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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

First Semester

Aeronautical Science

MATHEMATICS — I

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Define rank of a matrix.
2. Find the product of the eigen values of the matrix
$$A = \begin{bmatrix} 1 & 2 & 5 \\ 2 & 2 & 4 \\ 1 & 2 & 7 \end{bmatrix}.$$
3. Find the direction cosines of the line joining the points (4,3,-5) and (-2,1,-8).
4. Find the equation of the line joining the points (1,-1,2) and (4,2,3).
5. Define curvature and radius of curvature.
6. Find the envelope of the family of lines $y = mx \pm a\sqrt{1+m^2}$, m being parameter.

7. If $u = x^2 + y^2 + 2xy$, find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$.
8. If $u = x^2, v = y^2$, find $\frac{\partial(u, v)}{\partial(x, y)}$.
9. Solve $(D^2 + 2D + 1)y = 0$.
10. Find the particular integral of $(D^2 + 6D + 5)y = e^{2x}$.

Part B

(5 × 5 = 25)

Brief answer with either or choice.

11. (a) Test for the consistency of $x - 3y - 8z = -10$,
 $3x + y + 4z$, $2x + 5y + 6z = 13$.

Or

- (b) Find the eigen values of $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$.

12. (a) Show that the lines $\frac{x-4}{2} = \frac{y-5}{3} = \frac{z-6}{4}$ and
 $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar.

Or

- (b) Find the equation of the sphere passing through the points $(3, 0, 1), (-1, 1, 1), (2, -5, 4)$ and having its centre on the plane $2x + 3y + 3z = 3$.

13. (a) Find the coordinate of the centre of curvature on the parabola $y^2 = 4ax$ at any point (x, y) .

Or

- (b) Find the envelope of the family of straight lines $y = mx + \frac{1}{m}$.

14. (a) If $u = xy + yz + zx$, where $x = \frac{1}{t}, y = e^t, z = e^{-t}$, find $\frac{du}{dt}$.

Or

- (b) Find the Taylor's series expansion of x^y near the point $(1, 1)$ upto the second degree term.

15. (a) Solve : $(D^3 + D^2 + D + 1)y = 2e^{-x}$.

Or

- (b) Solve : $x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} + 2y = x^2 + \frac{1}{x^2}$.

Part C (3 × 10 = 30)

Essay questions of either or choice.

16. (a) Verify Cayley-Hamilton theorem for the matrix

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}.$$

Or

- (b) Diagonalise the matrix $A = \begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & -2 \\ -1 & -2 & 1 \end{bmatrix}$ by means of an orthogonal transformation.

17. (a) Find the equation of the line through $(-6, -4, -6)$ which cuts each of the lines $\frac{x}{2} = \frac{y}{1} = \frac{z}{3}$ and $-x - 2 = \frac{y-1}{2} = -z - 1$ and also the co-ordinates of the points in which it meets them.

Or

- (b) Find the evolute of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.
18. (a) Find the minimum value of the function $x^2 + y^2 + z^2$, when $xy + yz + zx = 3a^2$.

Or

- (b) Solve the equation $\frac{d^2y}{dx^2} + y = x \cos x$, by the method of variation of parameters.
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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018.

First Semester

Aeronautical Science

WORKSHOP PRACTICES

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Define metallic fire and electrical fire with their extinguishers.
2. Mention the types of Pliers.
3. Why is calibration of tools and equipments necessary for maintenance?
4. Mention various common power tools with their applications.
5. Define zero error and positive error in vernier caliper.
6. Mention the use of dial test indicator in metrology.
7. Mention the parts of vernier caliper.
8. Define lead screw.
9. Define milling machine.
10. Mention various types of solders used in joining metals.

Part B

(5 × 5 = 25)

Brief answer with either or choice.

11. (a) Explain various types of fire extinguishing agents.

Or

- (b) Explain the safety precautions to be followed while handling gases especially oxygen, oils and chemicals.

12. (a) Explain various types of screw drivers.

Or

- (b) Explain care of tools and control of tools.

13. (a) With a neat sketch, explain the construction of micrometer.

