C–1717

Sub. Code
91342

B.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Aircraft Maintenance Science

THERMODYNAMICS

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is Thermodynamics?
2. Mention the laws of thermodynamics.
3. What is ideal gas in thermodynamics?
4. Define Boyles law.
5. What are the properties of ideal gas mixtures?
6. State the Avogadro's law.
7. What is compressor?
8. Define isothermal efficiency.
9. What are the gas turbine engine?
10. Define thermal efficiency of gas turbine engine.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Write a short note on enthalpy and entropy.

Or

(b) Discuss the modes of heat transfer.

12. (a) What are the fundamentals of air-conditioning system.

Or

(b) Sketch the Otto cycle and Brayton cycle.

13. (a) Write the calorific value for petrol, CNT, Hydrogen, coal and kerosene.

Or

(b) State the importance of gas compression.

14. (a) Explain the working principle of reciprocating compressor.

Or

(b) Write the difference between centrifugal and axial flow compressor.

15. (a) Write the advantages and disadvantages of closed cycle gas turbine engine.

Or

(b) Explain the types of rocket propulsion.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) A fluid at a pressure of 2 bar and with specific volume of $0.15 m^3/kg$ contained in a cylinder behind a piston expands reversibly to a pressure of 0.6 bar according to a law, $p=c/v^2$ where c is a constant. Calculate the work done by the fluid on the piston.

Or

(b) Explain the different types of systems with neat sketches and suitable examples.

17. (a) What is the value of and units on R? What is R called? And What is often called the Ideal Gas Constant is 0.0820574 L atm mol^{-1} K^{-1}. What is often called the Universal Gas Constant is 8.31451 J mol^{-1} K^{-1}. Convert the Ideal Gas Constant into the Universal Gas Constant and vice versa.

Or

(b) Explain the working principle of open cycle and closed cycle gas turbine engine.

18. (a) Briefly explain the Avogadro's law for ideal gas.

Or

(b) Explain air standard cycles and its assumptions.

———————

C–1718	Sub. Code
	91343

B.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Aircraft Maintenance Science

AIRCRAFT INSTRUMENTS AND COMPASS

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Mention the types of aircraft display.
2. What is ISA?
3. What is a pitot tube heater?
4. What is machmeter?
5. What is turn indicator?
6. Write the application of Gyroscopic instruments.
7. What is RPM indicator?
8. List out the functions of pressure gauges.
9. What are the types of compasses?
10. Write the advantages of remote reading compass.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Write a short note about aircraft basic instruments.

Or

(b) Explain about display markings and its purpose.

12. (a) Explain the working principle of Altimeter.

Or

(b) Explain the function of pitot static probes.

13. (a) Explain the working principle of gyroscopic.

Or

(b) Explain the working principle of artificial horizon.

14. (a) Explain thermocouple thermometers.

Or

(b) Discuss the operation of fuel quantity indicator.

15. (a) Explain the magnetic properties of compass.

Or

(b) Explain calibration process of DR compass.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Explain the difference between quantitative and qualitative displays, and quote some examples of instruments to which they are applied.

Or

(b) Explain in details about the working of pitot tube in the airspeed indicator.

17. (a) Explain in detail about the principle and operation of gyroscopic instruments.

Or

(b) Explain the working principle of resistance thermometer with neat sketch.

18. (a) Briefly explain the principle and operation of bourdon type pressure gauge.

Or

(b) Explain the function and operation of direct reading compass with neat sketch.

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C–1719	Sub. Code
	91344

B.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Aircraft Maintenance Science

AIRCRAFT STRUCTURE AND SYSTEMS

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. What are aircraft station numbers?

2. Define failsafe.

3. What are the flight controls of aircraft.

4. How are the main flight control surfaces affected?

5. List out the components of instruments landing system

6. What are the components of landing gear.

7. Define pascal's law.

8. Mention the classification of seals used in hydraulic system.

9. What is aircraft fuel system?

10. What is multi engine aircraft fuel system?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Explain the types of wing structure and sketch the forces acting on it.

Or

(b) Discuss the zoning nomenclature of aircraft.

12. (a) What are the primary and secondary flight controls of an airplane?

Or

(b) What are the different methods of balancing of control surfaces.

