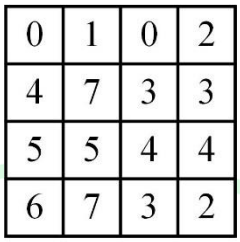
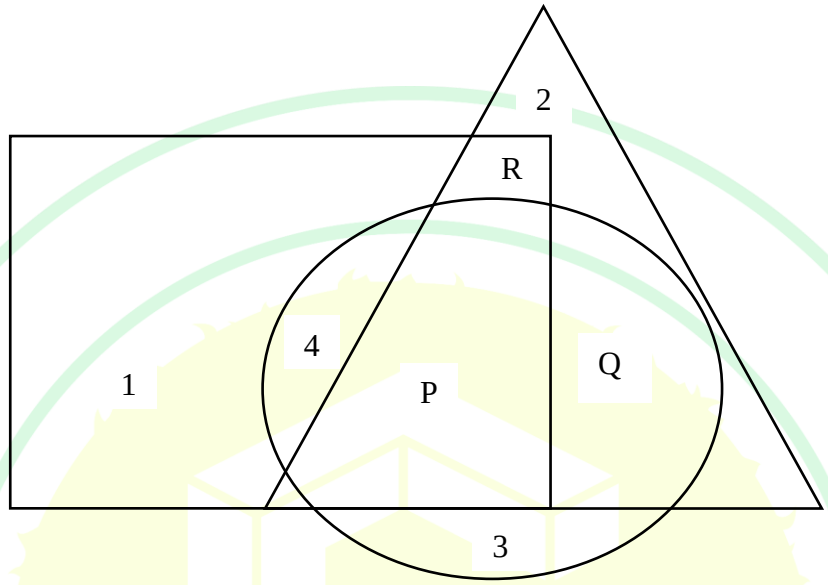
General Aptitude

Q.1 – Q.5 Carry ONE mark Each

Q.1	Courage : Bravery :: Yearning : _____ Select the most appropriate option to complete the analogy.
(A)	Longing
(B)	Yelling
(C)	Yawning
(D)	Glaring

Q.2	We _____ tennis in the lawn when it suddenly started to rain. Select the most appropriate option to complete the above sentence.
(A)	have been playing
(B)	had been playing
(C)	would have been playing
(D)	could be playing

Q.3	A 4 × 4 digital image has pixel intensities (U) as shown in the figure. The number of pixels with $U \leq 4$ is:
	
(A)	3
(B)	8
(C)	11
(D)	9

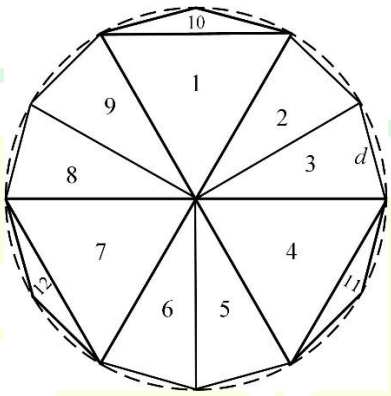
Q.4	In the given figure, the numbers associated with the rectangle, triangle, and ellipse are 1, 2, and 3, respectively. Which one among the given options is the most appropriate combination of P, Q, and R ?
	
(A)	P = 6; Q = 5; R = 3
(B)	P = 5; Q = 6; R = 3
(C)	P = 3; Q = 6; R = 6
(D)	P = 5; Q = 3; R = 6

Q.5	A rectangle has a length L and a width W, where L > W. If the width, W, is increased by 10%, which one of the following statements is correct for all values of L and W?
(A)	Perimeter increases by 10%.
(B)	Length of the diagonals increases by 10%.
(C)	Area increases by 10%.
(D)	The rectangle becomes a square.