Or

- (b) With a neat sketch, explain the construction of Vernier bevel protractor.

14. (a) Explain various types of gauges.

Or

- (b) Explain various classes of fits.

15. (a) Explain various types of gears.

Or

- (b) Explain gas welding process.

Part C

(3 × 10 = 30)

Essay questions of either or choice.

16. (a) Explain various types of hammers with neat sketches.

Or

- (b) Explain limits, fits and tolerance.

17. (a) Explain various tools required to set up an arc welding shop.

Or

- (b) Explain various safety precautions to be followed while working in welding shop.

18. (a) Explain various types of flames used in oxy - acetylene welding.

Or

- (b) Explain various tools used in oxy — acetylene welding technique.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

First Semester

Aeronautical Science

BASIC ELECTRICITY AND ELECTRONICS

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. State ohms law.
2. What is a transformer?
3. What is a dc motor?
4. List the types of dc generators.
5. Give the main parts of an induction motor.
6. Write down the efficiency of a three phase induction motor.
7. Give the principle of capacitor.
8. What is biasing?
9. What is a voltage regulator?
10. Mention two applications of Diac.

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) State and explain Kirchoff's laws.

Or

- (b) Write a note on instrument transformers.

12. (a) Derive the EMF equation of a dc generator.

Or

- (b) Discuss the speed-torque characteristics of a series type dc motor.

13. (a) Explain the production of rotating magnetic field in 3-phase induction motors.

Or

- (b) Discuss the starting of a single phase induction motor by capacitor.

14. (a) Briefly explain the operation of a pnp transistor.

Or

- (b) Write a note on function generator.

15. (a) With a neat diagram, explain the characteristics of a triac.

Or

- (b) Give a brief account of silicon Bilateral switch.

Part C

(3 × 10 = 30)

Essay questions of either or choice.

16. (a) Derive expression for current and impedance in an AC circuit containing R, L and C in series. Also deduce the condition for resonance.

Or

- (b) Describe the construction and working of dc generator.
17. (a) With a neat sketch, explain the construction and working of a three phase induction motor. Also discuss the speed control in 3-phase induction motors.

Or

- (b) With necessary circuit diagram, describe the construction and working of a multimeter.
18. (a) With a neat circuit diagram, explain the working of a bridge rectifier. Find its rectification efficiency.

Or

- (b) Write short note on :
- (i) 3-phase transformer. (3)
- (ii) Universal motor. (3)
- (iii) UPS. (4)

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018.

Second Semester

Aeronautical Science

Allied – MATHEMATICS – II

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Evaluate $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} xy \, dy \, dx$.
2. Change the order of integration in $\int_0^1 \int_0^y f(x, y) \, dx \, dy$
3. Find grad ϕ at $(1, -2, -1)$ when $\phi = 3x^2y - y^3z^2$.
4. If $f = (ax + 3y + 4z)i + (x - 2y + 3z)j + (3x + 2y - z)k$ is solenoidal, find the constant a
5. State the Cauchy-Riemann equations in cartesian co-ordinates satisfied by an analytic function.
6. Define harmonic function.
7. Find $L[\sin at]$.

8. Find $L^{-1}\left[\frac{s}{(s+2)^2}\right]$.
9. Define standard deviation.
10. Define regression coefficient of X on Y .

Part B

(5 × 5 = 25)

Brief answer with either or choice.

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

Or

(b) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dy dx$ by changing the order of integration.

12. (a) If $r = |\vec{r}|$, where \vec{r} is the position vector of the point (x, y, z) , prove that $\nabla^2(r^n) = n(n+1)r^{n-2}$.

Or

- (b) Find the work done by the force $\vec{f} = z\vec{i} + x\vec{j} + y\vec{k}$, when it moves a particle along the arc of the curve $\vec{r} = \cos t\vec{i} + \sin t\vec{j} + t\vec{k}$ from $t = 0$ to $t = 2\pi$.

13. (a) Show that the function $f(z) = e^{-z}$ is analytic.

