C–4750	Sub. Code
	91313

B.Sc. DEGREE EXAMINATION, NOVEMBER 2021.

First Semester

Aircraft Maintenance Science

MATHEMATICS

(2016 onwards)

Duration : 3 Hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. How many number of terms in the expansion of $(x + a)^n$?

2. Write down the general term in the expansion of $(x - a)^n$.

3. Find the modulus and amplitude of $\dfrac{\left(3 - \sqrt{2}i\right)^2}{1 + 2i}$.

4. State any two properties of complex number.

5. Define Euler's theorem on Homogeneous functions.

6. Suppose $f(x, y, z) = \dfrac{\left(4x^3 + 2y^2z\right)}{(x + 2y + 3z)}$ is homogeneous. What is its degree?

7. Find $\int \cos(3x + 2)\, dx$.

8. Evaluate $\int \sqrt{x^2 + 2x + 5}\, dx$.

9. Define particular solution of the differential equation.

10. Solve $p^2 - 7p + 12 = 0$.

Part B $(5 \times 5 = 25)$

Answer **all** questions, either (a) or (b)

11. (a) Find the values of 5th power of 11 using Binomial theorem.

Or

(b) Find the general term in the expansion of $\left(5x + \dfrac{1}{x^2}\right)^{10}$.

12. (a) Simplify $\dfrac{(\cos 5\theta - i \sin 5\theta)^2 . (\cos 7\theta + i \sin 7\theta)^{-3}}{(\cos 4\theta - i \sin 4\theta)^9 . (\cos \theta + i \sin \theta)^5}$

Or

(b) Use De-Moivre's theorem to solve the equation $x^4 - x^3 + x^2 - x + 1 = 0$.

13. (a) If $u = x^3 - 3x^2 y - 2z^3$, then prove that $x u_x + y u_y + z u_z = 3u$.

Or

(b) If z is a homogeneous function of degree n in x and y. Show that

$$x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \, \partial y} + y^2 \frac{\partial^2 z}{\partial z^2} = n(n-1)z.$$

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14. (a) Evaluate by partial fraction method of $\int \dfrac{1}{x^2 + 3x + 2}\, dx$.

Or

(b) Evaluate $\int \dfrac{7x - 6}{x^2 - 3x + 2}\, dx$.

15. (a) Solve $x - yp = \alpha p^2, 0 < p < i$.

Or

(b) Write down the working rule for the first order differential equation solvable for y.

Part C $(3 \times 10 = 30)$

Answer **all** questions, either (a) or (b)

16. (a) Find the value of $(0.999)^{\frac{1}{3}}$ correct to four decimal places.

Or

(b) The first three terms in the expansion of $(1 + ax)^n$, where n is a positive integer are $1 + 15x + 90x^2$. Find $'a'$ and $'n'$.

17. (a) Expand $\sin^7 \theta \cos^3 \theta$ in a series of sines of multiples of θ.

Or

(b) (i) Prove that $\tan 5\theta = \dfrac{5t - 10t^3 + t^5}{1 - 10t^2 + 5t^4}$ where $t = \tan \theta$.

(ii) Prove that

$\cos 6\theta = 32 \cos^6 \theta - 48 \cos^4 \theta + 18 \cos^2 \theta - 1$

3   C–4750

18. (a) Solve the differential equation $y = px + \alpha\sqrt{1 + p^2}$.

Or

(b) Solve $xp^2 - 2yp + x = 0$.

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C–4750

C–4751	Sub. Code
	91314

B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

First Semester

Aircraft Maintenance Science

WORKSHOP PRACTICES

(2016 onwards)

Duration : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1. What is Safe Dress for Machinist?

2. Why it is considered dangerous to permit a large accumulation of chips in the lathe Panel?

3. What is meant by "Peening"

4. What are Pliers?

5. What is Vernier Bevel Protector?

6. What is known as Dial Test Indicator?

7. List out the three basic types of Bolts?

8. What is system of fit?

9. What is Head Stock?

10. Define Brazing.

Answer **all** questions, by choosing either (a) or (b).

