELF-AWARENESS & PERSONAL DEVELOPMENT****3+6**

Self-Awareness: Key Areas -Personality, Values, Habits, Needs & Emotions, Impact of Self Awareness on Personal Development. Personality –Definition, Elements, Determinants, Needs and Benefits, Personality traits. Personality development skills, Positive traits for effective people, SWOT :Analysing Strength and weakness (SWOT), Building Esteem & Self-Confidence, Working on attitudes (aggressive, assertive, submissive), Self-Motivation

UNIT II**BODY LANGUAGE****3+6**

Body Language-Postures and Gestures, Personal Grooming, Personal Hygiene, Social Effectiveness, Business Etiquettes, Interpersonal Relationship

UNIT III**COMMUNICATION AND LEADERSHIP****3+10**

Communication: LRSW, Verbal & Non-Verbal Communication, Communication Barriers, Resume Building, Video Resume, Email writing, Presentation Skills, Self-Introduction, Extempore speech, Group Discussion, Mock Interview.

Leadership: Leadership Styles, Leadership Traits, Group Dynamics, Team Building - Conflict management, Time Management, Stress management.

UNIT IV**SOCIAL IMAGE TRAITS****3+6**

Social etiquettes -Positive Social Image, Social Graces, Online Etiquettes, , Dining Etiquettes, Public speaking, Voice Modulation, Telephone etiquettes, Interview etiquettes – Networking - Case Study and Company website References

UNIT V**PERSONALITY TEST****3+2**

Big Five Personality Test, Open DISC Assessment Test.

L :15 T: 0 P: 30 J: 0 T:45 PERIODS**TEXT BOOKS**

- 1 Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
- 2 Stephen P. Robbins and Timothy A. Judge (2014), Organizational Behavior 16th Edition: Prentice Hall.

REFERENCES

- 1 Smith, B. Body Language. Delhi: Rohan Book Company. 2004
- 2 Personality Development and Career management: By R.M.Onkar (S Chand Publications)

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Evaluate the quality of personality for self-development in career perspective.
- CO2** Apply the body languages in his professional interview modes.
- CO3** Apply the communication and leadership styles in the public speaking.
- CO4** Apply the social imaging qualities in their presentation skill.
- CO5** Demonstrate the personality development in mock interview.

SEMESTER IV

19MAT206	NUMERICAL METHODS	L	T	P	J	C
	(Common to B.E. Aeronautical & EEE)	3	0	0	0	3
UNIT I	SOLUTIONS OF EQUATIONS AND EIGEN VALUE PROBLEMS					9
Newton Raphson method –Iterative method of Gauss - Seidal – Matrix Inversion by Gauss – Jordan method – Eigen values of a matrix by power method.						
UNIT II	INTERPOLATION					9
Finite difference – Operators – Properties of operators – Relation between the operators –Interpolation with equal intervals – Newton’s forward and backward difference interpolation – Interpolation with unequal intervals – Lagrange’s and Newton’s divided difference interpolations.						
UNIT III	NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION					9
Approximation of derivatives using interpolation polynomials –Differentiation using interpolation formulae – Numerical integration by Trapezoidal and Simpson’s 1/3 rd and 3/8 th rules –Double integrals using Trapezoidal and Simpson’s rules.						
UNIT IV	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS					9
Single step methods: Taylor’s series method – Euler’s method – Modified Euler’s Method – Fourth order Runge-Kutta method for solving first order equations – Multi step methods: Milne’s predictor-corrector methods for solving first order equations.						
UNIT V	BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS					9
Finite difference methods for solving two-point linear boundary value problems – Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain – One dimensional wave equation by explicit method.						
		L : 45	T:0	P: 0	J: 0	Total: 45 PERIODS

TEXT BOOKS

1. Veerarjan, T. and Ramachandran.T., "Numerical Methods with programming in ‘C’", Second Edition Tata McGraw Hill Pub.Co.Ltd, First reprint 2007.
2. Sankar Rao K., "Numerical Methods For Scientists And Engineers", 3rd Edition Prentice Hall of India Private, New Delhi, 2007.

REFERENCES

1. Gerald C.F. and Wheate, P.O. , "Applied Numerical Analysis", 2nd Edition, Pearson Education Asia, New Delhi, 2014.
2. Chapra, S.C and Canale, R.P. “Numerical Methods for Engineers”, 6th Edition, Tata McGraw Hill Edition, 2014.
3. Grewal, B.S and Grewal, J.S, “Numerical methods in Engineering and Science”, 9th Edition, Khanna Publishers, New Delhi, 2012.
4. Kreyszig, E., “Advanced Engineering Mathematics”, 8th Edition, John Wiley & Sons, Inc, Singapore, 2008.
5. Kandasamy, P., Thilagavathy. K and Gunavathy, K., "Numerical Methods", 3rd Edition, S.Chand & Company Pvt. Ltd, 2013.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Solve a set of algebraic equations representing steady state models formed in engineering problems.
- CO2** Use the interpolation methods to discrete data tables.
- CO3** Find the trend information from discrete data set through numerical differentiation and summary information through numerical integration.
- CO4** Predict the system dynamic behaviour through solution of ODEs modeling the system.
- CO5** Solve PDE models representing spatial and temporal variations in physical systems through numerical methods.

UNIT I **STATICALLY DETERMINATE AND INDETERMINATE STRUCTURE**

9

Plane Truss Analysis - Propped cantilever beam, fixed – fixed beam, Principle of Super position, Clapeyron's three moment equation and moment distribution method for indeterminate beams - Strain Energy in axial, bending, torsion and shear loadings. Castigliano's theorems and their applications. Energy theorems – dummy load & unit load methods.

UNIT II **COLUMNS AND FAILURE THEORIES**

9

Classification of columns – Euler buckling – columns with different end conditions. Euler's column curve – inelastic buckling – effect of initial curvature – the Southwell plot– Columns with eccentricity – use of energy methods – theory of beam columns – beam columns with different end conditions – stresses in beam columns-Failure Theories

UNIT III **UNSYMMETRICAL BENDING**

9

General, Principal axis and neutral axis methods – Bending of symmetric beams subject to skew loads – Bending stresses in beams of unsymmetrical sections.

UNIT IV **SHEAR FLOW IN OPEN AND CLOSED SECTIONS**

9

Thin walled beams – Concept of shear flow – The shear centre and its determination – Structural idealization – Shear flow variation in idealized sections. Bredt-Batho theory– Shear flow distribution in thin walled single & multi-cell structures subject to combined bending and torsion – with walls effective and ineffective in bending – Shear centre of closed sections.

