

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI 51

1	Name of Syllabus	C.C. in Drone Pilot Training and Maintenance (303178)												
2	Max.Nos of Student	25 Students												
3	Duration	6 Months												
4	Type	Part time												
5	Nos Of Days / Week	5 Days												
6	Nos Of Hours /Days	5 Hrs												
7	Space Required	Workshop = 350 Sq feet <u>Class Room = 350 Sq feet</u> TOTAL = 700 Sq feet												
8	Entry Qualification	S.S.C. Passed												
9	Objective Of Syllabus/ introduction	1) Understanding Application and Scope of Drone Technology in industrial applications 2) Knowledge about Drone, its working principle and different systems involved in it 3) Ability to fly the drone according to particular industrial Application 4) Knowledge about maintenance and repairing the Drones 5) Knowledge about designing and building new Drones												
10	Employment Opportunity	Self Employment :- 1) Aerial Photographer 2) Drone Surveyor 3) Drone Repair Center Wage Employment :- 1) As a Drone Pilot in different Drone Application based companies 2) As flight planner in surveying companies 3) In drone repair and Maintenance Department 4) As Drone pilot trainer 5) In Drone data processing department 6) Drone pilot in disaster management and emergency management organizations 7) Drone pilot in police department and fire brigade department 8) Drone Search and Rescue operation departments												
11	Teacher’s Qualification	1) Person who has done Diploma or Degree in any engineering stream or ITI in any stream and Drone Pilot Training Course from any reputed institute like Maavan Drone Academy, Betterdrones, Indian Institute of Drones, etc.												
12	Training System	Training System Per Week <table><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>15 Hours</td><td>10 Hours</td><td>25 Hours</td></tr></table>							Theory	Practical	Total	15 Hours	10 Hours	25 Hours
Theory	Practical	Total												
15 Hours	10 Hours	25 Hours												
13	Exam. System	Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks						
		1	30317811	Basic Aerodynamics of Drone	TH-1	3 hrs	100	35						
		2	30317812	Drone Electronics & Mechanical Systems	TH-2	3 hrs	100	35						
		3	30317821	Drone Assembly & Maintenance	PR-1	3 hrs	100	50						
		4	30317822	Drone Flying and Surveying	PR-2	3 hrs	100	50						
				Total			400	170						

Theory I- Basic Aerodynamics of Drone

1. Introduction to Fluid Dynamics
 - i. Properties of Fluids- Density, Viscosity, Specific weight, etc.
 - ii. Types of Flows- Laminar Flow, Turbulent Flow
 - iii. Fluid dynamics Laws
 - iv. Continuity Equation
2. Bernouli's Equation
 - i. Pressure head, Velocity head, Elevation head, gravitational head
 - ii. Head loss
 - iii. Bernouli's Principal and its applications
 - iv. Coanda effect of Lift generation
3. Boundary Layer Flow
 - i. Introduction to Boundary layer and its mechanism
 - ii. Flow Separation
4. Aerofoil Theory
 - i. Types of Aerofoil
 - ii. Lift Equation
 - iii. Determining Efficient Aerofoil
5. Aerodynamics of Drones
 - i. Understanding working principle behind Fixed wing
 - ii. Working of Multirotor, VTOL, Helicopter
 - iii. Advanced aircraft configurations

Theory II- Drone Electronics & Mechanical Systems

6. Drone Frame and Structure
 - i. Basic materials used in Drones
 - ii. Light weight material design
 - iii. Advance material selection for Drone Frame
7. Power System
 - i. Brushless motor working principle and application in Drone
 - ii. Electronic Speed Controller(ESC)
 - iii. LiPo Battery
8. Propeller Theory
 - i. Theory of Propeller
 - ii. Selection criterion behind propeller
 - iii. Material selection for propeller
9. Flight Controller
 - i. Sensors study- Gyro, Accelerometer, Magnetometer, Barometer, etc.
 - ii. Control system
 - iii. GPS and Compass
10. Radio controllers
 - i. Working principle of remote controller
 - ii. Understanding 2.4GHz band and channels
 - iii. Frequency Hopping system

Practical I- Drone Assembly & Maintenance

- 1 Study of soldering Techniques.
- 2 Study of Frame construction and cutting
- 3 Study of measurement systems
- 4 Study assembling Drone components on frame
- 5 Drone configuration and programming
- 6 Study of Drone Logs and black box
- 7 Fault finding Techniques
- 8 Testing
- 9 Simulation

Practical II - Drone Flying Techniques

- 10 Preflight Checklists
- 11 Understanding DJI Go 4 App
- 12 Understanding Litchi, Drone Deploy, Pix4D app
- 13 Weather and Meteorology
- 14 DGCA Rules and Regulations
- 15 Digital Sky Platform
- 16 Simulation Training
- 17 Basic Hovering Skills
- 18 Basic Flying techniques
- 19 Advanced Flying Techniques
- 20 Flight Preparation Technique
- 21 Flight Planning for Data collection
- 22 Data processing Techniques using Drone Deploy, Pix4D capture, Litchi app
- 23 Data processing, Report generation and Accuracy Measurement
- 24 Use of Ground Control Points for improving Accuracy of Result

Guidelines for Theory Paper

1. No question on calculation or designing.
2. Questions should be practical oriented.
3. Question No 1 is compulsory objective type based on entire syllabus.
4. Each question should have 2/3 sub questions.
5. 2 question on Aerodynamics
6. 2 question on Drone Electronic and Mechanical System
7. 1 question on (topics).
8. 2 questions on (6 iii, iv topics).
9. 1 question on (topic 7).
10. 1 question on (topic 8)

List of Tools Equipment:

Sr No	Description of Tools/ Equipments	No/Required	Price(INR)
1	Industrial Drone	2	3,50,000
2	Custom Drone frame	2	1500
3	Drone motors	8	3400
4	Electronic Speed Controller	8	3400
5	Propeller	8	350
6	Flight Controller	2	6000
7	Remote controller	2	8000
8	Multimeter	2	4000
9	LiPo Batteries	2	3000
10	Charger	2	5500
11	LiPo checker	2	300
12	Fixed Wing	2	20000
13	Screw Driver Set	2	400
14	Soldering Gun	2	1500

Total = Rs. 4,07,350/-

- 15) Staff:
One person – Instructor cum Demonstrator

A) Reference Book

i) Drones (The Ultimate Guide) by Ben Rupert
ii) Drone Mastering Flight Techniques by Brian Halliday
iii) Getting Started with Drone by Shroff Publisher & Distributors Pvt. Ltd.