13. (a) Explain the operation of brake system.

Or

(b) Explain the landing gear with skid assembly wheels.

14. (a) What are the components of hydraulic system.

Or

(b) Explain the function of fluid lines used in hydraulic system.

15. (a) Discuss the fuel tanks used in aircraft.

Or

(b) Discuss fuel jettison system.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Briefly explain the fuselage structure and its types.

Or

(b) Explain damage tolerance and fail safety of sandwich structure.

17. (a) Explain in detail about Digital fly by wire system with neat sketch.

Or

(b) Explain the working principal of landing gear retraction system.

18. (a) Explain with neat sketch roles and responsibilities of aircraft hydraulic system.

Or

(b) Explain with neat sketch the working principle of gravity feed and pressure feed fuel system.

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C–1726	Sub. Code
	91361

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Aircraft Maintenance Science

AIRCRAFT MAINTENANCE, GROUND HANDLING AND SUPPORT EQUIPMENTS

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is the purpose of check list?

2. Write short note on 100 Hrs. inspection

3. Write a short note on inspection in the landing gear strut.

4. What are important things to be checked after lightning strike.

5. What are the points to be considered while designing a rivet layout?

6. What are the formulae for calculating the Number of rivets required on each side of the break

7. Describe about fire Extinguisher Periodic Check List

8. Write a short note on movement of aircraft.

9. What is the use of electrical power unit

10. What do you mean by Ground support unit?

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

Answer **all** questions.

11. (a) Describe different types of publications used in the aircraft maintenance?

Or

(b) Write a short note on progressive inspection.

12. (a) Write about the Severe Turbulence Inspection

Or

(b) Discuss about the landing gear retraction test procedure.

13. (a) Explain about types of rivet failures.

Or

(b) Explain about the lever type metal cutting manually operated tools.

14. (a) Discuss about the helicopter tie down procedure.

Or

(b) Write the steps to be followed in towing of the aircraft.

15. (a) Explain about air start unit

Or

(b) Explain about hydraulic power unit.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Discuss in brief about the alignment of main gear wheels.

Or

(b) Explain the procedure of the stringer repair work.

17. (a) Explain briefly about the steps and precautions while removing the rivets.

Or

(b) Write down the procedure and precautions to be followed while towing operation of the aircraft.

18. (a) Describe in detail about the annual inspection and 100 Hrs. inspection

Or

(b) Explain about following:

(i) Aircraft jacks

(ii) Tow bars

———————

C–1727	Sub. Code 91362

B.Sc. DEGREE EXAMINATION, APRIL 2024.

Sixth Semester

Aircraft Maintenance Science

AERO ENGINE MAINTENANCE

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. How is the term "overhauled engine" defined?

2. What is the purpose of the preliminary visual inspection?

3. What types of hubs of generally used to mount propellers on engine crankshafts?

4. What is the purpose of checking propeller track?

5. What are the components needed for ignition system check?

6. Explain liquid lock.

7. What are the sections included in cold section?

8. What is the use of boroscope?

9. Define EPR.

10. Describe wet motoring check.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Briefly describe magnetic particle inspection.

Or

(b) How the dimensional check carried out in cylinder barrels?

12. (a) Write a short note on static propeller balancing.

Or

(b) Write down the procedure for propeller tracking.

13. (a) Write a short note on magneto ignition timing devices.

Or

(b) Write about the engine post stopping procedures.

14. (a) Explain about the inspection to be carried out in compressor section.

Or

(b) What are the general procedures for performing a hot section inspection?

15. (a) How do you asses the performance of engine from EGT, Fuel flow, RPM?

Or

(b) Write the procedure for preparing the engine for run up and initial warm up.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) Write about the general overhaul procedure of reciprocating engine.

Or

(b) What are the causes for rejection of the wooden propeller?

17. (a) Write down the Engine Stopping procedure.

Or

(b) Explain about the Turbine Blade Replacement Procedure.

18. (a) Explain about the engine initial warm up, run up and full throttle checks.

Or

(b) Explain about the inspection and repair of combustion section.

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C–1728

Sub. Code
91363

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Aircraft Maintenance Science

AIRCRAFT COMMUNICATION AND NAVIGATION SYSTEM

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define radio wave.