UNIT V **BUCKLING OF PLATES AND STRESS ANALYSIS**

9

Bending of thin plates –Local buckling stress of thin-walled sections – Crippling strength estimation by Needham and Gerard methods –Load carrying capacity of sheet stiffener panels –Inter rivet buckling and sheet wrinkling failures – Effective width. Loads on an aircraft– the V-n diagram – Shear force and bending moment distribution over the aircraft wing and fuselage – Tension field beam theory. Thermal stresses – impact loading – Fatigue – Creep - Stress Relaxation.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

1. Megson T H G, "Aircraft Structures for Engineering Students", 7th Edition, Elsevier Ltd, 2012.
2. Bruhn E.F., "Analysis and Design of Flight Vehicles Structures", Tri-state off-set Company, USA, 1985.

REFERENCES

1. Peery D. J., and Azar J.J., "Aircraft Structures", McGraw-Hill, N.Y., 2011.
2. Timoshenko S., and Goodier T.N., "Theory of Elasticity", 3rd ed. McGraw – Hill (India) Ltd.
3. Donaldson B.K., "Analysis of Aircraft Structures – An Introduction", McGraw-Hill, 1993.
4. J.P Den Hartog, "Advanced Strength of Materials", Dover Publications Inc, 1988
5. Lakshmi Narasaiah G, "Aircraft Structures" BSP Books Pvt ltd., 2010.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Analyze the structures subjected to statically determinate and indeterminate structure.
- CO2** Understand the behavior of columns and failure theories.
- CO3** Solve the problems on unsymmetrical Bending
- CO4** Analyze the structures subjected to shear flow
- CO5** Analyze the stiffened plates subjected to buckling.

UNIT I QUANTITATIVE ABILITY III**6**

Time, speed & distance-Average speed- Relative speed- Train problems- Boats and streams- Races, Chain rule, Time and work -Pipes and cisterns

UNIT II QUANTITATIVE ABILITY IV**4**

Permutation & Combination, Probability, Mensuration

UNIT III VERBAL REASONING II**7**

Machine Input and Output, Coded Inequalities, syllogisms, Problems on Cubes, Data sufficiency.

Critical Reasoning -Statement and Argument, Statement and Assumption, Statement and Conclusion, Cause and effect, Course of action.

UNIT IV NON- VERBAL REASONING**5**

Figure series, Odd man out, Mirror Image, Water image, Embedded Image, Cubes and Dices, Insert the Missing Characters, Analytical reasoning.

UNIT V LINGUISTICS SKILLS III**8**

Sentences - Simple, Compound, Complex & Mixed sentences, Sentence Rearrangement, Idioms & Phrases, Reading Comprehension at higher level, Word Substitution, Synonyms & Antonyms, Error Spotting.

L :30 T: 0 P: 0 J: 0 T: 30 PERIODS**TEXT BOOKS**

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand& Company Pvt Limited.
- 3 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Learn the time and distance for solving application orientated concepts in quantitative aptitude
- CO2** Apply the financial ability for solving application orientated concepts in quantitative aptitude
- CO3** Analyze the verbal reasoning and the critical reasoning in quantitative aptitude.
- CO4** Analyze the non-verbal reasoning in verbal aptitude applications
- CO5** Apply appropriate LSRW skills

UNIT I REVIEW OF BASIC FLUID MECHANICS**9+6**

Continuity - momentum - energy equations - Aerodynamic forces and Moments –Viscous flow - Newton's law of viscosity- Viscous boundary layer - Methods to delay Flow Separation Flow over a flat plate - Blasius solution – NavierStokes equation – Review of Vector relations – Models of the fluid: Control volume and fluid element

Lab experiment:

- Water flow visualization method
- Pressure distribution over a symmetric aerofoil

UNIT II AIRFOIL AND WING THEORY**9+6**

Airfoils Nomenclature and NACA series - Airfoil Characteristics - Vortex sheet - Kelvin Circulation theorem - Thin aerofoil theory and its applications - Introduction to Finite wing - Downwash and Induced Drag - Biot Savart law and Helmholtz's theorems - Horse shoe vortex - Prandtl's Classical Lifting line theory and its limitations – Numerical nonlinear lifting line theory – Three dimensional incompressible flow

Lab experiment:

- Pressure distribution over various airfoil models.
- Determination of lift for the given airfoil section.

UNIT III NORMAL, OBLIQUE SHOCKS AND EXPANSION WAVES**9+6**

Prandtl equation and Rankine Hugoniot relation - Normal shock equations - Pitot static tube, corrections for subsonic and supersonic flows - Oblique shocks and corresponding equations - Hodograph and pressure turning angle - shock polars – Rayleigh and Fanno Flow – Flow past convex corners - Expansion hodograph - Reflection and interaction of shocks and expansion waves - Methods of Characteristics - Two-dimensional supersonic nozzle contours.

Lab experiment:

- Generation of lift in the tip vortices
- Flow visualization in smoke tunnel

UNIT IV DIFFERENTIAL EQUATIONS OF MOTION FOR STEADY COMPRESSIBLE FLOWS**9+6**

Small perturbation potential theory - Solutions for supersonic flows - Mach waves and Mach angles – Prandtl Glauert affine transformation relations for subsonic flows - Lift, drag pitching moment and center of pressure of supersonic profiles – Three dimensional incompressible flows – Subsonic compressible flow over airfoils – linear theory - Linearised Supersonic flow theory – Linearised Velocity potential equation – CFD applications: Transonic Airfoil and wings – Supercritical airfoils

Lab experiment:

- Flow visualization studies in subsonic speeds
- Pressure distribution over a symmetric aerofoil

UNIT V AIRFOIL IN HIGH-SPEED FLOWS & HIGH-SPEED WIND TUNNELS**9+6**

Lower and upper critical Mach numbers - Lift and drag divergence - shock induced separation - Characteristics of swept wings - Effects of thickness, camber and aspect ratio of wings - Transonic area Rule - Tip effects - Blow down, in draft and induction tunnel layouts and their design features - Wind tunnel types – Helium and gun tunnels - Shock tubes - Optical methods of flow visualization.

Lab experiment:

- Calibration of subsonic wind tunnel

L : 45 T: 0 P: 30 J: 0 Total: 75 PERIODS

TEXT BOOKS

1. Anderson, J.D., "Fundamentals of Aerodynamics", McGraw-Hill Book Co., New York, fifth edition 2010
2. Ethirajan Rathakrishnan" Theoretical Aerodynamics "Wiley 2013.