Or

- (b) Show that the image of the circle $|z-1|=1$ under the transformation $w = z^2$ is the cardioid $R = 2(1 + \cos \phi)$.

14. (a) Find $L[t e^{-t} \sin t]$.

Or

(b) Find $L^{-1}\left[\frac{s-3}{s^2+4s+13}\right]$.

15. (a) Calculate the mean and standard deviation from the following table.

| | | | | | | | |
|-----|----|----|-----|-----|-----|----|----|
| x | 25 | 35 | 45 | 55 | 65 | 75 | 85 |
| f | 3 | 61 | 132 | 153 | 140 | 51 | 2 |

Or

(b) Given $f(x, y) = x e^{-x(y+1)}$; $x \geq 0, y \geq 0$, find the regression curve of Y on X .

Part C

(3 × 10 = 30)

Essay Questions of either or choice.

16. (a) Change the order of integration in $\int_0^1 \int_y^{2-y} xy \, dx \, dy$ and then evaluate it.

Or

(b) Verify Stokes theorem for a vector field defined by $\vec{f} = (x^2 - y^2)\vec{i} + 2xy\vec{j}$ in the rectangular region in the xoy -plane bounded by the lines $x = 0, x = a, y = 0$ and $y = b$.

17. (a) Verify Gauss divergence theorem for $\vec{f} = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$, where S is the surface of the cuboid formed by the planes $x = 0, x = a, y = 0, y = b, z = 0$ and $z = c$.

Or

(b) Find the analytic function $w = u + iv$ if $u = e^x(x \sin y + y \cos y)$ Hence find v .

18. (a) Using Laplace transform solve $y''-4y'+8y = e^{2x}$,
 $y(0) = 2$ and $y'(0) = -2$.

Or

- (b) The rank of same 16 students in mathematics (X)
and physics (Y) are as follows :

| | | | | | | | | | | |
|-----|----|----|----|----|----|----|---|---|---|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| y | 1 | 10 | 3 | 4 | 5 | 7 | 2 | 6 | 8 | 11 |
| x | 11 | 12 | 13 | 14 | 15 | 16 | | | | |
| y | 15 | 9 | 14 | 12 | 16 | 13 | | | | |

Calculate the rank correlation coefficient for
proficiencies of this group in mathematics and
physics.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Second Semester

Aeronautical Science

**ENGINEERING MECHANICS AND STRENGTH OF
MATERIALS**

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Define Parallelogram Law of forces.
2. Define the principle of work.
3. Define impulse – momentum principle.
4. Define rigid body.
5. Define forced and free vibration.
6. Define velocity ratio and mechanical advantage.
7. Define Stress and Strain.
8. State Newton's Laws of Motion.
9. Define Simple Machine.
10. Define imperfect frame.

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) Explain Fundamental Units and derived Units.

Or

- (b) Explain moment of forces.

12. (a) Explain the principle of Virtual Work.

Or

- (b) Explain inertia forces in rotation.

13. (a) Explain the composition of forces.

Or

- (b) Explain the laws of friction.

14. (a) Explain the principle of Belt friction.

Or

- (b) Explain the principle of transmissibility.

15. (a) Derive the relationship between Stress and Strain.

Or

- (b) Explain the classification of frames.

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

Essay question of either or choice.

16. (a) Explain various types of forces.

Or

- (b) Explain various terms of fundamentals of mechanics.

17. (a) Derive the formula for efficiency of Simple lifting machine.

Or

- (b) Derive Newton's laws of motion.

18. (a) Explain Torsion of shafts.

Or

- (b) Explain various types of beams.
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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Third Semester

Aeronautical Science

THERMODYNAMICS

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Define System and Surrounding.
2. Define Enthalpy and Entropy.
3. Mention various stages of Diesel cycle with P-V and T-S diagrams.
4. Define Refrigeration process.
5. Define Joule's Law and Charles law.
6. Define Internal Energy.
7. Define calorific value of fuel.
8. Define Jet propulsion.
9. Define law of conservation of momentum.
10. Derive characteristic equation of gas.

Part B (5 × 5 = 25)

Brief answer with either or choice.

