

UNIVERSITY OF MUMBAI



Syllabus for the sem V & VI
Program: B.Sc.
Course: Aviation

(Credit Based Semester and Grading System with
effect from the academic year 2013–2014)

T.Y.B.Sc.

AVIATION

**Credit Based Semester and Grading System
To be implemented from the Academic year 2013-2014**

SEMESTER V

THEORY

Course Code	Title	#hours / week	Total hours / Semester	Credits
USAV501	AIR NAVIGATION V	4	60	5
USAV502	AIR REGULATION V	3	45	3
USAV503	AVIATION METEOROLOGY V	3	45	3
USAV504	AIRCRAFT & ENGINE V	3	45	5
USAV505	FLYING V		40	4
				20

Semester VI

Course Code	Title	#hours / week	Total hours / Semester	Credits
USAV601	AIR NAVIGATION VI	4	60	5
USAV602	AIR REGULATION V I	3	45	3
USAV603	AVIATION METEOROLOGY VI	3	45	3
USAV604	AIRCRAFT & ENGINE VI	3	45	5
USAV605	PROJECTS		40	4
				20

SEMESTER V

USAV501

USAV501 : Air Navigation V Credits: 5 Lectures/Week: 4 Lectures/Semester: 60

UNIT I

No of Lectures

1. Electronic Instrumentation: - System (EFIS), 04
Electronic Attitude and Direction Indicator (EADI) - Colour Codes,
Electronic Horizontal Situation Indicator (EHSI) – Modes available,
Engine Indicating and Crew Alerting System (EICAS),
Electronic Centralised Aircraft Monitoring (ECAM) – Operating Modes.

2. Jeppesen Charts: - 12
 - (i) Jeppesen Airway Manual overview, Source and Updation of Information
 - (ii) Departure Charts (SIDs) Interpretation of Heading, Plan View
 - (iii) Enroute / Charts – Interpreting Front and Back Panel information, Information provided on Nav Aids, Airways, Airports, Airspace, Boundaries etc, Area Charts, Approx
 - (iv) Area Charts – Coverage and Information provided.
 - (v) Approach Charts – Precision / Non Precision approaches, Interpretation of Heading, Plan view, Profile view and landing minimums.
 - (vi) Arrival Charts (STARs) – Interpretation of Heading and Plan view.
 - (vii) Airport Charts, Interpretation of Heading, Plan View, Additional Runway Information, Minimums, Surface Movement.

3. Area Navigation System (RNAV) : 04
Introduction, Benefits of RNAV , Types & levels of RNAV, Components and Operation of 2D RNAV System, Principal of operation and limitations of simple RNAV systems, Level 4 RNAV system, control display unit (CDU).

Total 20

UNIT II

No of Lectures

4. General Aircraft Performance: - 12
 - (viii) Aircraft documents
 - (ix) Take Off speeds - (V1, VR, V2) Take off Speed Limits (V_{mbe}, V_{tire})
 - (x) Available Take off Lengths and Take off Distances.
 - (xi) Factors affecting MTOW and Take off Optimization Principle.

- (xii) Flexible Take off
 - (xiii) LDA, ALD and RLD.
 - (xiv) Approach Speed and Go around Performance
 - (xv) Dry, Wet and Contaminated Runway.
 - (xvi) Specific Range, MMR, MLRC, Cost Index and Economic Mach Number.
 - (xvii) Optimum Altitude and Max Altitude
 - (xviii) In flight Engine Out Strategies
5. Fuel Planning: - Calculation of minimum quantity of fuel for a flight based in Taxi Fuel, Trip Fuel, Contingency Fuel, Alternative Fuel and Holding Fuel.& decision Point procedure 08

