C–1525

Sub. Code
11823

B.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Aeronautical Science

MATHEMATICS — II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Evaluate : $\int_0^3 \int_0^1 (x^2 + 3y^2)\, dy\, dx$.

2. Evaluate : $\int_0^1 \int_0^x dy\, dx$.

3. State the condition for a vector $\vec{F}$ to be solenoidal.

4. Prove that div (grad ϕ) = $\nabla^2 \phi$.

5. Define Analytic function.

6. Find the invariant points of the transformation.

7. Find the Laplace transform of $\sin^2 t$.

8. Find the inverse Laplace transform of $L^{-1}\left(\frac{1}{2S+3}\right)$.

9. Define regression.

10. What are the types of measures of dispersion?

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

Answer **all** questions.

11. (a) Evaluate : $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{dx\,dy}{1+x^2+y^2}$.

Or

(b) Evaluate $\iint \frac{4xy}{x^2+y^2} e^{-x^2-y^2}\,dx\,dy$, over the region bounded by the circle $x^2+y^2-x=0$ in the first quadrant.

12. (a) Find the unit normal to the surface x^2+xy+y^2+xyz at the point (1, –2, 1).

Or

(b) Applying Green's theorem in plane show that the area enclosed by a simple closed curve C is $\frac{1}{2}\int (x\,dy - y\,dx)$.

13. (a) Show that $\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} = 4\frac{\partial^2}{\partial z\,\partial \bar{z}}$.

Or

(b) Find the bilinear transformation which maps $z = 1, i, -1$ respectively onto $w = i, 0, -i$.

14. (a) Using convolution theorem find inverse Laplace transform of $L^{-1}\left[\frac{1}{(s+a)\,(s+b)}\right]$.

Or

(b) Find the inverse Laplace transform of $L^{-1}\left(\frac{3S-4}{S^2-8S+65}\right)$.

15. (a) Calculate the correlation coefficient from the data :

x	10	12	13	17	18
y	5	6	7	9	13

Or

(b) Find the standard deviation of first 'n' Natural numbers.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Evaluate $\int_0^1 \int_0^{1-x} \int_0^{x+y} e^x \, dxdydz$.

Or

(b) Verify Gauss Divergence theorem of $\vec{F} = 4x\,z\vec{i} - y^2\vec{j} + yz\vec{k}$ over the cube bounded by $x = 0,\ x = 1$.

17. (a) Test whether the function $f(z) = \frac{1}{2}\log\left(x^2 + y^2 + \tan^{-1}\left(\frac{y}{x}\right)\right)$ is analytic or not.

Or

(b) Use Laplace Transform to solve $y' - y = e^t$ given that $y(0) = 1$.

18. (a) Transform the integral into polar co ordinates and hence evaluate.

Or

(b) Find the two regression lines from the data :

X	85	60	73	40	90
Y	93	75	65	50	80

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C–1526	Sub. Code
	11824

B.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Aeronautical Science

ENGINEERING MECHANICS AND STRENGTH OF MATERIALS

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Lami's theorem with neat sketch.

2. What is free body diagram?

3. Define Centroid and Center of gravity.

4. Write Impulse-Momentum equation.

5. Define angle of repose.

6. Define column friction.

7. Write the classification of Frames.

8. What are the types of beams?

9. Draw stress strain curve for ductile material.

10. Define slenderness ratio.

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

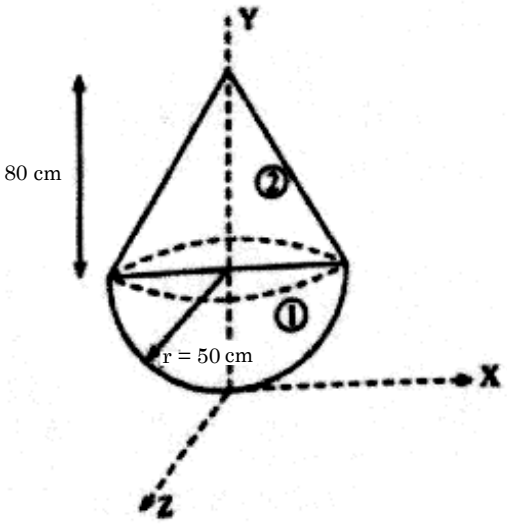
Answer **all** questions.

11. (a) Two forces are acting on a body and the body is in equilibrium. What conditions should be fulfilled by these two forces?

Or

(b) Explain superposition law and law of transmissibility.