11. (a) Explain work or forms of work.
Or
(b) Explain heat and modes of heat.
12. (a) Explain thermodynamic equilibrium with their types.
Or
(b) Explain various types of system.
13. (a) Write short notes on calorific value of fuels.
Or
(b) Write short notes on combustion of fuels.
14. (a) Explain second law of thermodynamics with sketch.
Or
(b) Explain air standard efficient of Brayton.
15. (a) Explain the working of open cycle gas turbine.
Or
(b) Explain the principle of reversed heat engine.

Part C (3 × 10 = 30)

Essay questions of either of choice.

16. (a) Explain various applications of steady flow energy equations.
Or
(b) Explain specific heat of gases and derive the relationship between C_p and C_v .

17. (a) Derive the air standard efficiency of Otto cycle with P-V and T-S diagram.

Or

- (b) Derive the air standard efficiency of Diesel cycle with P-V and T-S diagrams.

18. (a) Explain vapour compression refrigerator with block diagram.

Or

- (b) Explain open cycle gases turbine.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Third Semester

Aeronautical Science

FLUID MECHANICS AND HYDRAULIC MACHINES

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Define specific gravity.
2. What are the various types of manometer?
3. Notes on Rate of Flow (Q).
4. Write the types of fluid flow.
5. What is the assumption of Bernoulli's equation?
6. Define Water hammer.
7. Define reciprocating pump.
8. Write notes on Gear pump.
9. Write short notes on Hydraulic torque converter.
10. Draw Hydraulic Accumulator.

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) Define pressure. Explain about absolute, gauge, vacuum pressure.

Or

- (b) A hydraulic press has a ram of 30 cm diameter and a plunger of 4.5 cm diameter. Find the weight lifted by the hydraulic press when the force applied at the plunger is 500 N.

12. (a) Derive Continuity equation for Discharge (Q).

Or

- (b) Find the volume of the water displaced and position of centre of buoyancy for a wooden block of width 2.5 m and of depth 1.5 m. When it floats horizontally in water [density of wood = 650 kg/m³, length = 6 m].

13. (a) Explain about Orifice meter with sketch.

Or

- (b) Explain Losses in Branched pipe with diagram.

14. (a) Explain Force exerted by a jet on hinged plate.

Or

- (b) Write short notes on Centrifugal pump.

15. (a) Explain about Hydraulic lift with sketch.

Or

- (b) Write notes on Hydraulic Ram (with diagram).

Part C**(3 × 10 = 30)**

Essay questions of either or choice.

16. (a) Explain the various properties of fluid.

Or

- (b) Derive an expression for velocity potential function and stream function.

17. (a) Derive Euler's and Bernoulli's equation.

Or

- (b) Explain about equilibrium of stability of submerged body and floating body with sketch.

18. (a) Hydraulic power plant.

Or

- (b) Explain about :
- (i) Hydraulic Intensifier Radiography.
 - (ii) Hydraulic Press.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Third Semester

Aeronautical Science

AERODYNAMICS AND HELICOPTER THEORY

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. State and list the assumptions of Bernoulli's principle.
2. Define Angle of Attack.
3. What are the types of stability in an airplane?
4. What is induced drag?
5. What is the blade flapping?
6. What is blade hunt?
7. Write the function of Dampeners in main rotors.
8. What are the different types of main rotor heads?
9. What is the role of clutches in Engine Transmission?
10. What is the function of Tail rotor Drive shaft?

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) What are the types of airfoils and how C_L varies with change in angle of attack?

Or

- (b) Explain the following :

- (i) Pressure
- (ii) Density
- (iii) Viscosity
- (iv) Temperature
- (v) Relative Humidity.

12. (a) What is the function of flaps, slats and slots?

Or

- (b) Explain the types of drag with the equations.

13. (a) Explain how the cyclicpitch is performed.

Or

- (b) Explain the construction and function of Blade Dampers.

14. (a) Classify and explain the different types of main rotor heads.

Or

- (b) Explain the principle and construction of Swashplate Mechanism.

15. (a) Write about the tail rotor drive shaft and its functions.