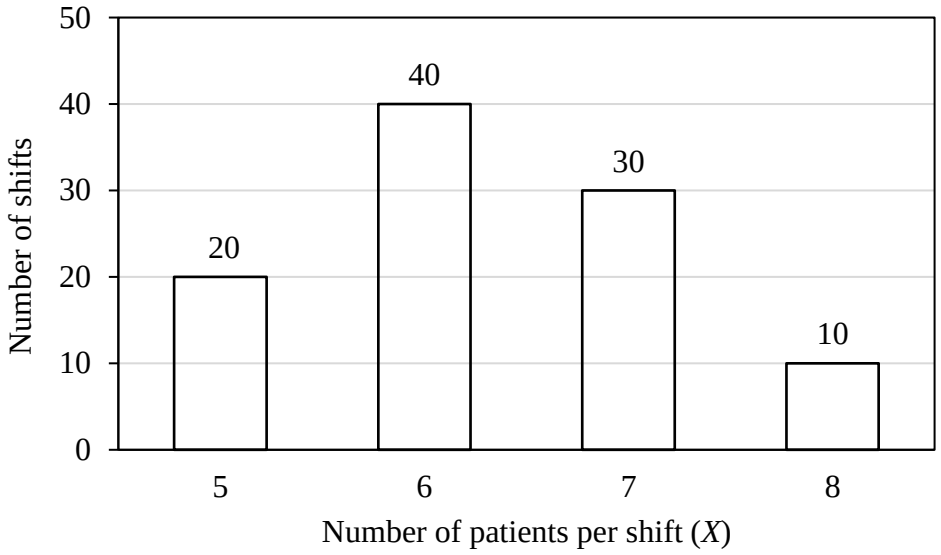
Q.6 – Q.10 Carry TWO marks Each

<table>
<tr><td>Q.6</td><td>Column-I has statements made by Shanthala; and, Column-II has responses given by Kanishk.
<table>
<tr><th colspan="2">Column-I</th><th colspan="2">Column-II</th></tr>
<tr><td>P.</td><td>This house is in a mess.</td><td>1.</td><td>Alright, I won’t bring it up during our conversations.</td></tr>
<tr><td>Q.</td><td>I am not happy with the marks given to me.</td><td>2.</td><td>Well, you can easily look it up.</td></tr>
<tr><td>R.</td><td>Politics is a subject I avoid talking about.</td><td>3.</td><td>No problem, let me clear it up for you.</td></tr>
<tr><td>S.</td><td>I don’t know what this word means.</td><td>4.</td><td>Don’t worry, I will take it up with your teacher.</td></tr>
</table>
Identify the option that has the correct match between Column-I and Column-II.</td></tr>
<tr><td>(A)</td><td>P – 2; Q – 3; R – 1; S – 4</td></tr>
<tr><td>(B)</td><td>P – 3; Q – 4; R – 1; S – 2</td></tr>
<tr><td>(C)</td><td>P – 4; Q – 1; R – 2; S – 3</td></tr>
<tr><td>(D)</td><td>P – 1; Q – 2; R – 4; S – 3</td></tr>
<tr><td></td><td></td></tr>
</table>

Q.7	Weight of a person can be expressed as a function of their age. The function usually varies from person to person. Suppose this function is identical for two brothers, and it monotonically increases till the age of 50 years and then it monotonically decreases. Let a_1 and a_2 (in years) denote the ages of the brothers and $a_1 < a_2$. Which one of the following statements is correct about their age on the day when they attain the same weight?
(A)	$a_1 < a_2 < 50$
(B)	$a_1 < 50 < a_2$
(C)	$50 < a_1 < a_2$
(D)	Either $a_1 = 50$ or $a_2 = 50$

Q.8	A regular dodecagon (12-sided regular polygon) is inscribed in a circle of radius r cm as shown in the figure. The side of the dodecagon is d cm. All the triangles (numbered 1 to 12) in the figure are used to form squares of side r cm and each numbered triangle is used only once to form a square. The number of squares that can be formed and the number of triangles required to form each square, respectively, are: Note: The figure shown is representative.
	
(A)	3; 4
(B)	4; 3
(C)	3; 3
(D)	3; 2

Q.9	If a real variable x satisfies $3^{x^2} = 27 \times 9^x$, then the value of $\frac{2^{x^2}}{(2^x)^2}$ is:
(A)	2^{-1}
(B)	2^0
(C)	2^3
(D)	2^{15}

Q.10	The number of patients per shift (X) consulting Dr. Gita in her past 100 shifts is shown in the figure. If the amount she earns is ₹ $1000(X - 0.2)$, what is the average amount (in ₹) she has earned per shift in the past 100 shifts? Note: The figure shown is representative.
	