Total 20

UNIT III

No of Lectures

6. ATC Flight Plan: Individual (CA48) and repetitive flight plan , Procedures to fill up the flight plan VFR & IFR flight plans 06
7. Mass & Balance Performance : 06
- Loading and C of G :: Effects of overloading, effects of out of limit CG. position, movement of C of G in flight, Definitions – CG,CG limit, CG datum, Arm Movement, Dry Operating Index (DOI), Basic Empty Mass (BEM),Dry Operating Mass(DOM), Traffic Load, Useful Load, Zero Fuel Mass (ZFE),MZFM ,Take Off Mass, MTOM, MLM, Max RAMP mass, Calculation of Fuel Mass
8. Calculation of Payload : 04
9. Holding Patterns: - Identification of Sectors, Procedure for Joining the Holding Pattern, Holding Procedure with correction for leg timing and Drift due to Wind. 04

Total 20

REFERENCE BOOKS

TITLE

PUBLISHER

- | | |
|-------------------------------------|----------------|
| 1. Air Pilot's Manual Vol 3 & 5 | Peter D Godwin |
| 2. Flight Performance & Planning | Nordian AS |
| 3. General Navigation: ATPL JAR | Nordian AS |
| 4. GSP : Plotting & Flight Planning | Underdown |
| 5. GSP : Radio Aids | Underdown |
| 6. GSP : Flight Instr. & Auto Flt. | Underdown |
| 7. Range & Endurance | Hitchens |
| 8. Radio Navigation ATPL JAR | Nordian AS |
| 9. JAA ATPL Performance | Jeppesen |
| 10. JAA ATPL Mass & Balance | Jeppesen |
| 11. Mass & Balance | Cranfield |
| 12. Performance | Cranfield |
| 13. Jeppesen Chart Training | Jeppesen |

USAV502

USAV502: Air Regulation V Credits: 3 Lectures/Week: 3 Lectures/Semester: 45

UNIT I

No of Lectures

Indian Aircraft Rules 1937

Extent & Definitions	2
Part IX – Aerodromes Rules – 79 to 89	2
Part XII – Regulatory Provisions Rules 133A	1
Part XIII – Air Transport Service Rules – 134, 140, 140A, 140B & 140C	4
Part IV – General Rule 156, 157, 159 & 161	3
Schedule IV – Instrument Flight Rules	3
Total	<u>15</u>

UNIT II

No of Lectures

Schedule VI – Penalties	2
The Anti Hijacking Act 1982	3
The suppression of unlawful act against the safety of Civil Aviation Act 1982	3

Lighting

<ul style="list-style-type: none">• Precision Approach Runway cat – I lighting system• Visual slope Indicator system	3 4
Total	<u>15</u>

UNIT III

No of Lectures

<ul style="list-style-type: none">• Simple approach Lighting System• Runway edge lights, Runway Threshold lights, Runway end lights• Intensity control of Runway and approach light system• Taxiway Lights, Apron lights, PAPA-AGNIS• Aerodrome beacon, Identification beacon	3 3 3 3 3
Total	<u>15</u>

REFERENCE BOOKS

TITLE	PUBLISHER
1. Aviation Act 1934	Ministry of Civil Aviation
2. Indian Aircraft Rules	Ministry of Civil Aviation
3. Aeronautical Information Publication	Ministry of Civil Aviation
4. Aircraft Manual	India

USAV503

USAV503: Meteorology V Credits: 3 Lectures/Week: 3 Lectures/Semester: 45

UNIT I **No of Lectures**

Flight Hazards

- | | |
|---|---|
| a) Icing | 5 |
| • Weather conditions for Ice Accretion, Topographical Effects | |
| • Types of Ice Accretion | |
| • Hazards of Ice Accretion, Avoidance | |
| b) Turbulence | 5 |
| • Effects on Flight, Avoidance | |
| • CAT – Effects on Flight | |
| c) Wind Shear | 5 |
| • Definition of Wind Shear | |
| • Weather conditions for Wind Shear | |
| • Effects on Flight | |