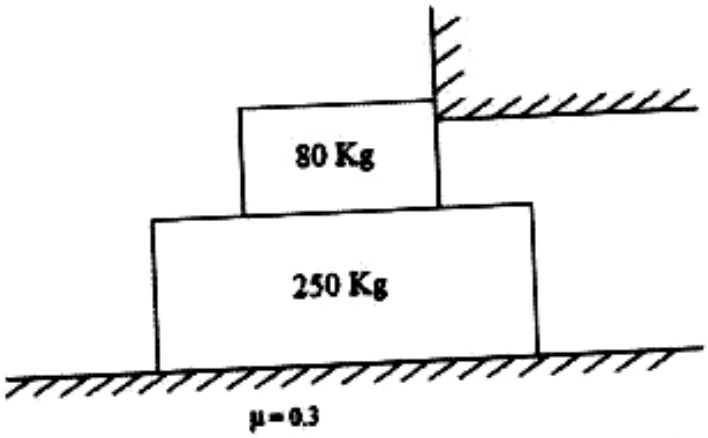
12. (a) Determine the center of gravity of the following figure.



Or

(b) A stone, dropped from a certain height, can reach the ground in 5s. It is stopped after 3 seconds of its fall and then allowed to fall again. Find the time taken by the stone to reach the ground for the remaining distance.

13. (a) If coefficient of friction between all surfaces shown in Fig. is 0.30. What is the horizontal force required to get 250 kg block moving to the right?



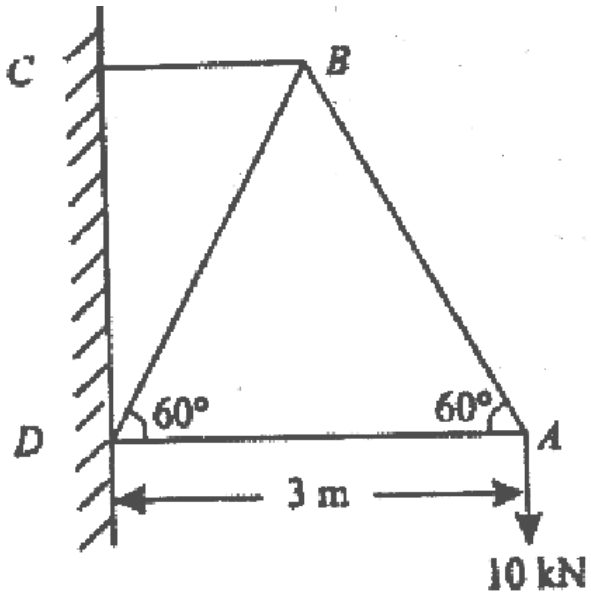
Or

(b) An object rests on a horizontal floor. The coefficient static friction is 0.4 and acceleration of gravity is 9.8 m/s^2.Determine

(i) The maximum force of static friction

(ii) minimum force of F is exerted on the object, that will start the object moving

14. (a) A cantilever beam truss of 3m span is loaded as shown in figure. Find the forces in various members of the frames.



Or

(b) Briefly explain about perfect and imperfect frames.

15. (a) Write the relationship between Shear modulus G and Bulk modulus K.

Or

(b) Write a short note of crippling load in the column with example.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) The resultant of two forces acting at a point is 65kN. It is observed that one force is double than that of the other and if the direction of one of them is reversed the resultant becomes 45kN. Find the magnitudes of forces and the angle between them.

Or

(b) A particle moves along straight line. Its motion in represented by the equation S = 16t + 4t2 – 3t3 where S is in metres and t, in seconds. Determine

(i) displacement, velocity and acceleration 2 seconds after start.

(ii) displacement and acceleration when velocity is zero and

(iii) displacement and acceleration when acceleration is zero.

17. (a) A ladder 5m long and of 250N weight is placed against a vertical wall in a position where its inclination to the vertical is 300. A man weighing 800N climbs the ladder. At what position will he induce slipping? The co-efficient of friction for both the contact surfaces of the ladder viz, with the wall and the floor is 0.2.

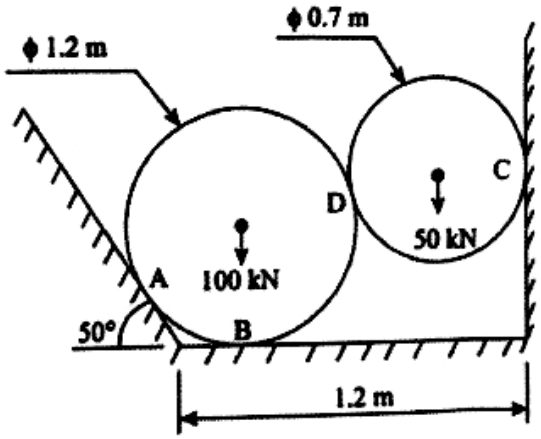
Or

(b) Explain the types of organizational structures to consider for your business.