11. (a) List out the five precautions for Electricity.

Or

(b) Write short notes on Fire Extinguishers colours.

12. (a) What are the energy sources for Power Tools?

Or

(b) Write short notes on Clamping and Holding Devices.

13. (a) List out the types of Micrometers.

Or

(b) Write short notes on Optical Flat.

14. (a) How will you decide the selection of Bolt Materials?

Or

(b) Write short notes on Classification of Threads and Taper Size.

15. (a) List out different types of Milling Machines.

Or

(b) What type and shapes of Cutting Tool are used for various Metals and Materials in Lathe?

C–4751

Answer **all** questions, by choosing either (a) or (b).

16. (a) List out the Basic Guidelines for safe Handling of Electricity.

    Or

    (b) List out the uses of the Electrical Test Equipments.

17. (a) How will you Enhance durability, Sensitivity and Visibility of Dial Test Indicators?

    Or

    (b) List out the explain the types of Bolts and their uses.

18. (a) List out the types of Welding and its applications.

    Or

    (b) What are the principal safety rules that the Grinding Machine operator must follow?

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C–4752	Sub. Code
	91315

B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

Allied Courses – III

First Semester

Aircraft Maintenance Science

BASIC ELECTRICITY

(2016 onwards)

Duration : 3 Hours　　　　　　　Maximum : 75 Marks

Part A　　　　　　　$(10 \times 2 = 20)$

Answer **all** questions.

1.   State "Ohms Law".

2.   State Thevenin's Theorem.

3.   What is Modern Electron Theory?

4.   State "Bohr's Theory".

5.   List out the types of magnetism.

6.   How does a Voltmeter works?

7.   Write the purpose of Ohmmeter.

8.   List out the types of Speed Control of Shunt Motor.

9.   What is the difference between a Voltmeter and Multimeter?

10. Define Doping.

Answer **all** questions, either (a) or (b).

11. (a) How a Short Circuit Occurs?

    Or

    (b) What is Linear and Non-Linear Circuits?

12. (a) Write short notes on Rectifier voltage Drop.

    Or

    (b) What is the significance of Dipoles?

13. (a) Write short notes on Electrical Units of Measure.

    Or

    (b) List out the assumptions and Limits of Band State of Solid.

14. (a) What are the different types of Probes used in Multimeter?

    Or

    (b) Write disadvantages of three point starter.

15. (a) List out two broad categories of Electro Magnetic Generator.

    Or

    (b) List out the types of starters for DC motors and its advantages.

2   **C–4752**

Part C (3 × 10 = 30)

Answer **all** questions, either (a) or (b).

16. (a) List out the parts of Electric Circuits and Network.

Or

(b) Briefly discuss about the Thevenin' s Theorem in DC Circuit analysis.

17. (a) Write notes on Inductors and Capacitors.

Or

(b) List out the properties of Semi-Conductors.

18. (a) Explain about the application of Electromagnetic Inductions.

Or

(b) Discuss about the speed control methods of DC Motor.

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3 **C–4752**

C–4753	Sub. Code
	91323

B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

Second Semester

Aircraft Maintenance Science

APPLIED PHYSICS

(2016 onwards)

Duration : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1.   Write down the condition for good interference pattern.

2.   Why Newton's rings are circular appears?

3.   Define Polarization.

4.   Define frame of reference.

5.   Define reverbration.

6.   What is ultrasonics?

7.   Define coherence in term of LASER.

8.   Write down the condition of total internal reflection.

9.   Write any two application of semi conductor LASER.

10.   Define unit cell.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain interference in thin flim.

Or

(b) Give the difference between interference and diffraction.

12. (a) With a neat diagram explain the working principle of Nicol Prism.

Or

(b) Write in brief about LCD.

13. (a) Explain the concept of reflection in sound waves.

Or

(b) Give the properties of ultrasonic waves.

14. (a) Discuss in brief about the population inversion of LASER.

Or

(b) Write in brief about the construction and working principle of Optical fibre.