Or

- (b) What is the function of Engine transmission couplings?

Part C**(3 × 10 = 30)**

Essay questions of either or choice.

16. (a) Write short notes on :
- (i) Centre of Pressure,
 - (ii) Humidity,
 - (iii) Stagnation Pressure,
 - (iv) Mach number
 - (v) Aerodynamic Centre.

Or

- (b) Write short notes on :
- (i) Ground Effect
 - (ii) Coriolis Effect.
17. (a) Explain the factors affecting take-off distance of an aircraft with the help of derivation.

Or

- (b) Explain about the alignment of main rotor blades.
18. (a) Explain the operation of pitch change mechanism of tail rotors.

Or

- (b) What are the factors contributing towards lift generation?
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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Third Semester

Aeronautical Science

AIRCRAFT CONSTRUCTION

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Explain station numbering.
2. Define Empennage.
3. Explain secondary control surfaces.
4. What are the tail draggers?
5. Explain the role of oleo struts.
6. Define dihedral angle.
7. Define Maximum Takeoff Weight?
8. What is rigging?
9. Define longerons.
10. Define spoilers.

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) Explain the wing configuration.

Or

- (b) Explain about the honeycomb construction.

12. (a) Explain the constructional features of secondary control surfaces.

Or

- (b) Explain the Cables and turnbuckles used in aircraft control systems.

13. (a) Explain the power assisted controls.

Or

- (b) Briefly explain about the skid control system.

14. (a) Write notes on weight and balance data.

Or

- (b) Explain the aircraft weighing procedure of passenger aircraft.

15. (a) Define: CG Range, Useful load, Maximum weight, mean aerodynamic chord, Maximum Ramp weight.

Or

- (b) Briefly explain the symmetry check for aircraft.

Part C**(3 × 10 = 30)**

Essay questions of either or choice.

16. (a) Briefly explain the wing construction of aircraft.

Or

- (b) Briefly explain the Fly by Wire system.

17. (a) Explain about the main landing gear of transport aircraft.

Or

- (b) Describe the procedure of Leveling of any transport aircraft.

18. (a) Explain the constructional features of primary flight control.

Or

- (b) Explain the flight controls layout.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Fourth Semester

Aeronautical Science

AIRCRAFT SYSTEM

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Define Pascal's Law.
2. Differentiate Laminar Flow and turbulent flow.
3. Where the flexible hoses are used?
4. Why check valves are used in pneumatic system?
5. What is the purpose of oil and water trap in pneumatic system?
6. Why the aircraft flying at higher altitude is pressurized?
7. Define atmospheric pressure.
8. Differentiate rime ice and glaze ice.
9. Describe vapor lock in fuel system.
10. Write a short note on Boost pump.

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) State the advantages of Hydraulic system as power a sources.

Or

- (b) State the characteristic and properties of hydraulic fluid used in aircraft.

12. (a) Explain the high pressure source of pneumatic system.

Or

- (b) Write short note on :

- (i) Dehydrator.
(ii) Storage Bottle.

13. (a) Briefly explain Air Duct used for Air-conditioning system.

Or

- (b) Describe pressurization. Explain the pressurization problems.

14. (a) Briefly explain Thermal anti icing system.

Or

- (b) Describe windshield rain repellent system.

15. (a) Describe Fuel cross feed system and Fuel jettison system.

Or

- (b) With the help of neat schematic picture Explain light aircraft pressure fuel feed system.

Part C

(3 × 10 = 30)

Essay questions of either or choice.

16. (a) Briefly explain the Hydraulic Seals.

Or

- (b) With neat sketch describe Hydraulic 'In line Reservoir'.

17. (a) Describe the following pneumatic system components.

- (i) Pressure regulator.
(ii) Control Valve.

Or

- (b) Briefly describe the Air heating systems.

18. (a) Briefly explain the pneumatic deicing systems.