REFERENCES

1. Aerodynamics for Engineering Students 1986 Houghton E L & Carruthers N B.
2. Boundary-Layer Theory , H Schlichting and K Gersten springer 2003.
3. L J Clancy,"Aerodynamics" Paperback 2006.
4. Frank M White,"Fluid Mechanics in S.I Units" Paperback 2017.
5. John J.Bertin, "Aerodynamics for Engineers", Fourth edition,Pearson2012

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Analyze the statically determinate and indeterminate structures
- CO2** Analyze the columns with different end conditions
- CO3** Describe the stresses and possible modes of failure of the structures subjected to external loads.
- CO4** Apply knowledge of science and engineering principles to solve Aeronautical engineering problems
- CO5** Design and conduct experiments as well as Analysis and interpret experimental data

UNIT I INTRODUCTION TO AIRCRAFT PROPULSION**9+6**

Introduction to propulsion - Basic thermodynamics, Fundamental equations - Types of aircraft engines - Performance parameters - thrust equation, factors affecting thrust and efficiencies. Atomization and spray formation

Lab experiments:

- Study of an aircraft piston gas turbine engines
- Study of gas turbine engines

UNIT II STEADY ONE-DIMENSIONAL FLOW**9+6**

One dimensional flow of a perfect gas - isentropic flow, non-isentropic flow, frictionless constant area flow - constant area flow with friction - without friction - normal shock and oblique shocks.

Lab experiments:

- Velocity profiles of free jets
- Velocity profiles of Wall jets

UNIT III FUNDAMENTALS OF GAS TURBINE ENGINES**9+6**

Working principle of gas turbine engine - gas turbine cycle - turboprop - turbofan and turbojet Engines -Thrust and efficiency - Methods of thrust augmentation - Engine Performance characteristics.

Lab experiments:

- Cascade testing of compressor blades
- Study of performance of propeller

UNIT IV FUNDAMENTALS OF ROCKET PROPULSION COMPRESSIBLE FLOWS**9+6**

History of rocket propulsion - types of rocket - Basic configurations and application -Types of missiles and their structure - Heat transfer and cooling system in rocket - classification of Chemical rocket propulsion system- MPD thrusters

Lab experiments:

- Flame stabilization studies using conical flame holders.
- Study of Ram jet

UNIT V PERFORMANCE OF AEROSPACE VEHICLES**9+6**

Static performance - vehicle acceleration - performance characteristics - nozzle, solid, liquid and Hybrid rocket and their propellants- Electric propulsion for space applications - magnetic levitation propulsion

Lab experiments:

- Wall pressure distribution in subsonic diffuser
- Study of secondary injection in a supersonic cross flow

L : 45 T: 0 P: 30 J: 0 Total: 75 PERIODS**TEXT BOOKS**

1. Hill,P.G. & Peterson,C.R.“Mechanics & Thermodynamics of Propulsion”2ndEdition Pearson publishers, 2008.
2. Cohen,H.Rogers,G.F.C. and Saravanamuttoo ,H.I.H. “Gas Turbine Theory”, Prentice Hall; 6th Edition, 2008.

REFERENCES

1. Mathur, M.L.and Sharma,R.P.,“GasTurbine,JetandRocketPropulsion”,2nd Edition, Standard Publishers Distributors, Delhi, 2008
2. Rolls Royce, "Jet Engine", 5th Edition, Rolls Royce Technical Publications, 2005
3. Klause Hunecke, “Jet Engines – Fundamentals of theory, design and operation”, 1st Edition, the

Crowood Press Ltd, 2010

4. SM Yahya“ Turbines, Compressors andFans”TataMcGrawHillEducationPvtLtd.4th Edition, 2011
5. Robert D.Zucker, Oscar Biblarz, “Fundamentals of Gas Dynamics” 2nd Edition ,John Wiley & Sons Inc, Print 2011

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Describe the working principles of components of gas turbine engines.
- CO2** Analyze the performance of compressible flow through ducts and combustion chambers.
- CO3** Analyze the performance of the nozzle.
- CO4** Analyze the performance of the compressors and turbines of a gas turbine engine.
- CO5** Describe and analyze the performance of the Ramjet engine

LIST OF EXPERIMENTs

1. Concept Sketching using constraints and relationships. Dimensioning. Studies on the capabilities of software for Drafting and Modeling - as per Standards.
2. Exercises on drafting of conic sections and surface generation.
3. Creation of simple 3D solids using extrusion, Revolve, Sweep and loft operations.
4. Modeling of riveted & welded joints and 2D printing with title block.
5. Assembly of simple devices like, coupling, screw jack, connecting rod, piston.
6. Generation of assembly into drawing, mass property calculation, BOM generation.
7. Generation of airfoil and wing drawings as per NACA 4 & 5 digit.
8. Simple exercises on sheet metal operations and its development.
9. Representation of GD&T in drawings, feature control frame reading & surface roughness.
10. Exercises on Digital mockup and kinematic simulation of a scissor jack.

L : 0 T: 0 P: 60 J: 0 Total: 60 PERIODS

MAJOR EQUIPMENTS / SOFTWARE REQUIRED (for a batch of 30 students)

S. No	LIST OF EQUIPMENTS	QUANTITY
1.	Drawing Boards and Drafting Machines	30
2.	Computer with i5 or AMD processor with suitable graphics facility	30
3.	Modeling Packages	30
4.	CAD Software	30
5.	Laser Printer or Plotter to print / plot drawings & UPS	01

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Design and draw the various types of riveted and welded joints used in aircraft.
- CO2** Model and generate 2D drawings of various joints.
- CO3** Calculate the mass properties of an assembly and generate Bill of material.
- CO4** Generate and draw the typical wing as per NACA and typical sheet metal drawing.
- CO5** Understand the importance of GD&T and Digital mockup usage in aero industry

LIST OF EXPERIMENTS

1. Introduction to fundamental on IOT Architecture.
2. Study and installation of Arduino, Raspberry pi hardware & software.
3. Exercises on Arduino programming with sensor
 - Pressure sensor
 - Proximity
 - Temperature
 - Passive Infra Red
4. Exercises on wireless IOT Modules
 - Blue Tooth
 - Wifi
 - RFID
5. Exercises on Sensor controller actuation through microcontroller using
 - Servo Motor
 - DC motor
6. Exercises to demonstrate the use of relays in automation.
7. Exercises to demonstrate integration of
 - Arduino to Arduino (A-A)
 - Arduino to Raspberry pi (A-R)
 - Raspberry pi - Raspberry pi (R-R)
8. Experiment to acquire sensor data using PLX-DAQ and CANSAT.
9. Exercises on demo on remote monitoring of devices through THINGSPEAK APP.
10. Study on IoT gateways by connecting to ZIGBEE MODULE.
11. Study on Application of IoT in Aerospace Industry.