18. (a) Draw shear force and Bending moment diagram for simply supported beam point load P acts at mid of the beam of length "L".

Or

(b) Two cylinders are kept in a channel as shown in figure. Determine the reactions at all the contact points A, B, C and D. Assume the contact Surfaces are smooth.



C–1527	Sub. Code
	11835

B.Sc. DEGREE EXAMINATION, APRIL 2024

Third Semester

Aeronautical Science

AIRCRAFT CONSTRUCTION

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is meant by sandwich structures?
2. What is the difference between fail-safe and safe life?
3. Write the functions of Aileron.
4. Define Inspection of Aircraft.
5. What is meant by tail wheel type?
6. Describe about nose wheel steering.
7. List the types of weights in aircraft.
8. What is meant by reference datum?
9. Define rigging.
10. What is meant by Incidence angle test?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Briefly describe types of wings in aircraft.

Or

(b) With the example describe aircraft structure station number in zoning.

12. (a) Briefly describe about the balancing of control surfaces.

Or

(b) Why maintenance is important is Aircraft industry?

13. (a) Briefly about the wheel alignment on an aircraft.

Or

(b) Write about emergency extension system.

14. (a) Describe the steps involved in weight calculation.

Or

(b) How center of gravity important in balancing of aircraft?

15. (a) How to do leveling in aircraft?

Or

(b) What is the purpose of torque wrench in rigging process?

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Briefly explain in detail about the Flight control system.

Or

(b) Explain in detail about the different types of fuselage structure.

17. (a) Explain in detail about the types of Landing gear system.

Or

(b) Explain in detail about hydraulic system in aircraft.

18. (a) Explain the procedure to do symmetry check.

Or

(b) Describe about the table method for calculating the weights.

———————

C–1528	Sub. Code 11842

B.Sc. DEGREE EXAMINATION, APRIL 2024.

Fourth Semester

Aeronautical Science

AIRCRAFT SYSTEMS

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. List out the basic components of hydraulic systems.

2. What is check valve and its purpose?

3. Write the role of Pressure Reducing Valve (PRV) in pneumatic system.

4. What is Ground Charging valve in pneumatic system?

5. What is the purpose of inward relief valve in Pressurisation system?

6. Define ACM.

7. Define De-icing and anti-icing.

8. What are the causes of ice formation on the aircraft?

9. What is fuel contamination?

10. Write the purpose of fuel filter in fuel system.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Write the operating principle of sequence valve.

Or

(b) List out the types of reservoirs and its significance.

12. (a) List out advantages and dis-advantages of pneumatic system.

Or

(b) Write the types of Pneumatic system and its application.

13. (a) Discuss the importance of Pressurisation system.

Or

(b) Write short note on

(i) Water separator

(ii) Cold air unit

14. (a) Discuss about Fluid De-icing system.

Or

(b) Explain the De-icing hangar in aviation.

15. (a) List out the various types of used in fuel system.

Or

(b) Write and explain any two types of Fuel-sub system.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Explain the typical Hydraulic system operation with block diagram.

Or

(b) Write short note on

(i) Hydraulic pipe lines

(ii) Hydraulic pumps

17. (a) Explain about the ACM with elaborate sketch.

Or

(b) Draw typical layout of low-pressure pneumatic system and explain about it.

18. (a) Explain about the Multi-engine fuel system.

Or

(b) Write short note on

(i) Fuel jettisoning valve

(ii) Fuel heater

(iii) Inter engine valve

———————

C–1529	Sub. Code 11843

B.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Aeronautical Science

AIRCRAFT INSTRUMENTS

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is flight instrument and display?
2. Define Barometer.
3. What is calibrated air speed?
4. List out the air data parameters.
5. State the principle of gyroscope.
6. Mention the application of gyroscope in aircraft.
7. Define thermocouple system.
8. What are engine instruments?
9. What is compass and its function?
10. Mention the types of compasses.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Write the difference between LED and LCD displays in aircraft instruments.

Or

(b) Explain about straight scale in aircraft display.

12. (a) Differentiate pitot probe and static probe.

Or

(b) What are the Q codes in altimeter?

13. (a) Write short on types of gyroscopes used in the aircraft.

Or

(b) Write short notes on turn and bank indicator.

14. (a) What is the operation of the Bourdon tube pressure gauge?

Or

(b) Explain about CHT and EGT Gauges.

15. (a) Explain the difference between magnetic compass deviation and variation.