(A)	6,100
(B)	6,300
(C)	6,000
(D)	6,500

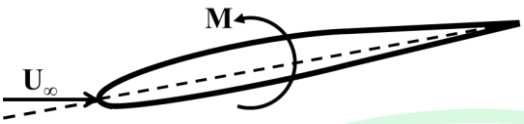
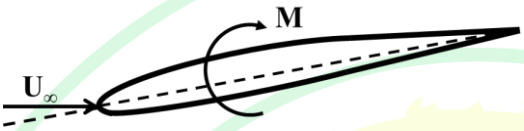
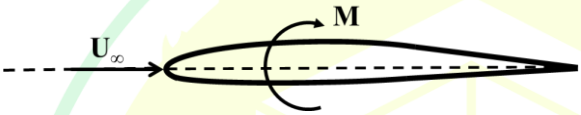
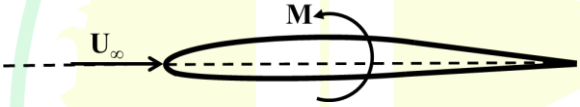
Q.11 – Q.35 Carry ONE mark Each

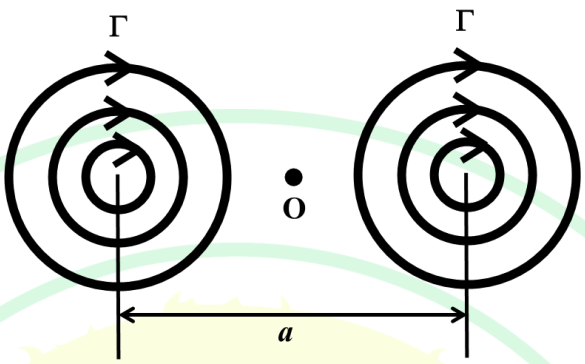
Q.11	For any real symmetric matrix A, the transpose of A is ____ .
(A)	inverse of A
(B)	null matrix
(C)	$-A$
(D)	A
Q.12	$$2x + 3y + z = 0$$ $$x + y = 0$$ $$y + z = 0$$ The given system of equations has
(A)	a unique solution.
(B)	infinitely many solutions.
(C)	no solution.
(D)	a finite number of solutions.

Q.13	The eigenvalues of the matrix $\begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$ are _____.
(A)	0, 2
(B)	2, 3
(C)	1, 3
(D)	1, 2
Q.14	The partial differential equation $\frac{\partial^2 u}{\partial x^2} + 4\frac{\partial^2 u}{\partial x \partial y} + 2\frac{\partial^2 u}{\partial y^2} = 0$ is _____.
(A)	elliptic
(B)	hyperbolic
(C)	parabolic
(D)	of mixed type

Q.15	$f(x) = \begin{cases} A + x & , \text{ if } x < 2 \\ 1 + x^2 & , \text{ if } x \geq 2 \end{cases}$ If the function $f(x)$ is continuous at $x = 2$, the value of A is _____.
(A)	2
(B)	2.5
(C)	3
(D)	3.5
Q.16	If $i = \sqrt{-1}$, $\frac{(i+1)^3}{i-1}$ = _____.
(A)	2
(B)	-2
(C)	$(i + 1)$
(D)	$(i - 1)$

Q.17	For a two-dimensional incompressible flow over a flat plate, the laminar boundary layer thickness at a distance x from the leading edge is δ. If Re_x is the Reynolds number defined based on length scale x, $\left(\frac{\delta}{x}\right)$ is proportional to _____.
(A)	$Re_x^{-1/2}$
(B)	Re_x^{-1}
(C)	$Re_x^{-3/2}$
(D)	Re_x^{-2}
Q.18	For a NACA 4415 airfoil, the location of maximum camber, as a fraction of the chord length from the leading edge, is _____.
(A)	0.44
(B)	0.40
(C)	0.15
(D)	0.04

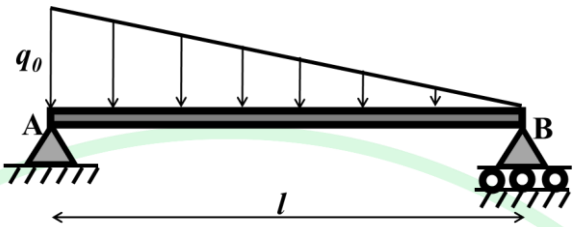
Q.19	A positively cambered airfoil is placed in a uniform flow (velocity, U_∞) at its zero-lift angle of attack. M is the corresponding pitching moment. Which one of the following representations accurately describes this scenario?
(A)	
(B)	
(C)	
(D)	