L : 0 T: 0 P: 30 J: 0 Total: 30 PERIODS

LIST OF EQUIPMENTS (for a batch of 30 students)

S. No	LIST OF EQUIPMENTS	QUANTITY
1.	Computer with suitable software	30
2.	Arduino Kit	06
3.	Raspberry pi Kit	06
4.	PLX-DAQ and CANSAT	02
5.	Pressure sensor, Proximity, Temperature, Passive Infra Red	03

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the fundamentals IoT hardware and software and the usage of Arduino boards
- CO2** Perform simple experiments to measure temperature, pressure, vibration etc
- CO3** Understand the use of actuators and their applications
- CO4** Understand data acquisition and remote monitoring applications
- CO5** Appreciate the usage of IoT for Aerospace Industry

19ASP204

INTERNSHIP – I

L	T	P	J	C
-	-	-	-	2

Guidelines

Minimum of two weeks in a Aircraft and Airline Industry in the area of Aeronautical Engineering. The summer internship should give exposure to the practical aspects of the discipline. In addition, the student may also work on a specified task or project which may be assigned to him/her. The outcome of the internship should be presented in the form of a report.

Total: 2 Weeks

LANGUAGE ELECTIVE

19GEB202

HINDI

L T P J C

1 0 2 0 2

UNIT I INTRODUCTION

3+6

Importance of Hindi Language- Devanagari Alphabet (Read/Write) – Numbers (Read & Write) - Vowels & their abbreviated forms-consonants-Conjuncts- Parts of speech- Gender

UNIT II WORDS

3+6

Pronoun-Adjective-Verb-Tenses-Voice- Secondary verbs- Indeclinable- Cardinal numerals- Daily life words

UNIT III CLASSIFIED SENTENCES

3+6

Expressions- Useful Expressions- Imperative sentences-Past tense- Present tense-Future tense- Interrogative sentences and negative sentences

UNIT IV SITUATIONAL SENTENCES

3+6

Situational Sentences: At home-Shopping- Craftsman-Food & Drink- Hotel & Restaurant- Post office/Telephone/Bank- While Travelling- Health & Hygiene- Weather-Time.

UNIT V CONVERSATION

3+6

Conversation between friends- About money- On the bus- Asking the way- Making a Trunk Call- About a Trips- The villager and the urban- The doctor & the patient- Self Introduction

L: 15 T: 0 P: 30 J : 0 Total :45 PERIODS

TEXT BOOKS

- 1 Hindi for beginners by Sunita Narain mathur “ Tuttle Publisher”
- 2 Learn hindi through English in 30 Days by Krishna gopal vikal “ Diamond Pocket books”

WEBLINKS

- 1 <https://www.loecsen.com/en/learn-hindi>
- 2 <https://www.wikihow.com/Learn-Hindi>
- 3 <https://www.duolingo.com/>

COURSE OUTCOMES

At the end of the course students should be able to

CO1: To know about the language Hindi and parts of speech.

CO2: To understand the verbs and tenses of Hindi language

CO3: To experience the expression and classified sentences in Hindi Language.

CO4: To Practice Hindi speaking in suitable situations.

CO5: To converse in Hindi with your friends & neighbours.

UNIT-I SELF INTRODUCTION AND BASIC CONVERSATION, JAPANESE SCRIPTS AND NUMBERS 3+6

Introduction to Japanese Syllables (phonetic alphabet), greetings & Self-introduction, Identifying things, point objects and listening to their names, Listen to things and places etc. Creating shopping lists. Numbers. Three Different types of Japanese Scripts : Hiragana, Katakana, Kanji.

UNIT-II TIME, DAY, MONTH AND YEARS, TRAVEL , WORK ENVIRONMENT, PARTICLES 3+6

Introduction to Time, day of the week, simple inquiries on telephone, Means of transport, Basic conversations of everyday life., Office Environment, Japanese Particles

UNIT-III LOCATION AND OBJECTS ALONG WITH EXPRESSIONS , PRESENT / PAST FORMS 3+6

Frame questions in Japanese. Vocabulary of giving and receiving objects, Stating impressions/things surrounding us, Expressing likes and dislikes, good/bad, possessions, Talking about the country, town and the environment

UNIT-IV COUNTERS , DIRECTIONS, COLORS, FAMILY & RELATIONSHIP 3+6

Quantity, number of people, time, period etc., Stating thoughts and impressions, Conveying movement (e.g. go / come). Colors, Family and Relationship.

UNIT-V BASIC AND DAY TO DAY CONVERSATIONS WITH MULTIPLE SCENARIOS 3+6

Conversational practices: Between Friends, Customer and Seller, & Business Conversation

L: 15 T: 0 P: 30 J : 0 Total :45 PERIODS

REFERENCE BOOKS

- 1 MINNA NO NIHONGO 1-1 Translation & Grammatical notes in English elementary
- 2 SHIN NIHONGO NO KISO 1 (Grammatical Notes in English)

WEB LINKS

- 1 <https://www.duolingo.com/>
- 2 <https://www.alllanguageresources.com/japanese-youtube-channels/#youtube-channels-for-beginners>
- 3 <https://learn.storylearning.com/sales-page-436032391602252797717>

COURSE OUTCOMES

the end of the course students should be able to

CO1: Know about the language Japanese and parts of speech.

CO2: Understand the Japanese language on time and travel

CO3: Experience the Conversation about location and expression.

CO4: Practice Conversation about family and relationship .

CO5: Converse in Japanese in day to day conversations

UNIT I INTRODUCTION**3+6**

Introduction to German Language- Alphabets-Greetings and goodbye - Introduce yourself and others - numbers -how to give your telephone number and email address -Speak about countries- languages - words.-Vowels-Read & Write-Tenses.

UNIT II CONVERSATIONS WITH FRIENDS COLLEAGUE**3+6**

Speaking about hobbies - fixing meetings and appointments - name days of the week - about work. Speak about Professions and working hours

UNIT III CONVERSATION ABOUT CITY**3+6**

Name places and buildings - Ask questions about places - Assigning texts to a picture story - Enquire about things - Name means of transport - ask for directions and describe a way -understand texts with international words - learn articles

UNIT IV CONVERSATION ABOUT FOOD AND SHOPPING**3+6**

Speak about food - plan for shopping - conversations while shopping - conversations while eating - Understand texts with W questions -Organize and learn words

UNIT V CONVERSATION ABOUT TIME WITH FRIENDS**3+6**

Understanding and saying the time -Specify times - to talk about family -To plan something together n to talk about birthdays - Understand and write an invitation -to Order and pay in the restaurant n to talk about an event

L: 15 T: 0 P: 30 J: 0 Total :45 PERIODS**TEXT BOOKS**

1. Netzwerk Deutsch als Fremdsprache A1.1 Kursbuch
2. Netzwerk Deutsch als Fremdsprache A1.1 Arbeitsbuch

COURSE OUTCOMES

At the end of the course students should be able to

CO1: To know about the German language and parts of speech.

CO2: To understand the Conversations with Friends Colleagues

CO3: To experience the Conversation about city

CO4: To Practice Conversation about food and shopping .