Total **15**

UNIT II **No of Lectures**

- | | |
|--|----|
| d) Thunderstorms | 10 |
| • Structure of Thunderstorms, Squall Lines, Life History, Storm Cells, Electricity in the Atmosphere, Static charges | |
| • Conditions for and process of development, Forecast, Location, Type Specification | |
| • Thunderstorm Avoidance, Ground / Airborne Radar, Stormscope | |
| • Development and effect of downbursts | |
| • Development of Lightning discharges and effect of lightning strike on aircraft and Flight execution | |
| e) Tornadoes | 5 |
| • Occurance | |

Total 15

UNIT III

No of Lectures

- f) Hazards in mountainous areas 10
- Influence of terrain on Clouds and Precipitation, Frontal Passage

- g) World Climatology

Total 5
15

REFERENCE BOOKS

TITLE

PUBLISHER

- | | |
|--|--------------------------------|
| 1) Ground Studies for pilots | R. B. Underdown & John Standan |
| 2) Meteorology for Pilots | Mike Wickson |
| 3) Meteorology for Pilots | Mudge |
| 4) Meteorology for Pilots | Mcgraw Hill |
| 5) Weather | R.S.Scorer |
| 6) Meteorology for Aviators | Sutcliffe |
| 7) Elementary Note on Indian Climatology | India Met Dept. |
| 8) Handbook of Aviation Meteorology | HMSO |
| 9) Meteorology for Airmen Dept. | Parts I & II Met. |
| 10) Climatological Atlas for Airmen | India Met Dept. |
| 11) Meteorological Glossary | HMSO. |
| 12) Weather Study | Brunt |
| 13) The Weather Map | HMSO. |
| 14) Ground Study for Pilots | Taylor & Parmar |

USAV504

**USAV504: Aircraft & Engines V Credits: 5 Lectures/Week: 3 Lectures/Semester
45**

UNIT I

No of Lectures

- Shock stall, Shock waves, Mach line, Mach angle, Mach cone Shock wave angle, 4
shockwave speed, Effect of shock waves
- Transonic/Supersonic aerofoil 4
- Flow modification on aerofoil, Vortex generator, Wing tip fence 4
- Slotted Fowler Flap, Kruger flap, Flap asymmetric split flap operation., 4
stabilizer Jam

Total 16

UNIT II

No of Lectures

- Piston engine : cylinder configurations, Low tension Ignition system, Ignition advance, T/M/P lever sequencing for thrust control, CHT, EGT, MAP 5
- Turbine case cooling system, TSFC 4
- Contra rotating prop, Counter rotating propeller, Slip stream effect, Torque reaction effect, P-factor effect, Gyroscopic effect, Forces on propeller, Helix, blade angle, geometric pitch , advance per revolution, Geometric pitch, slip, spin, spiral, spin recovery , Pusher/Tractor configuration 6

Total 15

UNIT III

No of Lectures

- Control Axes of Aircraft, Roll control, skid and slip, Load factor, Dutch roll, 5
- Operation of Control surface, Trim- control, servo tab, balance tab, anti servo tab, Stabilator, Elevons, trim tab, mass damping, balance horn , Control horn 2
- Electrical Power KVA, KW, Reactive power, real Power, GCU, BPCU, Variable speed constant frequency power generation, .Selection of frequency in a/c generator 2
- Signal failure mode in glass cockpit display 2
- Helicopter : swash plate control, Fully articulated prop blades, Coriolis Effect , Propeller configurations, forward flight 2
- Cabin door operation, Ditching and land evacuation 1

Total 14

REFERENCE BOOKS

TITLE

- 1) Flight Without Formula
- 2) Aero Engines for students
- 3) Gas Turbine and Jet Propulsion
- 4) Handbook of Aeronautics
- 5) Civil Aviation Requirements
- 6) Principles of Flight
- 7) Performance of Civil Aircraft
- 8) From the Ground Up
- 9) Manual of Flying (AP 129)

PUBLISHER

- Kermode
Allen and Unwin
Smith
Royal Aeronautical Society
DGCA India
Bert A Shield
Barker
Sandy A. F. Macdonald
Air Ministry UK