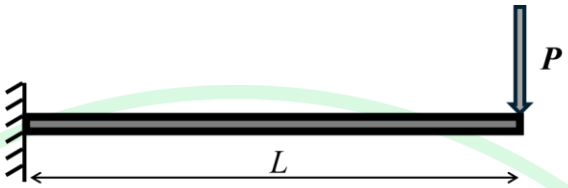
Q.20	Consider a pair of point vortices with clockwise circulation Γ each. The distance between their centers is a, as shown in the figure. Assume two-dimensional, incompressible, inviscid flow. Which one of the following options is correct?
	
(A)	The vortices translate downwards together with a velocity $\frac{\Gamma}{2\pi a}$.
(B)	The vortices translate upwards together with a velocity $\frac{\Gamma}{2\pi a}$.
(C)	The vortices rotate clockwise around each other about their centroid O.
(D)	The vortices rotate counter-clockwise around each other about their centroid O.

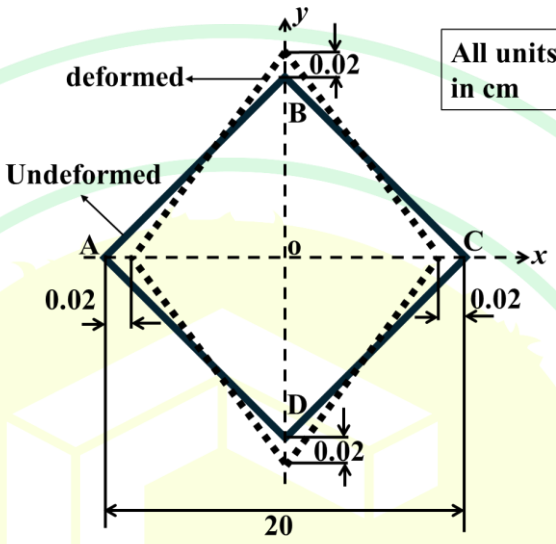
Q.21	In a fluid flow, Mach number is an estimate of _____.
(A)	$\sqrt{\frac{\text{inertia force}}{\text{viscous force}}}$
(B)	$\sqrt{\frac{\text{inertia force}}{\text{elastic force}}}$
(C)	$\sqrt{\frac{\text{elastic force}}{\text{viscous force}}}$
(D)	$\sqrt{\frac{\text{viscous force}}{\text{inertia force}}}$
Q.22	A general aviation airplane is in steady and level flight. The airplane is prone to adverse yaw. Which one of the following options best describes the deflections of aileron and rudder to achieve a coordinated right turn?
(A)	Left aileron: down; Right aileron: up; Rudder: left
(B)	Left aileron: down; Right aileron: up; Rudder: right
(C)	Left aileron: up; Right aileron: down; Rudder: left
(D)	Left aileron: up; Right aileron: down; Rudder: right

Q.23	For a general aviation airplane, which one of the following has a destabilizing effect on its static roll stability?
(A)	Wing with a positive dihedral angle
(B)	Fuselage with a high wing
(C)	Fuselage with a low wing
(D)	Swept back wing
Q.24	A general aviation airplane is flying at an altitude of 5000 m. The indicated airspeed is 250 km/h. Assume that there are no instrument errors and position errors. Neglecting compressibility effects, which one of the following options is FALSE?
(A)	The true airspeed is greater than 250 km/h.
(B)	The calibrated airspeed is 250 km/h.
(C)	The true airspeed is 250 km/h.
(D)	The equivalent airspeed is 250 km/h.

Q.25	To achieve longitudinal static stability of a general aviation airplane, which one of the following conditions should be satisfied?
(A)	The center of gravity of the airplane should be aft of the neutral point.
(B)	The center of gravity of the airplane should be forward of the neutral point.
(C)	The stability coefficient $\frac{\partial C_m}{\partial \alpha}$ (C_m is the airplane pitching moment coefficient and α is the angle of attack) is positive.
(D)	The static margin is negative.
Q.26	For a homogeneous, isotropic material, the relation between the shear modulus (G), Young's modulus (E), and Poisson's ratio (ν) is ____.
(A)	$G = 2E(1+\nu)$
(B)	$2G = E(1+\nu)$
(C)	$E = 2G(1+\nu)$
(D)	$2E = G(1+\nu)$

Q.27	A simply supported horizontal beam is subjected to a distributed transverse load varying linearly from q_0 at A to zero at B, as shown in the figure. Which one of the following options is correct?
	