15. (a) Explain the geometry of space lattice.

Or

(b) Differentiate between Type 1 and Type 2 Super conductor.

2 **C–4753**

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Explain Newton's ring arrangement and hence justify the condition of centre of Newton's ring darkness appears.

Or

(b) Write a note about Rayleigh's concept of resolving power.

17. (a) Derive Lorentz transformation of special theory relativity.

Or

(b) Obtain Sabine's Reverbration formula.

18. (a) Draw a neat energy level diagram of Ruby lase and discuss its construction and working.

Or

(b) Explain the classification of solids.

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C–4753

B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

Second Semester

Aircraft Maintenance Science

PRINCIPLE OF ELECTRONICS AND ELECTRONICS CIRCUITS

(2016 onwards)

Duration : 3 Hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1.   Define resistor and give its units.

2.   Define tolerance.

3.   What is a semiconductor?

4.   Draw the P type semiconductor.

5.   Explain power dissipation in power amplifier.

6.   Difference between oscillator and amplifier.

7.   Write down the frequency oscillation condition of Wein bridge oscillator.

8.   Give the principle of Colpitts oscillator.

9.   Covert $(25)_{10}$ into binary number.

10. What is OP-AMP?

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain resistor in series and parallel.

Or

(b) Compare between the resistor and capacitor.

12. (a) Explain the energy band diagram in a semiconductor.

Or

(b) How transistor act as an amplifier? Justify your answer.

13. (a) Explain any one classification of amplifier.

Or

(b) Derive the power efficiency of class B push pull amplifier.

14. (a) Write a brief note on tuned collector oscillator.

Or

(b) Give the difference between phase shift and Hartley oscillator.

15. (a) With the neat sketch verify the truth table of half adder and full adder.

Or

(b) Explain the phase modulation and demodulation.

Part C (3 × 10 = 30)

Answer any **three** questions either (a) or (b).

16. (a) Explain the different type of capacitor.

Or

(b) Explain the characteristics of MOSFET and SCR transistors.

17. (a) Write in brief about :

(i) Push pull amplifier

(ii) Feedback in amplifier.

Or

(b) Draw a neat diagram for the construction and working of Hartley oscillator and hence verify its frequency of its oscillation.

18. (a) Define amplitude and modulation and hence derive the mathematical analysis of modulation factor.

Or

(b) Explain OP-AMP as a

(i) Integrator.

(ii) Differentiator.

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3   C–4754

B.Sc. DEGREE EXAMINATION, NOVEMBER 2021.

Third Semester

Aircraft Maintenance Science

STRENGTH OF MATERIALS AND APPLIED MECHANICS

(2016 onwards)

Duration : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1.   Define rigid body.

2.   Define force.

3.   Define stress.

4.   State Hooke's law

5.   What are the sign conventions in the shear force and bending moment in general?

6.   What do you mean by thrust diagram?

7.   What are the types of bearing?

8.   What are the uses of rivet in aircraft industry?

9.   Define ISO.

10. What is the use of the belt drive?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Define the following:

    (i) Fundamental units

    (ii) Mechanics

    (iii) Triangle law of forces

Or

(b) Define the following:

    (i) Polygon law of forces

    (ii) Composition of forces

    (iii) kinetics

12. (a) Derive the expression for deformation of a bar due to its own weight.

Or

(b) Define the following:

    (i) Stress

    (ii) Strain

    (iii) Elasticity

13. (a) A cantilever of length 3 m carries a uniformly distributed load of 2 KN/m run over a length of 2 m from the fixed end. And also, it carries a point load of 1 KN at the free end. Draw the shear force and bending moment.

Or

(b) Write about the maximum shear stress theory.

C–4755

14. (a) (i) Define factor of safety.

(ii) What type of materials used in bearing?

Or

(b) What are the types of spring? What are the uses of springs?

15. (a) Discuss about the gear drives briefly.

Or

(b) Different types of fasteners used in aircraft.

Part C (3 × 10 = 30)

Answer **all** questions, choosing either (a) or (b).