CO5: To converse in German about time with friends

UNIT I INTRODUCTION**3+6**

Introduction to the French Language- Alphabets -Consonants-Greetings and goodbye –Daily life words- Introduce yourself and others - numbers -how to give your telephone number and email address -Speak about countries- languages - words.-Vowels-Read & Write-Tenses

UNIT II CONVERSATIONS WITH FRIENDS COLLEAGUES**3+6**

Speaking about hobbies - fixing meetings and appointments - name days of the week - about work. Speak about Professions and working hours

UNIT III CONVERSATION ABOUT CITY**3+6**

Name places and buildings - Ask questions about places - Assigning texts to a picture story - Enquire about things - Name means of transport - ask for directions and describe a way -understand texts with international words - learn articles

UNIT IV CONVERSATION ABOUT FOOD AND SHOPPING**3+6**

Speak about food - plan for shopping - conversations while shopping - conversations while eating - Understand texts with W questions -Organize and learn words

UNIT V CONVERSATION ABOUT TIME WITH FRIENDS**3+6**

Understanding and saying the time -Specify times - to talk about family -To plan something together n to talk about birthdays - Understand and write an invitation -to Order and pay in the restaurant n to talk about an event

L: 15 T: 0 P: 30 J: 0 Total :45 PERIODS**REFERENCE BOOKS**

- 1 1.G.Mauger Cours DE Languet De Civilisation Francaises
- 2 2. Annie Heminway, Complete French all in one Premium Second Edition, Tata McGraw Hill Education.
- 3 Diamond French-Aprenons Le Francois New Saraswathi House (India)Private Limited
- 4 A.Monnerie Beinvenue En France. Documentation Marrie Franchoise Boullet

COURSE OUTCOMES

At the end of the course, students should be able to

CO1: To know about the French language and parts of speech.

CO2: To understand the Conversations with Friends Colleagues

CO3: To experience the Conversation about the city

CO4: To Practice Conversation about food and shopping.

CO5: To converse in French about time with friends

CAREER COURSES

19GEP375	TECHNICAL INTERVIEWING	L	T	P	J	C
		0	0	4	0	2

UNIT I C - PROGRAMMING 12

Basic Programming: Data Types, Iteration, Recursion, Decision, Procedure, functions and scope. Data Structures: Arrays, Linked Lists, Trees, Graphs, Stacks, Queues, Hash Tables, Heaps. OOPs: Polymorphism, Abstraction, Encapsulation Miscellaneous, Searching and Sorting, Complexity Theory.

UNIT II DATA STRUCTURE CONCEPT USING C/C++/JAVA/PYTHON 12

Basics-Distinction between nanoparticles and bulk materials-Top down and Bottom up approach- -Sol gel method-Chemical vapour deposition- -Types (Nano clusters, Nano rods, Nanotubes and Nanowires)-Application of nanomaterials.

UNIT III ADVANCED DESIGN AND ANALYSIS TECHNIQUES USING C/C++/JAVA/PYTHON 12

Greedy Algorithms: Activity-selection problem fractional knapsack. Minimum Spanning Trees:Kruskal, Prim. String Matching: The naive string-matching algorithm.Divide and Conquer: Sorting algorithms Binary Search. Computational Geometry: Line-segment properties Intersection of line segment.

UNIT IV DEPARTMENT SPECIFIC DOMAIN-1 12

Geometric Dimensioning and Tolerances – Material Selection, Material testing,Stress strain , Power transmission, Balancing, Drives, CAM.

UNIT V DEPARTMENT SPECIFIC DOMAIN-2 12

Vehicle Structures, Steering system, transmission, suspension and breaking system, Friction- Electrical and Hybrid Vehicles, Conventional engines- Fuels and lubricants- Fuel cells.

L :0 T: 0 P: 60 J: 0 Total:60 PERIODS

REFERENCES

- 1 Kernighan, B.W and Ritchie,D.M, —The C Programming language, Second Edition, Pearson Education, 2006
- 2 Mark Allen Weiss, —Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 1997.
- 3 Data structures, Algorithms, and applications in C++, SartajSahni, Universities Press, 2nd Edition, 2005.
- 4 Data Abstraction and Problem Solving with Java: Walls and Mirrors by Frank M. Carrano and Janet J. Prichard
- 5 AnanyLevitin, “Introduction to the Design and Analysis of Algorithms”, 3rd Edition, Pearson Education, 2012.
- 6 Spotts M F, "Dimensioning and Tolerance for Quantity Production", Prentice Hall Inc., 1983.
- 7 Kirpal Singh, “Automobile Engineering Vol. I & II”, Standard Publishers Distributors 2007
- 8 Mehrdad Ehsani, Yimin Gao, Stefano Longo, Kambiz Ebrahimi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles”, CRC Press, 2018

COURSE OUTCOMES :

At the end of the course students should be able to Apply the technical competencies to the real life problems

- CO 1** Implement concepts using C/C++/ Java/ Python.
- CO 2** Apply suitable concept of Data structures and implement the programs
- CO 3** Analyze algorithms and calculate its complexity
- CO 4** Write SQL commands and excel in Normalization techniques.
- CO 5** Excel in Layers of Computer Networks and Scheduling in Operating systems

3+6

3+6

3+6

3+6

3+6

L:15 T: 0 P: 30 J: 0 Total: 45 PERIODS

1 Dr.Nishi Goyal “Industrial Psychology” Krishna’s Educational Publisher.
2 Dr.S.S Khanka, Human Resource Management, S.Chand Publications
3 Parul Singh ’Writing Effective resume for effective resume for job applications” Fortune Institute of International
Business”
4 Andrea R Nirenberg” Essentials of Business networking” Tips, Tools and Tactics you can use, Pearson Education
5 Miriam Salpter “Social Networking for career success “Learning express, New York
6 Joshua Waldman, Job searching with social media, John Wiley & Sons, Inc

At the end of the course students should be able to

- | | |
|------------|--|
| CO1 | To know about the framework of Personnel Phycology |
| CO2 | To understand the job analysis for Job search |
| CO3 | To understand the performance analysis in job |
| CO4 | To know about resume building qualities |
| CO5 | To experience the job search and networking |

List of Exercises

S.No	Exercises
1	Mock Interview
2	Portfolio creation
3	Psychometric test
4	Video Resume
5	Cover letter and thank you letter
6	Attending business career fair
7	Empathy on Job Analysis/Search
8	Business card creation
9	Networking –Online/offline
10	Online Image & Branding
11	Exercises in career portals

UNIT I QUANTITATIVE ABILITY III**3+6**

Algebra, Power, Surds and Indices, Inverse, Logarithms, Equations, Progressions, Functions and Graphs, Perimeter, Geometry, Coordinate Geometry, Direction Sense, Logical Connectives, Venn Diagrams