(A)	The magnitude of the vertical reaction force at A is larger than that at B.
(B)	The magnitude of the vertical reaction force at B is larger than that at A.
(C)	The magnitudes of the vertical reaction forces at A and B are equal.
(D)	The reactions at points A and B are indeterminate.
Q.28	A stress field is given by $\sigma_{xx} = \sigma_{zz} = C_1 y;\ \sigma_{yy} = C_2 y;\ \tau_{xy} = \tau_{yz} = \tau_{zx} = 0$, where C_1 and C_2 are non-zero constants. If the stress field satisfies equilibrium, which one of the following options is correct?
(A)	There is no body force per unit volume.
(B)	There is a constant body force per unit volume in the y-direction.
(C)	The body force per unit volume varies linearly in the y-direction.
(D)	The direction of the body force per unit volume depends on the value of C_1.

Q.29	A uniform symmetric cross-section cantilever beam of length L is subjected to a transverse force P at the free end, as shown in the figure. The Young's modulus of the material is E and the moment of inertia is I. Ignoring the contributions due to transverse shear, the strain energy stored in the beam is _____.
	
(A)	$\frac{P^2L^3}{6EI}$
(B)	$\frac{PL^3}{3EI}$
(C)	$\frac{PL^3}{6EI}$
(D)	$\frac{P^2L^3}{3EI}$

Q.30	In the given figure, plate ABCD in its undeformed configuration (solid line) is a rhombus with all the internal angles being 90°. The lengths of the undeformed diagonals are 20 cm. ABCD deforms as shown by the dotted lines. Upon deformation, diagonal AC reduces to 19.96 cm and BD increases to 20.04 cm. In the given *x*-*y* coordinate system, the engineering shear strain γ_{xy} is equal to ____.
	
(A)	0
(B)	0.002
(C)	0.004
(D)	-0.004

Q.31	δQ and δW are the heat and work interactions of a system with its surroundings, and dU is the change in the internal energy of the system. For an adiabatic process in a closed, constant pressure combustor, which one of the following options is correct?
(A)	$\lvert\delta Q\rvert = \lvert dU\rvert \neq 0$ and $\lvert\delta W\rvert = 0$
(B)	$\lvert\delta Q\rvert = \lvert\delta W\rvert = 0$ and $\lvert dU\rvert \neq 0$
(C)	$\lvert\delta Q\rvert = \lvert\delta W\rvert = \lvert dU\rvert = 0$
(D)	$\lvert\delta W\rvert = \lvert dU\rvert \neq 0$ and $\lvert\delta Q\rvert = 0$
Q.32	An ideal two-stage rocket has identical specific impulse and structural coefficient for its two stages. For an optimized rocket, the two stages have identical payload ratio as well. The payload is 2 tons and the initial mass of the rocket is 200 tons. The mass of the second stage of the rocket (including the final payload mass) is ____ tons.
(A)	100
(B)	10
(C)	20
(D)	50

Q.33	A gaseous fuel mixture comprising 3 moles of methane and 2 moles of ammonia is combusted in X moles of pure oxygen in stoichiometric amount. Assuming complete combustion, with only CO_2, H_2O and N_2 in the product gases, the value of X is ___.
	$3\ CH_4 + 2\ NH_3 + X\ O_2 \rightarrow$ Products (CO_2, H_2O, N_2)
(A)	7.5
(B)	5.5
(C)	8.5
(D)	9.5
Q.34	The lift per unit span for a spinning circular cylinder in a potential flow is 6 N/m. The free-stream velocity is 30 m/s, and the density of air is 1.225 kg/m^3. The circulation around the cylinder is ____ m^2/s (*rounded off to two decimal places*).
Q.35	In a centrifugal compressor, the eye tip diameter is 10 cm. For a shaft rotational speed of 490 rotations per second, the tangential speed at the inducer tip is ___ m/s (*rounded off to one decimal place*).