2. Mention the types of amplifiers.

3. State the importance of communication system.

4. Define VHF communication in aircraft.

5. Define navigation. Write short notes on navigation system.

6. What GPS system.

7. What is the use of radio in aircraft?

8. What is emergency locator transmitters?

9. What is weather radar in aircraft?

10. What are the different radar bands?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Explain wave length and frequency.

Or

(b) Explain the function of radio receiver.

12. (a) Write the difference between VHF and RF communication system.

Or

(b) Discuss the function of VHF antenna in aircraft.

13. (a) What are all the different categories of navigation? Brief in detail.

Or

(b) Explain in detail about principle and features of VOR.

14. (a) What is TCAs and how its work?

Or

(b) Explain the technical characteristics of radio altimeter system.

15. (a) Discuss about flat plate antenna used in aircraft.

Or

(b) Explain the function of radome used in aircraft.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) With neat sketch explain the function and operation of Radio receiver and its types.

Or

(b) Explain briefly about radio transmitter and its types.

17. (a) Explain the function and operation of audio control system.

Or

(b) Explain about general arrangement of inertial navigation system (INS) components with neat sketch.

18. (a) Briefly explain the types of Aircraft transponder.

Or

(b) Explain the operation of aircraft weather system in detail.

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C–1729	Sub. Code 91364A

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Aircraft Maintenance Science

CUSTOMER RELATIONSHIP MANAGEMENT

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is CRM?
2. What is relationship marketing?
3. Write the importance of CRM.
4. Mention the stages of evolution of CRM.
5. What is sales automation?
6. State the objectives of contact management in CRM.
7. How does culture affect CRM.
8. What is a customer centric ecosystem?
9. State the examples of CRM best practices.
10. What is a customer centric ecosystem?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What is the purpose of relationship management?

Or

(b) Write the difference between relationship marketing and CRM.

12. (a) What is CRM strategy and how it can benefit for your business?

Or

(b) Write the advantages and disadvantages of customer divisibility in CRM.

13. (a) Write the advantages and disadvantages of sales force automation.

Or

(b) Discuss the importance of CRM and relationship marketing.

14. (a) Explain web-based contact management system for small business.

Or

(b) Explain the components of enterprise marketing management.

15. (a) Differentiate database marketing and CRM.

Or

(b) Why is it important to have a prospecting database?

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) Explain in detail about customer Life cycle stages and its analysis. Also explain how to implement it in your organization to grow the business.

Or

(b) Explain the steps to build better customer relationships in organization with CRM.

17. (a) Explain about evolution of customer relationship management.

Or

(b) Briefly discuss the CRM vendor selection process for small business category.

18. (a) Explain role of artificial intelligence in customer relationship management.

Or

(b) Explain in detail about CRM metrics for small business owners.

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C–1730

Sub. Code
91364B

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Aircraft Maintenance Science

PRINCIPLES OF AIRLINE AND AIRPORT MANAGEMENT

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. List out the different players in Airline Industry.

2. Write the two types of airline industry analysis.

3. What are the divisions of ICAO?

4. What are the roles of IATA in airline industry'?

5. What is Demand Factor?

6. List out the types of airports in India.

7. Define Boarding Pass.

8. Write the significance of security clearance.

9. List out the contribution of environmental issues in Airline Industry.

10. Discuss about the Airport Charges.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Write short notes on Post World War-II growth of air transportation.

Or

(b) What are the perspectives of Globalization in air transport?

12. (a) What are the aims of ICAO?

Or

(b) What are the objectives of ICAO in relation to Technology transfer and resource development?

13. (a) What are the functions of IATA?

Or

(b) Write short notes on Airport Planning.

14. (a) List out the Aims and objectives of Aircraft Handling.

Or

(b) What is At-Gate Processing?

15. (a) Write short notes on Calculation of common use outbound baggage system rate.

Or

(b) List out the environmental issues related to Noise reduction and Management measures.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) Explain about the Market Potential of Indian Airline Industry.

Or

(b) List out and explain the main objectives of IATA.

17. (a) Briefly describe about the role of ICAO in international air transportation.

Or

(b) List out the measures of Airline Activity.