Paper Pattern & Evaluation Criteria for Semester V is as Follows

(a) Internal assessment - 40 %

Sr No	Evaluation type	Marks
1	One Assignment/Case study/Project	10
2	One class Test (multiple choice questions objective)	20
3	Active participation in routine class instructional deliveries(case studies/ seminars//presentation)	05
4	Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.	05

(b) External Theory examination - 60 %

i) **Duration – 2 Hours 30 Minutes.**

ii) **Marks - 60**

iii) **Theory Question Paper Pattern:-**

- There shall be four questions each of 15 marks. On each unit there will be one question and the fourth one will be based on entire syllabus.
- All questions shall be compulsory with internal choice within the questions.
(Each question will be of 30 marks with options)
- Question may be subdivided into sub-questions a, b, c... and the allocation of marks depend on the weightage of the topic.

Illustration: -

Q No	Unit No	Max Marks with internal options
1	1	30
2	2	30
3	3	30
4	1, 2 & 3	30

The following tables illustrate part (a) and (b) described above.

SEMESTER V

Course	Credit	Assignment (10)	Unit Test (20)	Active Participation (5)	Responsible Student (5)	Internal (16/40)	External (24/60)	Total (100)	Grade Point	Letter Grade
Air Navigation V USAV 501	5									
Air Regulation V USAV 502	3									
Aviation Meteorology V USAV 503	3									
Aircraft & Engine V USAV 504	5									
Flying V USAV 505	4	CPL License								

SEMESTER VI

USAV601

USAV601: Air Navigation VI Credits: 5 Lectures/Week: 4 Lectures/Semester: 60

UNIT I

No of Lectures

- 1) Flight Management Systems: - Purpose, Multipurpose Control and Display Unit(MCDU), Flight Director Systems – Attitude Director Indicator (ADI), Horizontal Situation Indicator (HSI), Modes of Operation, Autopilot Command Modes, Auto land – Fail Passive System, Fail Operational System, Auto throttle – Operating Modes. 8
- 2) Reduced Vertical Separation Minimum(RVSM): - RVSM Levels, Altimeter and Other System Errors, Full and Basic RVSM Envelope, Minimum Equipment for RVSM Operations, RT Phraseology, RVSM Procedures, Abnormal and Emergency procedures. General Procedures for In-flight Contingencies, Weather Deviation Procedure. 6

- 3) Required Navigation Performance (RNP) / RNAV:- RNP, RNAV & PBN concepts, Benefits of PBN, RNAV & RNP specifications, System Performance, Monitoring & Alerting, Nevoid Infrastructure, Navigational Data Base, General Operating Procedures, Contingency Procedures. 6

Total 20

UNIT II

No of Lectures

- 4) Aerodrome Operating Minimum: Definition, Categories of Aeroplanes, Obstacle Clearance Altitude Height (OCA/H), Decision Altitude/Height (DA/H), Minimum Descent Altitude/Height (MDA/H), Runway Visual Range(RVR), Visibility, Normal Aerodrome Operating Minima, Restricted Operating Minima, Calculation of Normal/Restricted operating Minima approach lighting system with full facilities, intermediate facilities, Basic facilities. 8
- 5) Low Visibility Operations: - Requirements to be fulfilled for Low Visibility Operations, ILS, CAT I, CAT II and CAT III operations, Conditions for approval of Low Visibility Take-off Operations. 6
- 6) Extended Twin Operations (ETOPS): - ETOPS Requirements and Benefits, Glossary of Terms Used, ETOPS Approval, Etops Weather Minimum, Dispatch Configuration and Maintenance Requirements, In-flight ETOPS Procedures, ETOPS Diversion Strategy, Calculation of ETP with Wind Component 8