16. (a) (i) Two wire one of steel and the other of copper, are of the same length and are subjected to the same tension. If the diameter of the copper wire is 2 mm, find the diameter of the steel wire, if they are elongated by the same amount. Take E for steel as 200 GPa and that for copper as 100 GPa.

Or

(b) Define the following:

(i) Derived units

(ii) Space

(iii) Parallelogram law

(iv) Composition of forces

(v) Scalar

3 C–4755

17. (a) A steel wire ABC 16 m long having cross-sectional area of 4 mm² weighs 20 N as shown in Fig. If the modulus of elasticity for the wire materials is 200 GPa, find the deflections at C and B.

Or
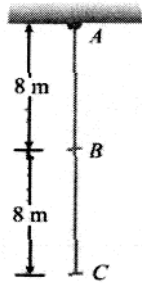
(b) Derive the expression for slope and deflection of cantilever beam carrying a uniformly distributed load over a whole span.

18. (a) Explain about the procedure for riveting process.

Or

(b) Explain about the belt drivers and derive the expression for the span of the belt.

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C–4756	Sub. Code
	91333

B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

Third Semester

Aircraft Maintenance Science

FLUID MECHANICS AND HYDRAULIC MACHINES

(2016 onwards)

Duration : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1. Define pascal's law

2. What is the need for pressure measurement in aircraft?

3. What are the types fluid flow?

4. Distinguish between rotational flow and irrotational flow?

5. Define water hammers.

6. How will you determine the velocity of flow using pitot tube?

7. Define jet.

8. Draw the Francis turbine and mention its parts.

9. What is hydraulic crane?

10. What are the methods of joints of pneumatic circuits?

Part B $(5 \times 5 = 25)$

Answer **all** questions, either (a) or (b).

11. (a) Explain about U tube differential manometer with suitable sketch and derive the expression to find the pressure.

Or

(b) Write definition expression and units followed for given below.

(i) Capillary

(ii) Surface tension

(iii) Vapour pressure

12. (a) A 25 cm diameter pipe carries oil of sp.gr. 0.9 at a velocity of 3 m/s. At another section the diameter is 20 cm. Find the velocity at this section and also mass rate of flow of oil.

Or

(b) Derive the expression for Bernoulli's equation.

13. (a) Define losses in pipes. Explain about losses in pipes.

Or

(b) An oil of sp.gr.0.9 and viscosity 0.06 poise is flowing through a pipe of diameter 200mm at the rate of 60 liters/s. Find the head lost due to friction for a 500 in length of pipe. Find the power required to maintain this flow.

2   **C–4756**

14. (a) A nozzle of 50mm dia. Delivers a stream of water at 20 m/s perpendicular to a plate that moves away from the jet at 5 m/s. Find:

      (i) The force

      (ii) The work done

      (iii) The efficiency of the jet.

Or

  (b) Explain about Kaplan turbine with suitable diagram.

15. (a) Write in detail about the Gear pump.

Or

  (b) Write in detail about the hydraulic press.

Part C $(3 \times 10 = 30)$

Answer **all** questions either (a) or (b).

16. (a) Write about the flow through nozzle. And derive the expression for power transmitted through nozzle.

Or

  (b) Write about the applications of Euler's and Bernoulli's principle.

3   **C–4756**

17. (a) A main pipe divides into two parallel pipes which again forms one pipe as shown in fig. The length and dia. for the first parallel pipe are 2000 m and 1 m respectively. While the length and dia. of 2nd parallel pipe are 2000 m and 0.8 m. Find the rate of flow in each parallel pipe, if total flow in the main is 3 m^3/s. The co efficient of friction for each parallel pipe is same and equal to 0.005.

Or

(b) Explain about the types of fluid flow.

18. (a) Write in detail about the working of the hydroelectric power plant.

Or

(b) What are the types of valves and controls? Write in detail.

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C–4756

B.Sc. DEGREE EXAMINATION, NOVEMBER 2021.