Or

(b) What is terrestrial magnetism?

Part C

(3 × 10 = 30)

Answer **all** questions.

16. (a) Discuss the basic instrument panels in aircraft instrument.

Or

(b) Explain In detail about qualitative and quantitative displays in aircraft instruments with suitable sketch.

17. (a) Briefly explain the construction and operation of Altimeter.

Or

(b) Briefly explain the working principle of directional indicator with neat sketch.

18. (a) Explain briefly about temperature indicating system with suitable sketch.

Or

(b) Explain with neat sketch types compasses used in aircraft instruments.

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C–1530	Sub. Code
	11844

B.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Aeronautical 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 materials used in aircraft construction.

2. Mention the properties of Titanium and its application in aviation industry.

3. What is heat treatment and its types?

4. Define annealing process.

5. What fabric used in aircraft?

6. Mention the types of woods used in aircraft.

7. What is composite material?

8. Define thermoset process.

9. Define hardness.

10. What is mean by NDT?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Write the differences between ferrous and non-ferrous metals.

Or

(b) What are the various alloys of aluminium?

12. (a) What is corrosion and mention it's types?

Or

(b) Explain the procedure of metal spraying process.

13. (a) Explain the different types of threads used in aircraft.

Or

(b) Explain the importance of doped fabric.

14. (a) What is sandwich construction?

Or

(b) Write the advantages and disadvantages of composite materials.

15. (a) Explain the working principle of eddy current inspection.

Or

(b) Explain the procedure of impact testing.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Briefly explain the heat-treating process of aluminium in aerospace application.

Or

(b) Briefly explain the process of preventive methods of corrosion.

17. (a) Explain in detail about types of plastics used in aircraft structures and mention it's characteristics with suitable example.

Or

(b) Explain any two manufacturing process of composite materials with neat sketch.

18. (a) Discuss in detail about thermoset and thermoplastic.

Or

(b) Explain the procedure of Rockwell and Brinell hardness test with suitable sketch.

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C–1531	Sub. Code 11861

B.Sc. DEGREE EXAMINATION, APRIL 2024.

Sixth Semester

Aeronautical 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. Why maintenance is important is aircraft?

2. Define inspection.

3. What are the loads acting on the Landing gear?

4. List the types of Landing gear.

5. Draw single row and double row rivet.

6. Write the procedure to do longeron repair.

7. Differenciate tie down from rigging.

8. What is meant by Web repair?

9. What is meant by Jacking?

10. What are the functions of Tow bar?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Describe about on-condition maintenance.

Or

(b) Write short note on hard-time maintenance.

12. (a) What is meant by heavy maintenance?

Or

(b) Explain the procedure to do maintenance of struts.

13. (a) Write short note on Leading and Trailing edge repair.

Or

(b) Write the steps involved in sheet metal repair.

14. (a) Define taxing.

Or

(b) What are the precautions done before taxing?

15. (a) Write short note on GPU.

Or

(b) Write procedure of pre-oiling.

Part C (3 × 10 = 30)

Answer **all** questions.

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

Or

(b) Explain in detail about the special inspection of landing gear due to weather.

17. (a) Explain in detail about the types of repairs in aircraft structural components.

Or

(b) Explain in detail about the types of fire.

18. (a) Explain in detail about the landing gear retraction test and its procedure.

Or

(b) Explain briefly about power and non-power ground handling equipment.

———————

C–1532	Sub. Code 11862

B.Sc. DEGREE EXAMINATION, APRIL 2024.

Sixth Semester

Aeronautical Science

AERO ENGINE MAINTENANCE

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Maintenance.

2. List out the various dimensional checks to be carried in aero engine.

3. What are various damages of propeller blade?

4. What is the significance of balancing of propeller?

5. What is the purpose of acceleration checks?

6. What is the purpose of engine ground run?

7. What are the main significance of Axial flow Compressor?

8. What are the materials used for engine exhaust section?

9. Write the basic principles of EGT measurement.

10. What is the role of fuel flow meter?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) List out the checks to be carried out in piston engine cylinder head.

Or

(b) Write short notes on piston rings.

12. (a) Write the significance of wooden propeller blades.

Or

(b) What are the checks to be carried out for propeller mount?

13. (a) Write short notes on engine ignition system of gas turbine engine.

Or

(b) What are the precautions to be carried out for engine ground run?

14. (a) Write short notes on construction of turbine assembly.

Or

(b) List out the inspections of combustion chamber.

15. (a) List out the preparations for engine run up.

Or

(b) What is the role of EPR in engine performance?

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Briefly explain about the construction details of Crankcase.