Total 22
No of Lectures

UNIT III

- 7) Satellite Navigation System: Principle of Operation, Space Segment, Control Segment, User Segment, GLONASS & GPS, Selective Availability, Errors of GPS, GPS Integrity & Augmentation, RAIM, Differential GPS, Use Advantages & disadvantages of Satellite Navigation System. 6
- 8) Collision Warning System: Principle of operating ACAS I, ACAS II & ACAS III, TAS & RAS, Displays symbology, RAVSI, Radar Display, Pilots Actions. 6
- 9) Airborne Weather Radar - Principle, Choice of Frequency, Conical Beam, Cosecant Beam, Airborne Equipment, Control Unit. Iso-echo Display, Turbulence Indication & Avoidance, Storm Movement, Calculation of height of cloud. 8

Total 20

REFERENCE BOOKS

TITLE

1. Air Pilot's Manual Vol 3 & 5
2. Flight Performance & Planning

PUBLISHER

Peter D Godwin
Nordian AS

3. General Navigation: ATPL JAR	Nordian AS
4. GSP : Plotting & Flight Planning	Underdown
5. GSP : Radio Aids	Underdown
6. GSP : Flight Instr. & Auto Flt.	Underdown
7. Range & Endurance	Hitchens
8. Radio Navigation ATPL JAR	Nordian AS
9. DGCA Ops Circular 06/1999	Aerodrome Operating Minima
10. DGCA Ops Circular 07/2010 ACAS Eqpt	Operational Procedures and Trg Reqts for
11. CAR Air Operations Series B Pt I	ILS CAT II/IIIA/B Operations
12. CAR Air Operations Series O Pt 11 RVSM	Requirements for implementation of
13. CAR Air Operations Series O Pt XII PBN,	Airworthiness, Operational and Trg Requirements for RNP/RNAV
14. CAR Air Operations Series O Pt VIII for ETOPS	Airworthiness, Maint & Operational Reqts

USAV602

USAV602: Air Regulation VI Credits: 3 Lectures/Week: 3 Lectures/Semester: 45

UNIT I

No of Lectures

Air Traffic Services Procedures

• Units providing Air Traffic Services	1
• Area Control Service	1
• Separation Minima Vertical, lateral & longitudinal based on time & distance	1
• Reduced Vertical Separation Minimum, Policy & Procedures	1
• Clearance	1
• Scope, Content & Limit	1
• Radar Separation & Radar Vectoring	2

Flight Plan

• Types of Flight plan	1
• Contents & Formats	1
• Filing & Closing of Flight Plan	1

Aviation & Medicine

• Effect of altitude	3
• Spatial disorientation / Vertigo	
• Hypoxia	
• Rapid decompression	
• Effect of Alcohol & Drugs	
• Mental Alertness	

- Hyperventilation

Total 15

UNIT II

Miscellaneous

No of Lectures

- Position Report 1
- Aerodrome operating Minima 2
- Air Defence Identification zones 1
- Identification & Interception procedures 1
- Minimum Fuel & Oil to be carried by public transport Aircraft 2
- Air-miss reporting procedure 1
- Entry Transit & Departure 1
- Communication failure procedures 1
- Anti – hijacking & Bomb scare procedures 2
- Area Navigation (RNAV) 2
- Required Navigation performance (R.N.P) ATS Routes 2

Total 16

UNIT III

No of Lectures

Carriage of Dangerous Goods

- Short title and extent of application 1
- Definition & Interpretation 2
- Carriage of Dangerous goods by Air 2
- Custody of un-authorized dangerous goods 1
- Labeling & marking of dangerous goods 1
- Operator's responsibility pertaining to dangerous goods 1

Procedures related to Emergencies

- Unlawful interference & Bomb Threat 1
- Emergency Descent 1
- Unidentified Aircraft 1
- Interception of Civil Aircraft 1
- Fuel Dumping 1

Procedures in regard to Aircraft equipped with airborne collision avoidance system 1