18. (a) List out the strategic objectives of ICAO.

Or

(b) Briefly explain the Baggage Handling system.

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C–1731	Sub. Code
	91365A

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Aircraft Maintenance Science

AIRPORT ENGINEERING

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Write the airport layout factors.
2. List out the two areas of airport.
3. What is clearway?
4. List out the factors influence required run way length.
5. What is unit terminal?
6. What are the uses of holding apron?
7. What is airport lighting?
8. Define “Touchdown Zone Light”.
9. What is air traffic clearance?
10. What are the contents of voice position reports?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Write the categories of airport and its significance.

Or

(b) What are the basic functions of airport management?

12. (a) Write short notes on "Runway Orientation".

Or

(b) Write the importance of obstacle free zone.

13. (a) List out the design factors for airport apron area.

Or

(b) Write short notes on slot allocation priorities.

14. (a) List out key benefits of an integrated security system.

Or

(b) What is takeoff hold light and its importance?

15. (a) What are the objectives of air traffic services?

Or

(b) Write the procedures for submission of flight plan.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Briefly explain the functions of airport.

Or

(b) Describe about the runways and shoulders.

17. (a) Discuss about the geometry of minimum aircraft parking area turns.

Or

(b) Explain the overview of airport environmental issues.

18. (a) Write notes on Taxiway lights.

Or

(b) Describe the altimeter setting procedure.

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C–1732	Sub. Code 91365B

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Aircraft Maintenance Science

AIRCRAFT MAINTENANCE MANAGEMENT

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are tasks of orientated maintenance managing system?

2. How maintenance is helpful for the aviation industry?

3. Why documentation is need in aircraft maintenance?

4. What is the function aircraft regulatory?

5. Define budgeting.

6. What is Error prevention?

7. Define maintenance control.

8. What is meant by Hamper maintenance?

9. Define reliability.

10. What is the function quality assurance cell?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What are tasks of oriented maintenance managing system?

Or

(b) How maintenance is helpful for the aviation industry?

12. (a) Write short note in ATA STANDARD documents.

Or

(b) What is the function of maintenance and engineering organization?

13. (a) Explain in detail about functions aviation training unit.

Or

(b) What are the functions of technical publications?

14. (a) Write short note on Scheduled maintenance.

Or

(b) What is the advantage of maintenance control system?

15. (a) Write safety rules of the maintenance.

Or

(b) Write short note on ISO certification.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Explain in detail about the types of maintenance.

Or

(b) Explain in detail about the types of documents used in aircraft maintenance.

17. (a) Explain in detail about technical publications.

Or

(b) Explain in detail about the recruitment process for the Maintenance crew.

18. (a) Explain Responsibilities of maintenance control center.

Or

(b) How quality assurance cell control the maintenance activities? Explain briefly.

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C–2414

Sub. Code
91313

B.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Aircraft Maintenance Science

BASIC AERODYNAMICS

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Section A $(10 \times 1 = 10)$

Answer **all** questions.

1. The temperature ratio at 18 km and 19 km is?

   (a) zero (b) 0.7582

   (c) 1 (d) 1.333

2. Which of the following statement(s) is/are true about the "Troposphere" in ISA

   (a) I is the bottom most layer in Earth's atmosphere

   (b) The temperature reduces exponentially as altitude increases

   (c) The temperature increases due to the presence of ozone

   (d) It is the coldest layer of the atmosphere

3. Which of the following drag is known as drag due to lift?

   (a) Wave drag (b) Form drag

   (c) Pressure drag (d) Induced drag

4. What do you mean by aerodynamic centre of an airfoil?

(a) It is point at which pitching moment is zero

(b) It is point at which pitching moment is linearly proportional to Angle of attack

(c) It is point at which pitching moment is independent of Angle of attack

(d) It is point at which angle of attack is zero

5. The life of an aircraft is directly proportional to _____

(a) Speed of the aircraft

(b) Square of speed of aircraft

(c) Doesn't depend on speed

(d) None of these

6. The rudder is a part of _____

(a) Under carriage (b) APU

(c) Empennage (d) Engine

7. Stability about the lateral axis is given by _____

(a) The ailerons

(b) The horizontal tail plane

(c) The wing dihedral

(d) None of these

8. Which of the following gives the aircraft directional stability?

(a) Vertical stabilizer

(b) Elevators

(c) Horizontal stabilizer

(d) Spoilers

9. Speed of sound is measured in ————————

(a) Hours (b) Decibel

(c) Joule (d) Metre/Second

10. What happens to the airflow velocity and pressure across a shock ware?

(a) Velocity increases, pressure decreases

(b) Velocity decreases, pressure increases

(c) Both velocity and pressure increases

(d) Both velocity and pressure decreases

Section B

$(5 \times 5 = 25)$

Answer **all** questions.