Or

- (b) Briefly explain the various fuel tanks used in aircraft.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Fourth Semester

Aeronautical Science

AIRCRAFT INSTRUMENTS

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Name the flight instruments that comprise the basic T layout.
2. What are the four principal elements which make up instruments?
3. What are the Altimeter Q code settings?
4. What is the difference between Indicated altitude and True altitude?
5. Explain the properties of a gyroscope.
6. Define Earth Rate and Real Drift.
7. Write the classification of EGT probe.
8. What adjustments are normally provided in a capacitance type fuel quantity indication system?
9. Define Magnetic Dip.
10. Write down the laws of magnetism.

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) What is the significance of using colors on instrument dial of ASI?

Or

- (b) Explain the following :

(i) LCD Displays

(ii) Electronic Displays.

12. (a) What is the purpose of static vents and how it is constructed?

Or

- (b) Explain the construction, principle and its operation of Altimeter.

13. (a) Explain the construction and operation of Rate Gyroscope.

Or

- (b) Explain Apparent Drift and Transport Wander.

14. (a) List out the EGT types of probe and its location.

Or

- (b) Explain the working of Manifold Pressure Gauge.

15. (a) Write about Magnetic Variation and Deviation.

Or

- (b) What are the errors in DR compass and its causes?

Part C

(3 × 10 = 30)

Essay question of either or choice.

16. (a) Briefly explain about grouping of aircraft instrument and its layout in cockpit of aircraft.

Or

- (b) Explain the principle and operation of Mach meter with a neat sketch.

17. (a) List out and explain the error of accelerating and turning of gyroscope.

Or

- (b) Explain the principle and operation of Directional Indicator.

18. (a) Describe the operation of capacitance type fuel quantity indication system.

Or

- (b) Explain the operating principles of remote reading compass.
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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Fourth Semester

Aeronautical Science

AIRCRAFT MATERIALS HARDWARE AND NDT

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Mention various properties of Aluminium.
2. Define Annealing.
3. Write various process of heat treatment.
4. Define corrosion .write any two prevention method
5. What are the types of wood used in Aircrafts
6. List out the various hardware components in Aircraft.
7. Define composite material.
8. What are the advantages of composite material?
9. Define creep test.
10. Write any four types of NDT method.

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) Write the difference between Ferrous and Non-Ferrous metals with example.

Or

- (b) Write short notes on :

- (i) Normalizing
- (ii) Tempering.

12. (a) Explain about Glue used in Aircraft materials.

Or

- (b) Brief notes on :

- (i) Bolts.
- (ii) Nuts used in aircraft construction.

13. (a) Explain about Glass Fiber.

Or

- (b) Explain about Honey comb construction in composite material.

14. (a) Explain with neat sketch about Electroplating.

Or

- (b) Write the properties of

- (i) Carbon.
- (ii) Nickel.

15. (a) Explain the procedure on Impact test (with sketch).

Or

- (b) Brief notes about Ultrasonic Inspection with diagram.

Part C

(3 × 10 = 30)

Essay questions of either or choice.

16. (a) Explain in detail about Heat Treatment process on ferrous metals.

Or

- (b) With neat sketch Explain about Brinell and Rockwell test.

17. (a) Explain about Thermoplastics and Thermosetting plastics.

Or

- (b) Write the types of corrosion, Explain any two method of Corrosion prevention method.

18. (a) Manufacturing process for composite structure with diagram.

Or

- (b) Explain about :

(i) Magnetic flux Inspection.

(ii) Radiography.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Fifth Semester

Aeronautical Science

**AIRCRAFT RULES AND AIRWORTHINESS
REGULATIONS**

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Explain
 - (a) Air Traffic Service.
 - (b) Aero plane.
 - (c) Aircraft Components.
 - (d) Amphibian.
2. Define
 - (a) Balloon.
 - (b) Convention.
 - (c) Certificate of Airworthiness.
 - (d) Crew member.
3. What is Type Certificate of Aircraft?
4. What is
 - (a) Mandatory modification?
 - (b) Airworthiness Directives?