Q.36 – Q.65 Carry TWO marks Each

Q.36	A lifting surface has a spanwise circulation distribution of $\Gamma(\theta) = A \sin 3\theta$ (where $A \neq 0$) over its span $-\frac{b}{2} \leq y \leq \frac{b}{2}$, and $y = -\frac{b}{2}\cos\theta$ is the spanwise coordinate. Furthermore, the downwash varies along the span as $w(\theta) = V_\infty \left(\frac{3A \sin 3\theta}{\sin\theta}\right)$, where V_∞ is the freestream velocity. Which one of the following options represents the total lift (L) and induced drag (D_i)?
(A)	$L = 0$ and $D_i = 0$
(B)	$L = 0$ and $D_i \neq 0$
(C)	$L \neq 0$ and $D_i = 0$
(D)	$L \neq 0$ and $D_i \neq 0$

Q.37 A 1 m long rod is to be designed to support an axial tensile load P (P >> weight of the rod). The material for the rod is to be chosen from one of the four provided in the table. Using strength-based failure criterion for design, which material results in the lowest weight of the rod?

Properties	**Material α**	**Material β**	**Material γ**	**Material δ**
Density (kg/m^3)	2700	4500	7800	9000
Young's modulus (GPa)	70	115	200	130
Yield Strength (MPa)	270	900	520	540

(A) Material α

(B) Material β

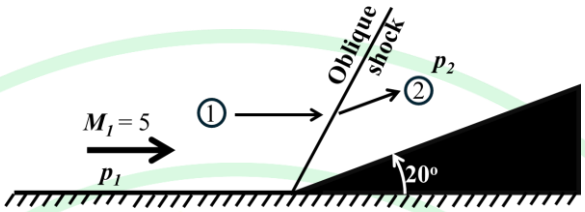
(C) Material γ

(D) Material δ

Q.38	A general aviation airplane is initially in steady and level flight. The stability coefficient $\frac{\partial C_m}{\partial q}$ (C_m is the airplane pitching moment coefficient and q is the pitch rate) is negative. The airplane is perturbed with a small nose-up constant pitch rate. Assume that the horizontal tail does not stall during the perturbation, and unsteady effects are neglected. When compared to steady and level flight condition, which of the following statements is/are true during the perturbed motion?
(A)	The angle of attack of the horizontal tail increases.
(B)	The contribution of the horizontal tail to the airplane's pitching moment about the center of gravity is more stabilizing.
(C)	The lift generated by the horizontal tail increases.
(D)	The contribution of the horizontal tail to the airplane's pitching moment about the center of gravity is less stabilizing.
Q.39	A general aviation airplane is gliding with a speed V_g at minimum glide angle. Which of the following statements is/are true?
(A)	V_g is equal to the speed corresponding to the maximum lift to drag ratio of the airplane.
(B)	V_g increases with decreasing wing loading when all other parameters remain constant.
(C)	V_g increases with decreasing altitude when all other parameters remain constant.
(D)	V_g increases with increasing altitude when all other parameters remain constant.

Q.40	The maximum value of the function $f(x) = (x-1)(x-2)(x-3)$ in the domain [0, 3] occurs at $x =$ _____(*rounded off to two decimal places*).
Q.41	$\lim_{x \to 0} \frac{1-\cos(2x)}{x^2} =$ _____ (*answer in integer*).
Q.42	The equation of a closed curve in two-dimensional polar coordinates is given by $r = \frac{2}{\sqrt{\pi}}(1 - \sin\theta)$. The area enclosed by the curve is _____ (*answer in integer*).
Q.43	Consider the ordinary differential equation: $\frac{1}{2}\frac{dy}{dx} + \frac{y}{x} = 1$. If $y = 2/3$ at $x = 1$, then the value of y at $x = 3$ is _____ (*rounded off to the nearest integer*).
Q.44	An approximate solution of the equation $x^3 - 17 = 0$ is to be obtained using the Newton-Raphson method. If the initial guess is $x_o = 2$, the value at the end of the first iteration is $x_1 =$ _____ (*rounded off to two decimal places*).