11. (a) How do you classify ISA?

Or

(b) Discuss briefly about gradient layer and isotherm region.

12. (a) What is the boundary layer in fluid dynamics, particulary in the context of aerodynamics?

Or

(b) How does aerodynamic twist and geometric twist impact on airplane performance?

13. (a) How roll control is done in an aircraft? Explain.

Or

(b) Explain the fundamental principles behind the gliding of aircraft.

14. (a) Define static and dynamic stability.

Or

(b) Explain the criterion for lateral static stability.

15. (a) Describe the effects of compressibility on high speed aerodynamics.

Or

(b) Explain the classification of mach number.

Section C (5 × 8 = 40)

Answer **all** questions.

16. (a) Derive an relationship between pressure, temperature with respect to altitude.

Or

(b) An aircraft is flying at a geometric altitude of 2.5 km, when the ambient air density is 1.007 kg/m^3. Calculate its pressure altitude (in km) under ISA conditions.

17. (a) What are the different types of drag and how do they affect an aircraft efficiency?

Or

(b) Derive the expression for lift.

18. (a) Explain the functions of secondary control surfaces.

Or

(b) With neat sketch, explain how pitch control carried out in an aircraft.

19. (a) Describe the concept of longitudinal control.

Or

(b) Explain the phenomenon of butch roll stability.

20. (a) Derive an expression for speed of sound.

Or

(b) Discuss the challenges and aerodynamic phenomena associated with transonic speeds in aircraft.

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C–2415

Sub. Code
91315

B.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Aircraft Maintenance Science

MATHEMATICS

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A $(10 \times 1 = 10)$

Answer **all** questions.

1. Let $A\begin{bmatrix}1 & 4\\ 2 & 3\end{bmatrix}$. The A Satisfies the equation ————.

   (a) $A^2 - 4A - 5I = 0$

   (b) $A^2 - 4A + 11I = 0$

   (c) $A^2 + 4A - 5I = 0$

   (d) $A^2 + 4A + 5I = 0$

2. If a characteristic equation of a 3×3 matrix A is $\lambda^3 - 6\lambda^2 + 9\lambda - 4 = 0$ then A^{-1} =————.

   (a) $\frac{1}{4}\left(A^2 + 6A + 9I\right)$ (b) $\frac{1}{4}\left(A^2 - 6A + 9I\right)$

   (c) $\frac{1}{4}\left(A^2 - 6A - 9I\right)$ (d) None

3. Find the angle between the planes $x+2y+z=7$ and $2x-y+z=13$.

(a) $\theta=\cos^{-1}\left(1/6\right)$ (b) $\theta=\cos^{-1}\left(1/3\right)$

(c) $\theta=\cos^{-1}\left(2/3\right)$ (d) $\theta=\cos^{-1}\left(3/4\right)$

4. What is the acute between the lines $x=2$ and $\sqrt{3x}-y-2=0$?

(a) 0^{o} (b) 30^{o}

(c) 45^{o} (d) 60^{o}

5. The Curvature of a straight line is ————.

(a) Zero (b) Vector

(c) Radius (d) Circle

6. Find the locus of a point whose Co-ordinates are given by $x=at^2$, $y=2at$ where t is a parameter

(a) $y^2=2ax$ (b) $x^2=4ay$

(c) $y^2=4ax$ (d) $x^2=2ay$

7. If $u+v=e^x\cos y$ and $u-v=e^x\sin y$ the value of $J\left(\frac{u,v}{x,y}\right)$ is ————.

(a) e^{2x} (b) $\frac{e^2x}{2}$

(c) $\frac{-e^2x}{2}$ (d) 0

8. Which among the following is the definition of Jacobian of u and v w.r. to x and y?

(a) $J\left(\frac{x, y}{u, v}\right)$ (b) $J\left(\frac{u, v}{x, y}\right)$

(c) $\frac{\partial (x, y)}{\partial (u, v)}$ (d) $\frac{\partial (u, x)}{\partial (u, y)}$