Or

(b) List out the procedures for Propeller tracking.

17. (a) List out the Engine Shut Down procedure.

Or

(b) What are the checks to be carried out after FOD?

18. (a) What are the detailed checks to be carried out for Compressor Section?

Or

(b) Briefly describe about the Turbine Engine Throttle operation.

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C–1533	Sub. Code
	11863

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Aeronautical Science

AIRCRAFT COMMUNICATION AND NAVIGATION SYSTEM

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **ALL** questions.

1. Define frequency and wavelength.
2. What are the functions of antenna?
3. What is the range of VHF and how it is propagated?
4. What is satellite communication system?
5. Define Navigation.
6. What are the advantages of MLS?
7. What is the function of ATC?
8. Write short note on GPWS.
9. What are the radar band used in aircraft?
10. What is the use of antenna in aircraft?

Part B (5 × 5 = 25)

Answer **ALL** questions.

11. (a) How radio waves are propagated?

Or

(b) Write short note on silent zone and skip distance.

12. (a) Determine the maximum line–of–sight distance when an aircraft is flying at a height of

(i) 2,500 feet and

(ii) 25,000 feet.

Or

(b) Write short note of Aircraft selcal systems.

13. (a) Write operation procedure of global positioning system.

Or

(b) What is working principal of distance measuring equipment?

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

Or

(b) Briefly explain the operation of A, C, S modes.

15. (a) Write the operation of Radar system.

Or

(b) What is meant by terrain mapping.

Part C (3 × 10 = 30)

Answer **ALL** questions.

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

Or

(b) Explain with block diagram about the satellite communication system.

17. (a) Explain in detail about the operation procedure of automatic direction finder.

Or

(b) Explain about the operational procedure of TCAS.

18. (a) With block diagram explain weather radar EFIS display.

Or

(b) Explain in detail principle, procedure of Microwave landing system and its advantages.

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C–1534	Sub. Code 11864

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Aeronautical Science

AIRPORT AND AIR TRAFFIC SERVICE

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Airport.
2. State the functions of IATA.
3. List out the major components if airplane.
4. Mention the types of runways used in airport.
5. What is airport operation?
6. Differentiate long haul and short haul operations.
7. What is VASI?
8. What is the colour airport light?
9. State the importance ATC.
10. What are the devices used in aircraft navigation.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Describe the evolution of airports in India.

Or

(b) What is the role of DGCA

12. (a) Write the relationship between airport and aircraft

Or

(b) Differentiate between runway and taxiway

13. (a) What should apron planner consider while designing.

Or

(b) Describe the ground handling and ramp operations.

14. (a) State the purpose of X rays in airport security

Or

(b) What are the factors affecting airport lightings

15. (a) Write a short note on ILS.

Or

(b) Write the difference between VFR and IFR.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Briefly discuss about airport operation and its function in detail

Or

(b) Explain the organizational structure of DGCA and it function.

17. (a) Explain with neat sketch about taxiway configuration and its types

Or

(b) Explain about future airport terminal configuration in detail.

18. (a) Explain with neat sketch about runway lighting system

Or

(b) Explain the characteristics of air traffic control network in airspace.

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C–1535	Sub. Code 11865

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Aeronautical Science

TRAVEL AND TOUR MANAGEMENT

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **ALL** questions.

1. List out the benefits of travel integration?

2. What is inbound tour operator?

3. Define travel agent.

4. List out the services provided by the retail travel agency?

5. What is passport?

6. Define package

7. What is the role General Sales Agent? (GSA)

8. Write the general public facilities provided by the hotel operator?

9. Define ITDC and its significance?

10. Write the role of Travel Trade Association?

Part B (5 × 5 = 25)

Answer **ALL** questions.

11. (a) Write short notes on Linkages with technology providers of travel?

Or

(b) What do you understand the types of tour operators?

12. (a) Write the importance of travel insurance.

Or

(b) What are the functions of travel agency?

13. (a) List out the conventional factors for package tour design.

Or

(b) Explain the Do's and Dont's in Itinerary preparation.

14. (a) Write the significance of tour package.

Or

(b) List out the important parts of planning your group travel.

15. (a) Write the functions of IATA.

Or

(b) List out the objectives of ITDC.

Part C (3 × 10 = 30)

Answer **ALL** questions.

16. (a) Discuss about the Travel agency automation.

Or

(b) Describe the organization structure of standard travel agency?

17. (a) Discuss about the Tour's manager itinerary.

Or

(b) List out and explain the sources of income of a travel agency.

18. (a) Discuss about the TAAI (Travel agents association of India).