Third Semester

Aircraft Maintenance Science

MECHANICS OF FLIGHT AND HELICOPTER CONFIGURATION

(2016 onwards)

Duration : 3 Hours　　　　　　　　Maximum : 75 Marks

Part A　　　　　(10 × 2 = 20)

Answer **all** questions.

1.　What is Relative humidity?

2.　What is Aerodynamic Center?

3.　What is Stability? Give its types.

4.　Define Thrust.

5.　Describe Collective Pitch.

6.　What is Coriolis Effect?

7.　What is meant by Stabilizer Bar?

8.　What is the purpose of Dampener?

9.　Mention the main components of Tail rotor assembly.

10.　What is the function of Sprag Clutch?

Answer **all** questions, choosing either (a) or (b).

11. (a) What is Bernoulli's Principle? Explain its significance.

    Or

    (b) What is an Aerofoil? Write the types of airfoils and its significance.

12. (a) Explain the effects of various control surfaces associated with roll, pitch and yaw motion of an aircraft.

    Or

    (b) Explain the effect of Sideslip in the Directional stability of an aircraft.

13. (a) With a neat sketch, explain the major parts of a helicopter and their functions.

    Or

    (b) Explain the Dissymmetry of lift.

14. (a) Explain the concept of Swash plate Mechanism.

    Or

    (b) Describe the procedure for Blade alignment.

15. (a) Write short notes on engine transmission couplings.

    Or

    (b) Explain the pitch changing mechanism of tail rotor.

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Part C (3 × 10 = 30)

Answer **all** questions, choosing either (a) or (b).

16. (a) What is Lift force? Discuss the various factors contributing Lift generation.

Or

(b) What are the various types Drag experienced by an aircraft?

17. (a) Explain the construction of Metal and Composite Rotor blades.

Or

(b) Explain the aerodynamic characteristics of a helicopter.

18. (a) Explain in detail about main rotor head maintenance.

Or

(b) Write short notes on

(i) Freewheeling unit

(ii) Drive shaft.

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3 **C–4757**

C–4758	Sub. Code
	91335

B.Sc. DEGREE EXAMINATION, NOVEMBER 2021.

Third Semester

Aircraft Maintenance Science

AIRCRAFT MATERIALS, HARDWARE AND NDT

(2016 onwards)

Duration : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **ALL** questions.

1.   List out the alloys of Nickel.

2.   What is Annealing?

3.   Define Normalizing.

4.   What are the outcomes of Heat Treatment?

5.   Name some glues used in Aircraft construction.

6.   What is kiln Drying of Wood?

7.   Define Composite Materials.

8.   What are Thermoplastics?

9.   What is NDT?

10.   Define Glass Fibers.

Part B   (5 × 5 = 25)

Answer **ALL** questions, choosing either (a) or (b).

11. (a) Write short notes on Magnesium and its Alloys.

    Or

 (b) Explain in detail about Impact tests.

12. (a) Write short notes on Case Hardening.

    Or

 (b) Explain the process and principles of Electroplating.

13. (a) Explain about the Dopes and Doping processes.

    Or

 (b) Explain briefly about Non Self locking nuts and Self locking nuts.

14. (a) Explain the importance of Carbon Fibers and FRPG.

    Or

 (b) Describe the advantages and disadvantages of Composite Materials.

15. (a) Briefly discuss about the Radiography.

    Or

 (b) Explain the procedure involved in Ultrasonic Testing.

C–4758

Part C $(3 \times 10 = 30)$

Answer **ALL** questions, choosing either (a) or (b).

16. (a) Write short notes on

   (i)   Hardness

   (ii) Elasticity

   (iii) Carburizing

   (iv) Yield point

   (v)   Elastic limit.

Or

   (b) Discuss the properties of Copper and its alloys.

17. (a) Discuss the process involved in Chromate Treatment.

Or

   (b) Explain the various applications of Plastics in Aircraft industry.

18. (a) Explain the various applications of Composite Materials.

Or

   (b) Explain the following terms:

   (i)   Dye Penetrate method

   (ii) Magnetic Particle testing.

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