9. The execution of a CPM network diagram activity is typically referred to as what?

(a) Connector (b) Occasion Node

(c) Shortest route (d) (a, b)

10. What is the symbol for activity in a network diagram?

(a) Rectangle arrows (b) Squares

(c) Circles (d) dots

Part B

$(5 \times 5 = 25)$

Answer **all** questions.

11. (a) Prove that every square matrix and its transpose have the same eigen values.

Or

(b) If $A = \begin{pmatrix} 1 & 2 & -3 \\ 0 & 3 & 2 \\ 0 & 0 & -2 \end{pmatrix}$, then find the eigen values of $3A^2 + 5A^2 - 6A + 2I$.

12. (a) Find the direction cosines of the line passing through the two points (–2, 4,–5) and (1, 2, 3).

Or

(b) Find the angle between the pair of lines given by $\vec{r} = 3\hat{i} + 2\hat{j} - 4\vec{k} + \lambda\left(\hat{i} + 2\hat{j} + 2\vec{k}\right)$ and $\vec{r} = 5\hat{i} - 2\hat{j} + u\left(3\hat{i} + 2\hat{j} + 6\vec{k}\right)$.

13. (a) Find the envelope of the family of circles $(x-a)^2 + y^2 = 4\alpha$ where α is the parameter.

Or

(b) Find the evolute of the parabola $x^2 = 4ay$ as the envelope of normals.

14. (a) Find the maximum and minimum of $x^2 + y^2 + 6x + 12$.

Or

(b) Find the minimum value of $x^2 + y^2$ subject to the condition $ax + by = c$.

15. (a) Explain the basic steps in PERT/CPM techniques.

Or

(b) Write the advantages of PERT/CPM.

Part C $(5 \times 8 = 40)$

Answer **all** questions.

16. (a) Verify Cayley-Hamilton theorem and hence find inverse for $\begin{pmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{pmatrix}$.

Or

(b) Diagonalise the matrix $A = \begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$ by orthogonal transformation.

17. (a) Find the equation of the two tangent planes to the sphere $x^2 + y^2 + z^2 = 9$ which passes through the line $x + y - 6 = 0 = x - 2z - 3$.

Or

(b) Find the angle between the line $\frac{x+1}{2} = \frac{y}{3} = \frac{z-3}{6}$ and the plane $10x + 2y - 11z = 3$.

18. (a) Find the evolute of the parabola $y^2 = 4ax$ as the envelope of normals.

Or

(b) Find the envelope of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ where $a + b = c$, c is constant.

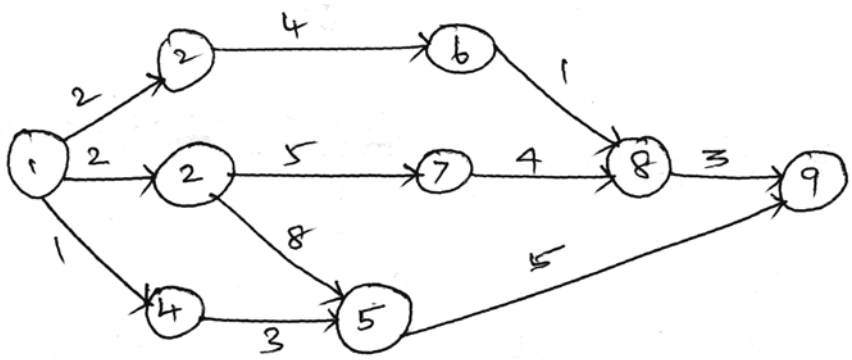
19. (a) If $r^2 = x^2 + y^2$ then show that

$$\frac{\partial^2 r}{\partial x^2} + \frac{\partial^2 r}{\partial y^2} = \frac{1}{r}\left[\left(\frac{\partial r}{\partial x}\right)^2 + \left(\frac{\partial r}{\partial y}\right)^2\right].$$

Or

(b) Find the value of the Jacobian $\frac{\partial(u, v)}{\partial(r, \theta)}$, where $u = x^2 - y^2$, $v = 2xy$ and $x = r\cos\theta$, $y = r \sin\theta$.