Minimum safe altitude warning procedures 1

Total 15

REFERENCE BOOKS

TITLE

PUBLISHER

1. Aviation Act 1934
2. Indian Aircraft Rules

Ministry of Civil Aviation
Ministry of Civil Aviation

3. Aeronautical Information Publication Ministry of Civil Aviation
 4. Aircraft Manual India

USAV603

USAV603: Meteorology VI Credits: 3 Lectures/Week: 3 Lectures/Semester: 45

UNIT I

No of Lectures

METEOROLOGICAL INFORMATION

8

a) Observation

- On the Ground, Surface Wind, Visibility and Runway
- Visual Range, Transmissometers, Cloud Type
- Amount, Height of Base and Tops, Movement,
- Weather – Including all types of Precipitation, Air Temperature, Relative Humidity, Dew Point, Atmospheric Pressure
- Upper Air Observations
- Satellite Observations, Interpretation
- Weather Radar observations, Ground and Airborne, Interpretation
- Aircraft observations and reporting. Data Link Systems, AIREPS

8

Total 16

UNIT II

No of Lectures

b) Weather Charts

15

- Significant Weather Charts
- Surface Charts
- Upper Air Charts
- Symbol and Signs on Analyzed and Prognostic charts

Total 15

UNIT III

No of Lectures

c) Information for Flight Planning

14

- Aeronautical Codes: METAR, TAF, SPECI, SIGMET, SNOWTAM
- Meteorological Broadcasts for Aviation: VOLMET, ATIS,
- Content and use of Pre-Flight Meteorological documents
- Meteorological briefing and advice

Total 14

REFERENCE BOOKS

TITLE

PUBLISHER

- | | |
|--|--------------------------------|
| 1) Ground Studies for pilots | R. B. Underdown & John Standan |
| 2) Meteorology for Pilots | Mike Wickson |
| 3) Meteorology for Pilots | Mudge |
| 4) Meteorology for Pilots | Mcgraw Hill |
| 5) Weather | R.S.Scorer |
| 6) Meteorology for Aviators | Sutcliffe |
| 7) Elementary Note on Indian Climatology | India Met Dept. |
| 8) Handbook of Aviation Meteorology | HMSO |

9) Meteorology for Airmen Dept.	Parts I & II Met.
10) Climatological Atlas for Airmen	India Met Dept.
11) Meteorological Glossary	HMSO.
12) Weather Study	Brunt
13) The Weather Map	HMSO.
14) Ground Study for Pilots	Taylor & Parmar

USAV604

USAV604: Aircraft & Engines VI Credits: 5 Lectures/Week: 3
Lectures/Semester: 45

<u>UNIT I</u>	<u>No of Lectures</u>
• Electronic Turbine Control for APU	5
• FADEC ENGINE	4
• FCU Block diagram and operation	3
• CVR, Flight Data Recorder	3
	Total <u>15</u>

<u>UNIT II</u>	<u>No of Lectures</u>
• Electrical Power: Standby Power. Essential Bus, Hot Battery Bus, Synch Bus, CSD disconnect, Ampere hour rating of Battery, Types of Battery, Battery Charger, KVA rating of Alternator.	3
• L.G: Partial gear operation, L.G ground safety pin	3
• Gear down dispatch performance	3
• Flap less landing performance	3
• Optimum altitude, Altitude capability, Step Climb	2
• Fire protection Systems: Types of Fire detectors, Types of smoke detectors	2
	Total <u>16</u>

<u>UNIT III</u>	<u>No of Lectures</u>
• Flight controls: differential ailerons, Frise aileron, Aileron lock out, control reversal, Stabiliser Jam, Stabiliser runaway , elevator trim drag, CG control of aircraft	4
• Fuel system: Fuel circuit for jet engine, boost pumps, fuel/oil heat exchanger, Fuel jettison system,	3
• Hydraulic system: control valve , selector valve, shuttle valve – applications, Hydraulic system failure, recovery for landing,	3

- T/O and Landing performance : r/w texture, Antiskid , Auto brake , Flap setting, Packs configuration, 4