Or

(b) List out discuss about the Ancillary services provided by the travel industry.

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C–2329

Sub. Code
11815

B.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Aeronautical Science

AVIATION MATHEMATICS

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. The rank of the matrix $\begin{pmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$ is ————————

   (a) 0 (b) 1

   (c) 2 (d) 3

2. The system $Ax = 0$ is ————————

   (a) Unique (b) Always consistent

   (c) Inconsistent (d) None

3. Find the values of K so the line $\frac{2x-2}{2k} = \frac{4-y}{3} = \frac{z+2}{-1}$ find $\frac{x-5}{1} = y/k = \frac{z+6}{4}$ are at right angles

   (a) 0 (b) 2

   (c) –2 (d) 1

4. The lengths of the intercepts on the co-ordinate axes made by the plane $5x+2y+z-13=0$ are

(a) 5,2,1 unit (b) $13/5, 13/2, 13$ unit

(c) $\frac{5}{13}, 2/13, 1/13$ unit (d) 1, 2, 5 unit

5. Differentiate $\cos(\sin x)$ with respect to 'x'

(a) $-\sin x.\cos(\cos x)$ (b) $-\cos x.\sin(\sin x)$

(c) $\cos x \sin(\sin x)$ (d) None

6. Find the derivative of $\sin^{-1} x$ with respect to x assuming it to exist

(a) $\frac{1}{\sqrt{x^2-1}}$ (b) $\frac{1}{\sqrt{1+x^2}}$

(c) $\frac{1}{\sqrt{1-x^2}}$ (d) None

7. If $x=r\cos\theta, y=r\sin\theta$ then the value of $\frac{\partial(x,y)}{\partial(r,\theta)}$ is _____

(a) 1 (b) 0

(c) r_0 (d) $1/r$

8. The Jacobian of p,q,r w.r. to x,y,z given $p=x+y+z$ $q=y+z$, $r=z$ is _____

(a) 0 (b) 1

(c) 2 (d) –1

9. CPM stands for

(a) Critical path method

(b) Control Path method

(c) Critical plan management

(d) None

10. The goal of network analysis is to ————————

(a) Reduce the entire project cost

(b) Reduce the overall project duration

(c) Keep production delays

(d) Extend for project entire time

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

Answer **all** questions.

11. (a) Prove that a eigen vectors X of a matrix A cannot correspond to more than one eigen root of A.

Or

(b) Find the eigen values and eigen vectors of the matrix $A=\begin{pmatrix} 4 & 1 \\ 3 & 2 \end{pmatrix}$.

12. (a) Find the angle between the pair of lines

$\frac{x+3}{3}=\frac{y-1}{5}=\frac{z+3}{4}$ and $\frac{x+1}{1}=\frac{y-4}{1}=\frac{z-5}{2}$.

Or

(b) Find the equation of the sphere which passes through the point $(1,-2,3)$ and the circle $z=0,\ x^2+y^2+z^2-9=0$.

13. (a) Find the envelope of the family of straight line $y = mx + 1/m$.

Or

(b) Find ρ for the curve $y = \cos h\, x/c$ at the point $(0, c)$.

14. (a) If $u = x^2, v = y^2$, find $\frac{\partial(u,v)}{\partial(x,y)}$.

Or

(b) Find the minimum value of $x^2 + y^2 + z^2$ subject to the condition $1/x + 1/y + 1/z = 1$.

15. (a) Why program evaluation and review technique is important?

Or

(b) Explain the CPM in network analysis.

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

Answer **all** questions.

16. (a) Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$.

Or

(b) Verify Cayley-Hamilton theorem for the matrix $A=\begin{bmatrix}2 & 1 & 1\\ 0 & 1 & 0\\ 1 & 1 & 2\end{bmatrix}$ and hence evaluate the matrix equation
$A^8-5A^7+7A^6-3A^5+A^4-5A^3-8A^2+2A-I$.

17. (a) A line makes angles α,β,γ and δ with the diagonals of a cube, Prove that $\cos^2\alpha+\cos^2\beta+\cos^2\gamma+\cos^2\delta=4/3$.

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 radius of curvature for the curve $y^2=x^3+8$ at $(-2,0)$

Or

(b) Find the equation of the evolute of the parabola $y^2=4ax$.

19. (a) Expound $e^x\sin y$ in powers of x and y as for as terms of the third degree.

Or

(b) If u and v are the functions of x and y, then Prove that $\frac{\partial(u,v)}{\partial(x,y)}\times\frac{\partial(x,y)}{\partial(u,v)}=1$.