20. (a) Find the critical path and calculate the slack time for the following network.



Or

(b) What is the critical path in project management?

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B.Sc. DEGREE EXAMINATION, APRIL 2024.

Second Semester

Aircraft Maintenance Science

WORKSHOP PRACTICES

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A $(10 \times 1 = 10)$

Answer **all** questions.

1. Which factor is critical in ensuring the appropriate selection of fire extinguishers?

   (a) The color of the fire extinguisher

   (b) The weight of the fire extinguisher

   (c) The size of the fire extinguisher

   (d) The markings or indications indicating suitability for a particular class of fire

2. What is the consequence of several wires inside a power cord being broken?

   (a) The current passing through decreases

   (b) The insulation coatings become more resistant to heat

   (c) The current passing through the remaining wires increases

   (d) The wires become more flexible

3. Which statement accurately describes the role of manufacturer's instructions in aircraft maintenance and repair?

(a) Manufacturers instructions are optional guidelines for aircraft engineers

(b) Manufacturer's instructions are solely for reference purposes in aircraft maintenance

(c) Manufacturer's instructions are designed procedures used by the engineer as mandatory guidance to achieve optimal results in aircraft maintenance and repair

(d) Manufacturer's instructions are irrelevant to aircraft maintenance and repair

4. Which criterion is primarily used to classify solid punches?

(a) The material they are made of

(b) Their weight and size

(c) The force required to use them

(d) The shape of their points

5. What is the primary function of calipers?

(a) Weighing objects accurately

(b) Measuring volume

(c) Comparing textures

(d) Measuring diameters and distances or comparing distances and sizes

6. When using a dial gauge, what type of contact is typically made with the surface being measured?

(a) Point contact (b) Surface contact

(c) Line contact (d) No contact

7. What does an allowance refer to in the context of engineering?

(a) The difference in dimension necessary to achieve a specific 'class of fit' between two parts

(b) The material cost difference between two parts

(c) The weight variation between two components

(d) The tolerance level in manufacturing

8. In aircraft and engine manufacturing, what aspect of fits and clearances is crucial for ensuring optimal performance and safety?

(a) Looseness of fits

(b) Tightness of fits

(c) Correct application of lubricants

(d) Compliance with regulatory standards

9. What happens to ammonia gas inside the nitriding furnace at high temperatures?

(a) It condenses into a liquid

(b) It breaks down into nitrogen and hydrogen

(c) It remains unchanged

(d) It solidifies into a powder

10. Which types of steels are best suited for casehardening?

(a) High-carbon steels

(b) Stainless steels

(c) Low-carbon and low-alloy steels

(d) Tool steels

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What are the Precautions must be observed when working with or around pure oxygen?

Or

(b) What are the requirements for fire to occur?

12. (a) Explain about the control of tools which is most important responsibilities of the engineer.

Or

(b) What will be contents of the calibration records or certificates?

13. (a) Explain about the external micrometer with suitable diagram.

Or

(b) Write short notes on Slip gauge.

14. (a) What are the types of bolts?

Or

(b) Discuss about the following :

(i) Ring thread gauge

(ii) Plug thread gauge

15. (a) Write short notes on tempering.

Or

(b) Write about the brines tester.

Part C (5 × 8 = 40)

Answer **all** questions.

16. (a) Explain the workshop safety procedures to be followed for below :

(i) Working in fuel tanks (4)

(ii) Fuel spillage (4)

Or

(b) Write in detail about the types of fire extinguishers.

17. (a) Write in detail about the voltmeter.

Or

(b) (i) What are the hand tool types? (2)

(ii) Explain about any two in detail. (6)

18. (a) Write in detail about any two power tools.

Or

(b) Write in detail about the following :

(i) Hammer (4)

(ii) Pliers (4)

19. (a) What are the limits for twist?

Or

(b) What are the classes of fits and explain in detail about any three.