UNIT II QUANTITATIVE ABILITY IV**3+6**

Puzzles, Physics, Base conversion, Trigonometry, Divisibility, Series, Simple Equations, Simplification, Quadratic Equations

UNIT III VERBAL REASONING II**3+6**

Sentence correction and completion, Para-Jumbles, Cloze Passage, Vocabulary, Voices & Forms of Speech, Multidimensional arrangement

UNIT IV NON- VERBAL REASONING**3+6**

The Embedded figure, Logical Games, Incomplete Pattern, Missing letters, Data arrangement, Mathematical orders, Inferred meaning

UNIT V LINGUISTICS SKILLS III**3+6**

Sentence improvement, Subject-Verb agreement, Speech & voices, Preposition & Conjunctions, Selection words, Comprehension ordering

L :15 T: 0 P: 30 J: 0 Total:45 PERIODS**TEXT BOOKS**

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.(Unit V)
- 5 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand& Company Pvt Limited.
- 6 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand the time and distance for solving application oriented concepts in quantitative aptitude
- CO2** Know the financial ability for solving application oriented concepts in quantitative aptitude
- CO3** Analyze the verbal reasoning and the critical reasoning in quantitative aptitude
- CO4** Understand the non-verbal reasoning in verbal aptitude applications
- CO5** Apply the appropriate LSRW skills

19GEB376	ENTREPRENEURSHIP & BUSINESS MODEL CANVAS	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	4	0	4

UNIT I INTRODUCTION 6+8

Meaning and concept of entrepreneurship, role of entrepreneurship in economic development, agencies in entrepreneurship management and future of entrepreneurship, types of entrepreneurs, skills/ traits required to be an entrepreneur, Creative and Design Thinking, the entrepreneurial decision process, skill gap analysis, and role models, mentors and support system, entrepreneurial success stories.-Business Storytelling

UNIT II BUSINESS MODEL CANVAS 6+36

Idea generation by design thinking, Idea Validation, Business Model Canvas- Value Proposition, Customer Segments, Channels and Partners, Revenue Model and Streams, Key Resources, Activities, and Costs Customer Relationships and Customer.

UNIT III BUSINESS MODEL TO BUSINESS PLAN 6+4

Translate Business Model into a Business Plan, Visioning for venture, Take product or service to market, Deliver an investor pitch to a panel of investors, Identify possible sources of funding for your venture – customers, friends and family, Angels, VCs, Bank Loans and key elements of raising money for a new venture.

UNIT IV BUSINESS LICENSES AND PERMITS 6+4

Business Licenses and permits Business Licenses, business permits, choosing a form of business organization, sole proprietorship, partnership, corporations, Limited Liability Company.

UNIT V TOOLS FOR ENTREPRENEURS 6+8

Agile Entrepreneurship, Business Process Management & Automation, Taking Business to Digital World via Digital Marketing & eCommerce, HRM and Keeping it lean with Freelancers

L :30 T: 0 P: 60 J: 0 Total: 90 PERIODS

REFERENCES

- 1 Donald F Kuratko, "Entrepreneurship – Theory, Process and Practice", 9th Edition, Cengage Learning, 2014.
- 2 Khanka. S.S., "Entrepreneurial Development" S.Chand & Co. Ltd., Ram Nagar, New Delhi, 2013.
- 3 Osterwalder, A. and Y. Pigneur. 2010. Business Model Generation. John Wiley & Sons. Hoboken, NJ
- 4 Levin, Jack S. Structuring Venture Capital, Private Equity, and Entrepreneurial Transactions. Aspen Publishers, 2009
- 5 Sole proprietorship, partnership, corporations, Limited Liability Company - Kapoor.N.D, 'Elements of Mercantile Law', 30th Edition, Sultan Chand &Co., 2015
- 6 The art of digital marketing, definitive guide by Ian Dodson, Wiley.
- 7 Marlon Dumas "Fundamentals of business process management" second edition, springer.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand the need for entrepreneurship and its characteristics
- CO2** Apply the ideas in to business model canvas
- CO3** To know the funding partner & investor for entrepreneurship
- CO4** Apply for business licenses and permits for their company/startup
- CO5** Apply the various tools for entrepreneurship/startup

S.No Exercises

- 1 Business Model Analysis 1
- 2 Business Model Analysis 2
- 3 Idea Generation & Validation
- 4 BMC Value Proposition Pitch
- 5 BMC- Customer Segments Pitch
- 6 BMC- Channels Pitch
- 7 BMC- Revenue Model and Streams Pitch
- 8 BMC- Key Resources & Key Activities Pitch
- 9 BMC- Key Partners & Cost Structure Pitch
- 10 BMC- Customer Relationships Pitch
- 11 Final BMC Pitch
- 12 Report on Investors/Funding agency
- 13 Report on Business License & Permits
- 14 Digital Marketing Exercises
- 15 Case study on Business Process Automation

19GET376	ECONOMICS, FINANCE & ACCOUNTING	L	T	P	J	C
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1 0 0 0 1

Introduction to Engineering Economics – Scope of Engineering Economics - Break Even Analysis-
Elementary economic analysis- Demand and Supply

Introduction to Financial Accounting-Book Keeping-Journal-Ledger- Trial Balance- Trading Account- Profit and Loss Account- Balance sheet statement - Working capital management

Introduction to Cost Accounting- Elements of cost- Types of cost -Cost Accounting systems: Job costing-Process costing

Introduction to budgeting- Characteristics of a sound budget-Fixed budget-Production. Budget- Sales budget-Flexible budgets- Zero base budgeting and budgetary control-ROI

Role of Purchase department-Vendor selection- Purchase- Documents related to Purchase: Invoice Generation-Material Inward & Outward-Introduction to ERP & SAP

L :15 T: 0 P: 0 J: 0 Total:15 PERIODS

- 1 R.V.Praveen, “Quantitative Aptitude and Reasoning” PHI Publication.
- 2 M.K.Panday, “Analytical Reasoning”, Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to “Reasoning Verbal, Non-Verbal & Analytical”,
Arihant Publications.
- 4 S.P.Bakshi, “Objective English” Arihant Publications.
- 5 R.S.Agarwal, “Quantitative Aptitude for Competitive Examinations”, S.Chand& Company Pvt
Limited.
- 6 R.S.Agarwal, “A modern approach to Verbal & Non-verbal reasoning”, S.Chand & Company
Pvt Limited.