20. (a) Determine the critical path, the critical activities and the project completion time for the following details

Activity	Predecessor Activity	Duration (weeks)
A	–	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D, E	4

Or

(b) Explain the advantages and disadvantages in PERT.

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C–2330

Sub. Code
11823

B.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Aeronautical Science

AIRCRAFT BASICS ELECTRICITY AND ELECTRONICS

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. According to Ohms Law, what is the relationship between voltage, current, and resistance?

   (a) V = IR (b) I = VR

   (c) R = VI (d) V = I/R

2. In which direction does conventional current flow in a circuit?

   (a) From negative to positive

   (b) From positive to negative

   (c) It depends on the circuit

   (d) There is no standard direction

3. The electrolyte used in nickel cadmium batteries is typically composed of:

   (a) Lead (b) Cadmium

   (c) Nickel (d) Acid

4. The capacity of an aircraft battery is typically measured in:

(a) Watts

(b) Amperes

(c) Ampere-hours (Ah)

(d) Volts

5. Which of the following components is NOT typically found in a DC motor?

(a) Armature (b) Stator

(c) Commutator (d) Brushes

6. What is the purpose of a voltage regulator in a generator system?

(a) To maintain a constant voltage output

(b) To convert AC to DC

(c) To control the speed of the generator

(d) To protect against over current conditions

7. Which type of rectifier utilizes only one diode for rectification?

(a) Half-wave rectifier

(b) Full-wave rectifier

(c) Bridge rectifier

(d) Voltage regulator

8. Rectification efficiency is defined as the ratio of:

(a) DC output power to AC input power

(b) AC output power to DC input power

(c) DC output voltage to AC input voltage

(d) AC output voltage to DC input voltage

9. Which type of lights are typically included in a navigation light circuit?

(a) Landing lights

(b) Taxi lights

(c) Anti-collision lights

(d) Strobe lights

10. What is the primary function of an anti-skid brake system in an aircraft?

(a) To improve braking efficiency

(b) To reduce the risk of tire skidding

(c) To control the deployment of landing gear

(d) To provide additional traction during takeoff

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

Answer **all** questions.

11. (a) Explain the construction and working principles of field effect transistors (FETs).

Or

(b) Describe the structure and operation of transistors.

12. (a) Explain the constructional features and working principles of nickel cadmium (NiCd) batteries.

Or

(b) Discuss the procedures and techniques involved in charging and capacity testing of aircraft batteries.

13. (a) Discuss the characteristics and types of generators used in aircraft systems.

Or

(b) Explore the characteristics and applications of high-power brushless alternators.

14. (a) Explain the operation and advantages of full-wave rectifier circuits.

Or

(b) Discuss the characteristics and advantages of different aircraft electrical wire types.

15. (a) Discuss the design and operation of an auto-ignition circuit in a turbine engine.

Or

(b) Describe the integration of advanced technologies such as electronic control units (ECUs) and digital bus systems in modern aircraft circuitry.

Part C (5 × 8 = 40)

Answer **all** questions.

16. (a) Explain the purpose and operation of circuit protection devices such as fuses and circuit breakers.

Or

(b) Discuss the principles of operation and key features of electronic measurement devices such as multi-meters, voltmeters.

17. (a) Explaining the lead acid batteries internal components, working principles, and advantages and disadvantages in aircraft applications.

Or

(b) Describe the ground power circuit used to supply external power to aircraft systems.

18. (a) Explain the constructional features of all aircraft generator, its principle of operation, and the types of generators commonly used in aircraft electrical systems.

Or

(b) Describe the construction and operation of induction motors.

19. (a) Describe the principles of operation and applications of UPS (Uninterruptible Power Supplies) in power distribution systems.

Or

(b) Explain the concept of a split power system in aircraft electrical architectures.

20. (a) Explore the future trends and developments in aircraft electrical systems.

Or

(b) Explain the electrical architecture and control logic of a comprehensive aircraft lighting system, incorporating navigation lights.

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C–2331	Sub. Code
	11825

B.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Aeronautical Science

APPLIED MECHANICS

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. Which of the following terms refers to the study of motion without considering its causes?

   (a) Kinetics (b) Statics

   (c) Kinematics (d) Dynamics

2. When two forces act on an object simultaneously but along different lines of action, the resultant force can be found using which principle?

   (a) The parallelogram law of forces

   (b) Newton's first law

   (c) Pascal's principle

   (d) Archimedes' principle

3. According to the principle of transmissibility, which statement is true?

(a) Forces cannot be transmitted through rigid bodies

(b) The effect of a force acting on a rigid body is independent of where the force is applied along its line of action.