20. (a) Explain about the nitriding method of surface hardening.

Or

(b) Write in detail about the Barcol tester.

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C–2417	Sub. Code 91325

B.Sc. DEGREE EXAMINATION, APRIL 2024.

Second Semester

Aircraft Maintenance Science

ELECTRONIC FUNDAMENTALS

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Which symbol represents a diode in a circuit diagram?

   (a) ⊕ (b) □

   (c) ➔ (d) ▭

2. Which of the following materials is commonly used in the construction of diodes?

   (a) Copper (b) Aluminum

   (c) Iron (d) Silicon

3. In a transistor, which lead is typically connected to the base region?

   (a) Base (b) Collector

   (c) Emitter (d) None of the above

4. What is the primary function of a transistor in a circuit?

(a) To regulate voltage

(b) To amplify signals

(c) To store charge

(d) To generate heat

5. What is the truth table for a NOT gate?

(a)

Input	Output
0	0
1	1

(b)

Input	Output
0	1
1	0

(c)

Input	Output
0	0
1	0

(d)

Input	Output
0	1
1	1

6. What is the function of a buffer gate in a logic circuit?

(a) It amplifies the input signal

(b) It reverses the input signal

(c) It maintains the input signal

(d) It performs logical inversion

7. What does PCB stand for in electronics?
   (a) Printed Circuit Base
   (b) Processed Circuit Board
   (c) Printed Circuit Board
   (d) Processed Conductive Base

8. What is the primary advantage of using a double-layer PCB over a single-layer PCB?
   (a) Reduced cost
   (b) Increased component density
   (c) Easier manufacturing process
   (d) Higher reliability

9. In a closed-loop system, the feedback signal is:
   (a) Ignored
   (b) Amplified
   (c) Used to adjust the system
   (d) Provided as an input

10. A synchro system is based on the principle of:
   (a) Magnetic induction
   (b) Mechanical linkage
   (c) Electromagnetic induction
   (d) Electrostatic induction

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

Answer **all** questions.

11. (a) What are the primary characteristics and properties of diodes and how do these properties influence their applications in electronic circuits?

Or

(b) Describe the significance in modern electronic devices and lighting applications.

12. (a) Discuss the significance of component orientation in transistors.

Or

(b) How does the choice of transistor configuration impact the design of amplifier circuits and other electronic systems?

13. (a) Provide the truth table for a NOT gate and explain how it functions to invert its input signal.

Or

(b) Describe the functionality of an XOR gate, including its truth table and applications in digital systems.

14. (a) Describe the fabrication process of a single-layer PCB, highlighting its advantages and limitations.

Or

(b) Explain the role of vias in multi-layer PCBs and how they facilitate the connection between different conductive layers.

15. (a) Describe the principle of operation of an analogue transducer.

Or

(b) Explain the principles of synchro systems, including their construction, operation and its types.

Part C

$(5 \times 8 = 40)$

Answer **all** questions.

16. (a) How do varistors protect electronic circuits from voltage surges and what factors determine their effectiveness in surge suppression?

Or

(b) What are the methods and techniques involved in the functional testing of diodes and how are these tests performed in practice?

17. (a) Draw and explain the input and output characteristics of a transistor in CB configuration.

Or

(b) Compare and contrast the performance metrics such as voltage gain, current gain and input/output impedance for the CE, CB and CC transistor configurations.

18. (a) Explain the principles of operation of operational amplifiers (op-amps) in linear circuits, discussing their key characteristics, ideal behavior and common applications.

Or

(b) Discuss the concept of negative feedback in operational amplifiers, explaining its role in stabilizing op-amp circuits and improving performance parameters such as gain and bandwidth.

19. (a) Explore the applications of flexible and rigid-flex PCBs in modern electronic devices, highlighting their advantages, design considerations and industry use cases.

Or

(b) Compare and contrast the design considerations for single-layer, double-layer and multi-layer PCBs.

20. (a) Explain the term "follow up" in control systems, illustrating its significance in maintaining system stability and accuracy and provide examples of mechanisms that exhibit good follow-up characteristics.

Or

(b) Compare and contrast LVDT and RVDT, discussing their respective applications, advantages and limitations in sensing rotational and linear motion.

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