At the end of the course students should be able to

- CO1** Understand about Managerial economics for Entrepreneurship
CO2 Learn about Financial accounting for Entrepreneurship
CO3 Know about Cost accounting for Entrepreneurship
CO4 Understand Budget for Entrepreneurship
CO5 Apply the Purchase Management for Entrepreneurship

UNIT I INTRODUCTION**3**

Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge - Trade Secret - IPR in India– IPR in abroad

UNIT II PATENTS**3**

Patents - Elements of Patentability: Novelty , Non Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board

UNIT III COPYRIGHT**3**

Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights

UNIT IV TRADEMARK**3**

Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board

UNIT V OTHER FORMS OF IP**3**

Design: meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection

Geographical Indication (GI): meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection

L :15 T: 0 P: 0 J: 0 Total:15 PERIODS**TEXT BOOKS**

- 1 Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.
- 2 Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.

REFERENCES

- 1 Deborah E. Bouchoux, Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets, Cengage Learning, Third Edition, 2012.
- 2 Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.
- 3 Prabuddha Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, McGraw Hill Education, 2011
- 4 Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: LexisNexis.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Know about Intellectual property rights and classification.
- CO2** Understand about Patents, Registration & Procedure and other information
- CO3** Learn about Copyrights, Registration & Procedure and other information
- CO4** Understand about Trademark, Registration & Procedure and other information
- CO5** Know about other forms of IP, Registration & Procedure and other information

19GEB377	ADVANCED VERBAL QUANTITATIVE APTITUDE REASONING	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	2	0	3
UNIT I	QUANTITATIVE ABILITY III					6+6
	Algebra, Power, Surds and Indices, Inverse, Logarithms, Equations, Progressions, Functions and Graphs, Perimeter, Geometry, Coordinate Geometry, Direction Sense, Logical Connectives, Venn Diagrams					
UNIT II	QUANTITATIVE ABILITY IV					6+6
	Puzzles, Physics, Base conversion, Trigonometry, Divisibility, Series, Simple Equations, Simplification, Quadratic Equations					
UNIT III	VERBAL REASONING II					6+6
	Sentence correction and completion, Para-Jumbles, Cloze Passage, Vocabulary, Voices & Forms of Speech, Multi dimensional arrangement					
UNIT IV	NON- VERBAL REASONING					6+6
	The Embedded figure, Logical Games, Incomplete Pattern, Missing letters, Data arrangement, Mathematical orders, Inferred meaning					
UNIT V	LINGUISTICS SKILLS III					6+6
	Agile Entrepreneurship, Business Process Management & Automation, Taking Business to Digital World via Digital Marketing & e Commerce, HRM and Keeping it lean with Freelancers					
		L :30	T: 0	P: 30	J: 0	Total: 60 PERIODS

TEXT BOOKS

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.
- 5 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited
- 6 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Apply the time and distance for solving application orientated concepts in quantitative aptitude
CO2 Apply the financial ability for solving application orientated concepts in quantitative aptitude
CO3 Analyze the verbal reasoning and the critical reasoning in quantitative aptitude
CO4 Analyze the non-verbal reasoning in verbal aptitude applications
CO5 Apply appropriate LSRW skills

S.No Exercises

- 1 Assessment 1 from Quantitative Ability III
- 2 Assessment 2 from Quantitative Ability III
- 3 Assessment 3 from Quantitative Ability III
- 4 Assessment 1 from Quantitative Ability IV
- 5 Assessment 2 from Quantitative Ability IV
- 6 Assessment 3 from Quantitative Ability IV
- 7 Assessment 1 from Verbal Reasoning II
- 8 Assessment 2 from Verbal Reasoning II
- 9 Assessment 3 from Verbal Reasoning II
- 10 Assessment 1 from Non Verbal Reasoning II
- 11 Assessment 2 from Non Verbal Reasoning II
- 12 Assessment 3 from Non Verbal Reasoning II
- 13 Assessment 1 from Linguistics Skills III
- 14 Assessment 2 from Linguistics Skills III
- 15 Assessment 3 from Linguistics Skills III

UNIT I INTRODUCTION**3**

Networking, Benefits, Quality vs Quantity in Networking, Networking for new opportunities, Networking for Professional Partnership, Local and In-person networking

UNIT II DIGITAL NETWORKING**3**

Tools for Online Networking – Linkedin, Facebook, Twitter, Google+, LMS, Open Learning Networks

UNIT III EMPATHIZING**3**

Art of Listening, Empathy, Listening Models, Networking etiquette, Digital Storytelling, Lead Generation

UNIT IV COMMUNICATION**3**

Interpersonal Skills, Personality and Emotional Intelligence, Business Communication, Copyrights, Networking Plan

UNIT V DIGITAL FOOTPRINTS**3**

Introverts & Extroverts, Maintain Your Connections, Long-Term Networking Strategies, Case Studies-Scholarship for higher education in various countries –Case study

L :15 T: 0 P: 0 J: 0 Total: 15 PERIODS

REFERENCES

- 1 Andrea R Nirenberg "Essentials of Business networking" Tips, Tools and Tactics you can use, Pearson Education
- 2 Miriam Salpter "Social Networking for career success "Learning express, Newyork
- 3 Andrea R Nirenberg "Network like you means it" handbook for business and personal networking.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.
- 5 Peter W Cardon "Business Communication" Tata Mcgraw Hill Publications, Third edition
- 6 Elizabeth A Segal "Social Empathy-Art of understanding others" Columbia University press, New York

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand the networking and its significance
- CO2** Apply the digital tools for networking with overseas professors.
- CO3** Empathize the need and prepare themselves for overseas education
- CO4** Apply the communication skills for the overseas education
- CO5** Apply the networking strategies for scholarship in overseas education

UNIT I OVERVIEW OF HIGHER STUDIES**3+6**

Higher education in India & Examinations- Higher Education in abroad: Introduction- Admission process- Identification & Procedure - SOP-LOR-Desirable Characteristics - Introduction to Proficiency test

UNIT II SELECTION & SCHOLARSHIP**3+6**

Top Universities in world- Cost of overseas education- Funding & Scholarships-Case studies Higher Education in USA, UK, France, Singapore, Germany, Norway, Sweden, Australia & Netherland

UNIT III GRE & GMAT**3+6**

GRE & GMAT: Importance of GRE & GMAT- Syllabus- Assessment pattern- Analytical reasoning- Quants-Verbal-Integrated Reasoning-Analytical writing assessment

UNIT IV TOEFL & IELTS**3+6**

Importance of TOEFL & IELTS - Syllabus-Assessment Pattern-Reading-Speaking -Writing

UNIT V GATE**3+6**

Importance of GATE- Syllabus -Assessment Pattern- Weightages in the different domain-General Aptitude- Candidate selected subject

L :15 T: 0 P: 30 J: 0 Total:45 PERIODS**REFERENCES**

- 1 B.S.Warrier "Studying Abroad" Tata Mcgraw Hill Education Private Limited, New Delhi
- 2 Dr.T.P.Sethumadhavan "Study abroad" iRank publishers , India
- 3 General Aptitude & Engineering Mathematics 2022 , Pearson Education