(c) Forces can only be transmitter through fluids

(d) The magnitude of a force depends on fluids, its point of application.

4. D'Alembert's principle is often used to ————————

(a) Analyze static equilibrium problems

(b) Determine the motion of a system subject to external forces

(c) Calculate the internal forces within a structure

(d) Study fluid dynamics

5. According to the laws of friction:

(a) Friction is directly proportional to the applied load

(b) Friction is independent of the area of contact

(c) Friction depends upon the nature of surfaces in contact

(c) All of the above

6. A wedge is used to:

(a) Lift heavy objects

(b) Separate two objects

(c) Both (a) and (b)

(d) None of the above

7. A perfect frame is one where:

(a) The number of members is less than 2j3

(b) The number of members is equal to 2j-3

(c) The number of members is more than 2j-3

(d) None of the above

8. A force table is used to

(a) Determine the resultant of several forces

(b) Measure the weight of an object

(c) Both (a) and (b)

(d) None of the above

9. Poisson's ratio is the ratio of:

(a) Lateral strain to longitudinal strain

(b) Longitudinal strain to lateral strain

(c) Stress to strain

(d) Strain to stress

10. The relationship between stress and strain is given by:

(a) Hooke's Law

(b) Newton's Second Law

(c) Ohm's Law

(d) Parallelogram Law

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

Answer **all** questions.

11. (a) Explain resultant of forces.

Or

(b) Differentiate between coplanar and non-coplanar in forces.

12. (a) Explain inertia forces in rotation.

Or

(b) Describe the following:

(i) free vibration

(ii) forced vibration.

13. (a) Explain the laws of friction.

Or

(b) Explain Friction on Rollers.

14. (a) Explain the classification of frames.

Or

(b) Explain the resolution of forces using methods of Joints.

15. (a) Calculate the change in diameter of a thin cylindrical shell 100 cm diameter, 1 cm thick and 5 m long when subjected to internal pressure of 3 N/mm^2. Take the value of $E = 2 \times 10^5$ N/mm^2 and Poisson's ratio, $\mu = 0.3$.

Or

(b) Write a short note on Mohr's circles.

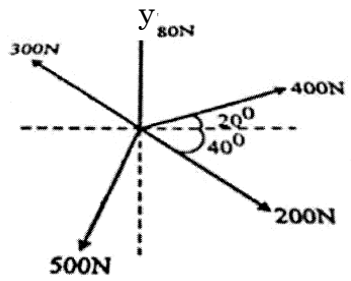
Part C (5 × 8 = 40)

Answer **all** questions.

16. (a) Explain in detail about the Newton's law of forces.(8)

Or

(b) Find the resultant magnitude and direction of the given force system. (8)



17. (a) Derive the equation of centre of gravity of the bodies. (8)

Or

(b) (i) Explain moment of a couple-force. (4)

(ii) Principle of transmissibility. (4)

18. (a) Derive the equation for efficiency of screw jack. (8)

Or

(b) What is mechanical efficiency? How it is calculated? (8)

19. (a) Explain the following:

(i) Perfect frames (2)

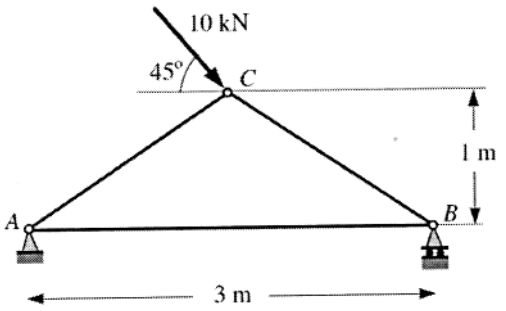
(ii) Imperfect frames (2)

(iii) Deficient frames (2)

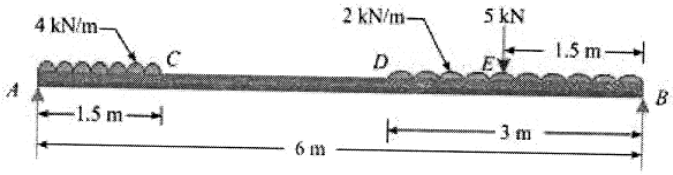
(iv) Redundant frames (2)

Or

(b) Find the forces in the members. (8)



20. (a) Draw the shear force and bending moment diagram for the given beam. (8)



Or

(b) A cylindrical pipe of diameter 1.5 m and thickness 1.5 cm is subjected to an internal fluid pressure of 1.2 N/mm^2.

Determine :

(i) Longitudinal stress developed in the pipe and (4)

(ii) Circumferential stress developed in the pipe. (4)