Total 14

REFERENCE BOOKS

TITLE	PUBLISHER
1) Flight Without Formula	Kermode
2) Aero Engines for students	Allen and Unwin
3) Gas Turbine and Jet Propulsion	Smith
4) Handbook of Aeronautics	Royal Aeronautical Society
5) Civil Aviation Requirements	DGCA India
6) Principles of Flight	Bert A Shield
7) Performance of Civil Aircraft	Barker
8) From the Ground Up	Sandy A. F. Macdonald
9) Manual of Flying (AP 129)	Air Ministry UK

Paper Pattern & Evaluation Criteria for Semester VI is as Follows

(a) Internal assessment - 40 %

Sr No	Evaluation type	Marks
1	One Assignment/Case study/Project	10
2	One class Test (multiple choice questions objective)	20
3	Active participation in routine class instructional deliveries(case studies/ seminars//presentation)	05
4	Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.	05

(b) External Theory examination - 60 %

- i) **Duration – 2 Hours 30 Minutes.**
- ii) **Marks - 60**
- iii) **Theory Question Paper Pattern:-**
 - There shall be four questions each of 15 marks. On each unit there will be one question and the fourth one will be based on entire syllabus.
 - All questions shall be compulsory with internal choice within the questions. (Each question will be of 30 marks with options)
 - Question may be subdivided into sub-questions a, b, c... and the allocation of marks depend on the weightage of the topic.

Illustration: -

Q No	Unit No	Max Marks with internal options
1	1	30
2	2	30
3	3	30

4	1, 2 & 3	30
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The following tables illustrate part (a) and (b) described above.

SEMESTER VI

Course	Credit	Assignment (10)	Unit Test (20)	Active Participation (5)	Responsible Student (5)	Internal (16/40)	External (24/60)	Total (100)	Grade Point	Letter Grade
Air Navigation VI USAV 601	5									
Air Regulation VI USAV 602	3									
Aviation Meteorology VI USAV 603	3									
Aircraft & Engine VI USAV 604	5									
Project USAV 605	4									

FLYING

The Students will have to complete minimum 200 hrs of flying training to obtain CPL (Commercial Pilot Licence) which is the requirement of the DGCA. **To obtain B.Sc Degree (Aviation) it is mandatory for the student to obtain CPL (Commercial Pilot Licence) and submit the copy to the examination section of the Mumbai University, through concerned college.**

PROJECTS (4 lectures per week)

1. CRM & Human Factors
2. Aviation Medicine & First Aid
3. Flight Safety
4. Air Traffic Control & Management
5. Aviation Safety & Security Management
6. Fuel Economy
7. Aircrew Survival over Sea and Land
8. Future Air Navigation Systems
9. Airline Route Planning
10. Airline Operations and Scheduling

Out of the Projects listed above, Four Projects will be allotted by the college during Semester VI. Students will only be required to study and submit these four projects. The projects are to be completed under the guidance of the teacher from the institute/ college/ any other related industry.

REFERENCE BOOKS

TITLE	PUBLISHER
1) Crew Resource Management	Brian Mcallister
2) Human Factors for General Aviation	Jeppesen
3) JAA ATPL Book 08 Human Performance OAT & Limitations	
4) Air Transportation: A Management perspective	J.G.Wensvenn
5) Airline Operations & Scheduling	M. Bazargan
6) Aviation Security (Legal & Regulatory Aspects)	Abeyratne
7) Pilot Judgment & Crew Resource Management	Jensen
8) Aircraft Safety: Accident Investigations Analyses & Applications	Krause
9) Aviation & Airport Security	Sweet
10) Commercial Aviation Safety 3 / E	Wells
11) Vol. 06 Aviation Medicine & Survival	Royal Airforce Publications
12) Future Air Navigation System (FANS)	V.P.Galotti

Evaluation of Projects (Where ever Applicable)

- i) A student who passes in all the theory courses but does not secure minimum grade 'E' in project as applicable has to resubmit a fresh project till he/she secures a minimum grade 'E'. His/her marks and/or grades in the theory courses that the student has passed will be carried forward but he/she shall be entitled for grade "E" on passing.
- ii) The evaluation of project and viva-voce examination shall be by awarding grade in the seven point scale as given in (1) above.
- iii) A student shall have to obtain minimum of grade 'E' (or its equivalent marks) in project evaluation and viva/voce taken together. i.e. 40% marks in project work. The evaluation of project will be based on the following guidelines.