5. What are the categories of Basic Aircraft Maintenance Engineer's examination certificate?
6. Define
 - (a) Psychoactive substances.
 - (b) Problematic use of substances.
7. Explain.
 - (a) Quality Control.
 - (b) Quality Manual.
8. Write down the groups of aircraft for the purpose of ratings on Aircraft Maintenance engineer's license.
9. What are the eligibility requirements for an Aircraft Maintenance Engineer's license?
10. Explain
 - (a) Operator
 - (b) Scheduled operator

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) What are the powers for protecting the public health as per Aircraft act 1934?

Or

(b) How aircrafts are classified? Show it with table.
12. (a) Write down the procedure for issue of duplicate certificate of registration.

Or

(b) What is the procedure for exporting an aircraft?

13. (a) Write the procedure for removal of approval of an organization.

Or

- (b) What is exit seat means?

14. (a) How major defects on aircraft are classified?

Or

- (b) What is the information a weight schedule should contain?

15. (a) What are the instruments or equipments fitted when aircraft operated in accordance with the Instrument Flight Rule (IFR)?

Or

- (b) Write a short note on Defueling and their safeties.

Part C (3 × 10 = 30)

Essay questions of either or choice.

16. (a) What are the documents to be submitted for validation of Type Certificate?

Or

- (b) Write briefly about the revalidation of a suspended certificate of Airworthiness.

17. (a) Write the procedure for Registration of Aircraft in India.

Or

- (b) Write down the procedures for grant of approval to organization.

18. (a) Write down the validation of licenses and experience requirements of foreign license of Aircraft Maintenance Engineers

Or

- (b) What are the safety measures to be followed by the operator during fuelling with passengers aboard and during Embarkation and Disembarkation?

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Fifth Semester

Aeronautical Science

PISTON ENGINE AND PROPELLER

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Draw the P-V and T-s diagram of Otto cycle with assumptions.
2. Define Compression Ratio.
3. What are the types of IC Engines based on their crank case configuration?
4. What is the function of Oil Supply Ring?
5. What are the advantages of Fuel Injection system in Piston Engines?
6. What is the need for lubrication in an IC engine?
7. What is the function of Contact Breaker?
8. What are the types of Spark Plug?
9. Define Blade Angle.
10. Write down the advantages of metal propellers over wood propellers?

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) Explain the following :

- (i) Piston Displacement
- (ii) IHP and
- (iii) BHP.

Or

(b) What are the factors affecting the performance of aircraft reciprocating engine?

12. (a) What are the components of piston assembly and its function with a neat sketch?

Or

(b) Explain the components of cylinder assembly and its functions.

13. (a) Mention the steps involved in maintenance of Float type Carburetor.

Or

(b) What are the characteristics of Lubricating Oil?

14. (a) Describe the role of ignition shielding and ignition switch.

Or

(b) Explain the working of Engine Starter Motor.

15. (a) Write about the forces acting on propeller in flight.

Or

(b) What are the propeller controls and instruments located in cockpit?

Part C

(3 × 10 = 30)

Essay questions of either or choice.

16. (a) Describe the operation of the four stroke–five event cycle with the help of Diesel and Otto Cycle.

Or

- (b) With the help of a neat sketch, explain the Working principle and operation of a Turbocharger.
17. (a) Illustrate the working principle of Wet sump lubrication system and its components with a neat sketch.

Or

- (b) Explain the principle and operation of Spark plug.
18. (a) Explain the Construction and working of fixed–pitch and reverse pitch propellers.

Or

- (b) With the help of the valve timing diagram, explain about the valve operating mechanism and its components.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Fifth Semester

Aeronautical Science

GAS TURBINE ENGINE

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Describe Newton's laws of motion.
2. Differentiate Gross thrust and Net thrust.
3. Describe propulsive efficiency.
4. State the major parts of centrifugal compressor.
5. What is Compressor stall?
6. What is the purpose of diffuser in Gas Turbine Engine?
7. Write a short note on Boost pump.
8. List down various types of Spray nozzles.
9. Describe 'Rich blow out' and 'Lean die out'.
10. Name any four types of Turbine engine starters.

Part B**(5 × 5 = 25)**

Brief answer with either (or) choice.

11. (a) Describe the process of airflow through gas turbine engine.