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** To know about the Indian constitution and Government services
- CO2** To understand about the civil services post and selection process
- CO3** To understand about the RRB & Public sector banks post and selection process
- CO4** To understand about the central and state public sector companies post and selection process
- CO5** To experience the resume building and networking

19GEB378	FOUNDATION COURSE ON COMPETITIVE EXAMS	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	4	0	4

UNIT I QUANTITATIVE ABILITY III 6+12

Algebra, Power, Surds and Indices, Inverse, Logarithms, Equations, Progressions, Functions and Graphs, Perimeter, Geometry, Coordinate Geometry, Direction Sense, Logical Connectives, Venn Diagrams, Puzzles, Physics, Base conversion, Trigonometry, Divisibility, Series, Simple Equations, Simplification, Quadratic Equations

UNIT II VERBAL REASONING II 6+12

Sentence correction and completion, Para-Jumbles, Cloze Passage, Vocabulary, Voices & Forms of Speech, Multi dimensional arrangement

UNIT III NON- VERBAL REASONING II 6+12

The Embedded figure, Logical Games, Incomplete Pattern, Missing letters, Data arrangement, Mathematical orders, Inferred meaning

UNIT IV GENERAL AWARENESS FOR CIVIL SERVICE EXAMS 6+12

Current events of National & International importance, History of India & Indian National Movement, Indian & World Geography – Physical, Social, Economic Geography of India & the World, Indian Polity & Governance – Constitution, Political System, Panchayati Raj, Public Policy, Rights Issues, Economic & Social Development – Sustainable Development, Poverty, Inclusion, Demographics, Social Sector Initiatives, Environmental ecology, Bio-diversity & climate change, General Science.

UNIT V GENERAL AWARENESS FOR BANKING SECTORS 6+12

Current Affairs (National and International), Major Financial/Economic News, Budget and Five Year Plans, Who's Who, Sports, Books and Authors, Awards and Honors, Science – Inventions and Discoveries, Abbreviations, Important Days, International and National Organizations

L :30 T: 0 P: 60 J: 0	Total : 90
	PERIODS

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand& Company Pvt Limited
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.
- 5 NIOS course books for classes XI and XII on - Ancient India, Medieval India, Modern India, National Movement & Contemporary World and Culture of India.
- 6 The Story of Civilization, Part 2 by Arjun Dev, NCERT
 Certificate Physical & Human Geography (Oxford) by Goh Cheng Leong
 General Knowledge 2019 (English, Paperback, Pandey Manohar)

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Apply the quantitative ability for competitive exams.
- CO2** Know the verbal reasoning for competitive exams
- CO3** Understand the non-verbal reasoning for competitive exams.
- CO4** Apply the general awareness in the civil service exams
- CO5** Understand the general awareness in the banking exams

S.No Exercises

- 1 Assessment 1 from Quantitative Ability III
- 2 Assessment 2 from Quantitative Ability III
- 3 Assessment 3 from Quantitative Ability III
- 4 Assessment 1 from Verbal Reasoning II
- 5 Assessment 2 from Verbal Reasoning II
- 6 Assessment 3 from Verbal Reasoning II
- 7 Assessment 1 from Non Verbal Reasoning II
- 8 Assessment 2 from Non Verbal Reasoning II
- 9 Assessment 3 from Non Verbal Reasoning II
- 10 Assessment 1 from General Awareness for Civil Service
- 11 Assessment 2 from General Awareness for Civil Service
- 12 Assessment 3 from General Awareness for Civil Service
- 13 Assessment 1 from General Awareness for Banking
- 14 Assessment 2 from General Awareness for Banking
- 15 Assessment 3 from General Awareness for Banking

19GEB381	PERSONNEL PSYCHOLOGY FOR GOVERNMENT JOBS	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	1	0	2	0	2

UNIT I GOVERNMENT JOBS 3+6

Hierarchical structure of Indian Government- Preamble to Constitution of India-7th pays commission- Classification of Government Services-Classification of Groups-Pay Band, Pay & Emoluments-Educational Qualifications.

UNIT II CIVIL SERVICES 3+6

Post & Selection Process: general group A services- technical group A services- uniformed group A services-group B services-group C services.

UNIT III RRB & PUBLIC SECTOR BANK 3+6

Railway Recruitment Board: Introduction to RRB-classification of RRB- Post & Selection Process

Public Sector Bank: Introduction to public sector banks- Post & Selection Process: RBI-SBI-IBPS-other public sector banks

UNIT IV CENTRAL/STATE PUBLIC SECTOR COMPANIES 3+6

Public sector classification- Post & selection process:: maharatna - navratna - miniratna- Non GATE-public sector insurance companies- central universities- other government jobs

UNIT V RESUME BUILDING & NETWORKING 3+6

Introduction- SWOT- Online learning -Writing a Winning Resume, Choosing a Resume Format - Canva Resume- Video Resume.- Importance of networking -Networking platforms

L :15 T: 0 P: 30 J: 0 Total: 45 PERIODS

REFERENCES

- 1 KP. Shashidharan “ Know How to get government Jobs”Jaico Publishing home
- 2 Dipak Anand IAS “How to Succeed in Civil Services” Ocean books private limited
- 3 VVK Subburaj “Railway Recruitment Board Exams, Technical Cadre” Sura Books Private Limited
- 4 Banking Awareness by Disha Publication, 4th Edition
- 5 Rajesh Varma, “Fast Track Objective Arithmetic”, Arihant Publications.
- 6 Parul Singh 'Writing Effective resume for effective resume for job applications.”Fortune Institute of International Business”
- 7 Andrea R Nirenberg ”Essentials of Business networking” Tips, Tools and Tactics you can use, Pearson Education
- 8 Miriam Salpter “Social Networking for career success “Learning express, Newyork

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** To know about the Indian constitution and Government services
- CO2** To understand about the civil services post and selection process
- CO3** To understand about the RRB & Public sector banks post and selection process
- CO4** To understand about the central and state public sector companies post and selection process
- CO5** To experience the resume building and networking

S.No Exercises

- 1 Assessment for Group A Services
- 2 Assessment for Group B Services
- 3 Assessment for Group C Services
- 4 Assessment for Uniformed Services
- 5 Assessment 1 for RRB
- 6 Assessment 2 for RRB

- 7 Assessment 1 for Banking Exams
- 8 Assessment 2 for Banking Exams
- 7 Assessment for Public sector company 1
- 8 Assessment for Public sector company 2
- 9 Resume Preparation for Government Jobs
- 10 Video Resume for Government Jobs
- 11 Networking Exercises using Linked In