Guide lines for Project evaluation

Each project is of 25 marks

Project	Scope 20%	Exposition 40%	Originality 20%	Presentation 20%	Total
	5	10	5	5	25
Project 1					
Project 2					
Project 3					
Project 4					
Total	20	40	20	20	100

General Guidelines of the Evaluation System for All Semesters

The Credits are defined in terms of the learner's time spent in hours which are divided into two parts such as Actual and Notional. The value of a particular course can be measured in number of Credit Points. The value of One Credit is equal to 30 to 40 learning hours.

The scheme of Examination shall be divided into two parts: Internal assessment and External assessment (semester end examination). Internal Assessment includes Assignments, Seminars, Case Studies, Quizzes, Viva, Open book test, Unit Tests etc..

Internal assessment	Semester end examination	Total (for each course or head of passing)
40 %	60 %	100%

The semester wise Credit Points will be varied from program to program but the total credits to be earned by learner to achieve Under Graduate Program degree shall be 120 Credits.

Program	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Undergraduate	20	20	20	20	20	20	120

Scheme of Examination: - The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part and by conducting the Semester End Examinations with 60% marks in the second part.

For Term work/ internal (continuous) assessment, a teacher may select a variety of procedures for examination such as:

- Mid Term Test (written or multiple choice questions objective)
- Short Quizzes
- Assignments
- Case study
- Extension/field/experimental Work
- An Open Book Test (with the concerned teacher deciding what books are to be allowed for this purpose)

The system of evaluation will be as follows:

Each term work module mentioned above will be evaluated in terms of marks first and then to letter grades and grade points as shown in the following performance grading table shown below.

PASSING STANDARD AND PERFORMANCE GRADING:

PASSING STANDARD

Minimum grade 'E' means grade 'E' or 'D' or 'C' or 'B' or 'A' or 'O' in seven point scale.

"Pass" means minimum grade 'E' or above in 7 point scale.

"Fail" means grade 'F' in 7 point scale.

The learners shall have to obtain a minimum of 40% marks in each of Internal Assessment and Semester End Examination separately. This means 16 out of 40 in the Internal Assessment and 24 Out of 60 in Semester End Examination separately.

PERFORMANCE GRADING

The PERFORMANCE GRADING of a student shall be on the SEVEN point grading system as under:

Grade	Marks	Grade Points
O	70 & above	7
A	60 to 69.99	6
B	55 to 59.99	5
C	50 to 54.99	4
D	45 to 49.99	3
E	40 to 44.99	2
F (Fail/Unsatisfactory)	39.99 & below	1

The performance grading shall be based on the aggregate performance of Internal Assessment and Semester End Examination.

CARRY FORWARD OF THE MARKS IN CASE STUDENT FAILS IN ONE OR MORE SUBJECTS / COURSES:

- i) A student who PASSES in the Internal Assessment but FAILS in the Semester End Examination of the theory paper shall reappear for the Semester End Examination of that theory course. In this case his/her marks of the Internal Assessment shall be carried over. Grade will be awarded after obtaining grade 'E' or above in that module/course.
- ii) A student who PASSES in the Semester End Examination but FAILS in the Internal Assessment of the paper shall reappear for the Internal Assessment of that course. However his/her marks of the Semester End Examination shall be carried over but he/she shall be entitled for grade "E" on passing.
- iii) The Internal Examination for reappearing students will consist of one project of 40 marks which will be divided into 20 marks for the hard copy of the project (10 marks for contents and 10 marks for documentation), 10 marks for the presentation and 10 marks for the viva.