Or

- (b) Describe the Basic propulsion Principles.

12. (a) Explain Ramjet engine.

Or

- (b) Describe pulse jet engine.

13. (a) Describe Air inlet Duct and Inlet anti-icing system.

Or

- (b) Describe the Compressors of Gas turbine Engine.

14. (a) Write note on Combustion chamber of Gas turbine engine.

Or

- (b) Describe variable area exhaust Nozzle.

15. (a) Briefly explain the functions of F C U.

Or

- (b) What are the methods adopted to reduce the engine noise?

Part C**(3 × 10 = 30)**

Essay question of either or choice.

16. (a) Briefly explain the principles of Gas turbine engine.

Or

- (b) Describe briefly the events of Brayton Cycle with PV and Ts diagram.

17. (a) Describe various types of combustion chambers with neat sketch.

Or

- (b) Describe Forces acting on the Propeller during flying.

18. (a) Write note on:

- (i) Oil Tank
- (ii) Pressure Oil pump
- (iii) Magnetic Chip detector
- (iv) Oil Cooler
- (v) Oil Filter.

Or

- (b) Describe the operation of a typical turbine engine fuel system with a neat sketch.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Fifth Semester

Aeronautical Science

AIRCRAFT ELECTRICAL SYSTEM

(2016 Onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. What are the differences between relay and solenoid?
2. What is circuit breaker?
3. What is the purpose of equalizing circuit?
4. What is the use of separator?
5. What are the different configurations of switches?
6. What is dc alternator?
7. What is purpose of voltage regulator?
8. What is bonding and shielding?
9. What is residual magnetism?
10. Describe brush rigging.

Part B

(5 × 5 = 25)

Brief answer with either or choice.

11. (a) Draw a diagram of battery circuit and explain.

Or

- (b) Explain vicious cycling.

12. (a) Explain constant voltage charging.

Or

- (b) Explain the precautions to be taken while serving aircraft battery.

13. (a) Explain armature reaction.

Or

- (b) Explain routing of electric wire bundles.

14. (a) Discuss electrical load analysis.

Or

- (b) Explain split-power system.

15. (a) Explain landing and taxi light circuits.

Or

- (b) Explain the general requirements for inspection and maintenance of electrical installation.

Part C

(3 × 10 = 30)

Essay question of with either or choice.

16. (a) Explain the theory of Lead Acid battery.

Or

- (b) Explain the constructions of Nickel Cadmium battery.

17. (a) Explain operation of carbon pile voltage regulator with the help of a diagram.

Or

- (b) Explain auto ignition system.

18. (a) Explain spilt power distribution system.

Or

- (b) Draw a diagram of anti skid brake system and explain.

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B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

Fifth Semester

Aeronautical Science

INDUSTRIAL MANAGEMENT

(2016 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Write the meaning and definition of management.
2. Define Planning.
3. What is called internal coordination?
4. Define Line organization.
5. Define Motivation.
6. Write any three importance of communication.
7. Give any three techniques of time management.
8. What is called record inventory?
9. Define filing and their objectives.
10. Define economic order quantity.

Part B**(5 × 5 = 25)**

Brief answer with either or choice.

11. (a) Discuss the nature and scope of management.

Or

- (b) Elaborate Henry Mintzberg ten managerial roles.

12. (a) Write the types and objectives of coordination.

Or

- (b) Write the difference between Recruitment and selection.

13. (a) What are obstacles of communication?

Or

- (b) Write duties of supervisor.

14. (a) What are the basic functions of office?

Or

- (b) Write the objective and scope of Production management.

15. (a) What are the reasons for holding inventories?

Or

- (b) Give the techniques and purpose of work study.

Part C

(3 × 10 = 30)

Answer **all** questions.

16. (a) Define planning, and its types, steps and importance of planning.

Or

- (b) Define Training. Discuss the process and methods of training.

17. (a) Define recruitment, procedure and its sources.

Or

- (b) Write the theories of motivation.

18. (a) What are the steps involved in production planning?

Or

- (b) Define method study. Explain the methods and procedures of work study.
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