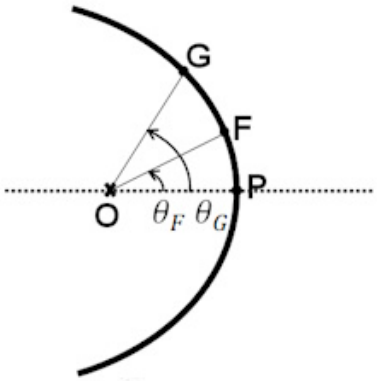
Q.45	$\hat{\imath}$ and $\hat{\jmath}$ denote unit vectors in the x and y directions, respectively. The outward flux of the two-dimensional vector field $\vec{v} = x\hat{\imath} + y\hat{\jmath}$ over the unit circle centered at the origin is _____ (*rounded off to two decimal places*).
Q.46	An aircraft is flying at an altitude of 4500 m above sea level, where the ambient pressure, temperature and density are 57 kPa, 259 K and 0.777 kg/m^3, respectively. The speed of the aircraft (V) is 230 m/s. Gas constant R= 287 J/kg/K, and specific heat ratio γ = 1.4. If the stagnation pressure is p_o, and static pressure is p, the value of $\left[\frac{p_o - p}{\frac{1}{2}\rho V^2}\right]$ is _____ *(rounded off to two decimal places).*
Q.47	A rectangular wing of 1.2 m chord length and aspect ratio 5 is tested in a wind tunnel at an air speed of 60 m/s. The density and the dynamic viscosity of air are 1.3 kg/m^3 and 1.8×10^{-5} kg/m-s, respectively. A second rectangular wing of the same span, but with an aspect ratio of 6, is to be tested in the same tunnel at the same Reynolds number. The air speed at which the second test should be performed is _____ m/s (*answer in integer*).
Q.48	In a low-speed airplane, a venturimeter with 1.3:1 area ratio is used for airspeed measurement. The airplane's maximum speed at sea level is 90 m/s. If the density of air at sea level is 1.225 kg/m^3, the maximum pressure difference between the inlet and the throat of the venturimeter is _____ kPa *(rounded off to two decimal places).*

Q.49	A supersonic stream of an ideal gas at Mach number $M_1 = 5$ is turned by a ramp, as shown in the figure. The ramp angle is 20°. The pressure ratio is $\frac{p_2}{p_1} = 7.125$ and the specific heat ratio is $\gamma = 1.4$. The pressure coefficient on the ramp surface is _____ *(rounded off to two decimal places).*
	
Q.50	A perfect gas flows through a frictionless constant-area duct with heat addition. The inlet conditions are as follows: pressure 100 kPa, density 1 kg/m^3, and velocity 100 m/s. At a particular downstream location, the gas velocity is 200 m/s. The static pressure at the downstream location is _____ kPa *(answer in integer).*
Q.51	The mass flow rate in a supersonic wind tunnel is 2 kg/s when the stagnation pressure and stagnation temperature are 1 MPa and 800 K, respectively. If the stagnation pressure and stagnation temperature are changed to 3 MPa and 200 K, the mass flow rate in the tunnel changes to _____ kg/s *(answer in integer).*

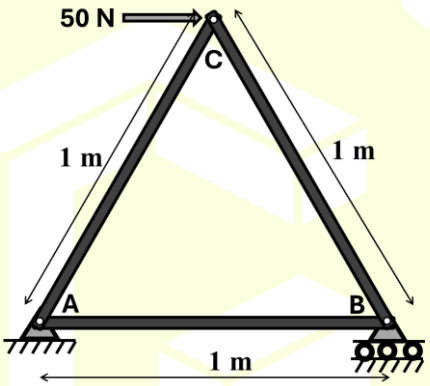
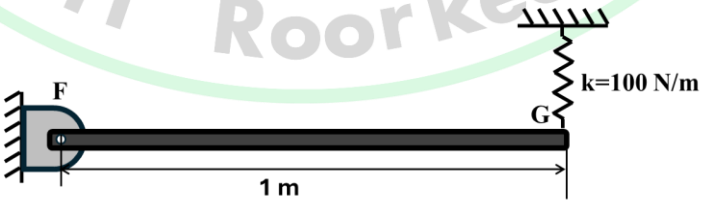
Q.52 A jet-powered airplane is steadily climbing at a rate of 10 m/s. The air density is 0.8 kg/m^3, and the thrust force is aligned with the flight path. Using the information provided in the table below, the airplane's thrust to weight ratio is _____ (*rounded off to one decimal place*).

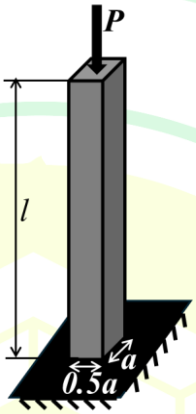
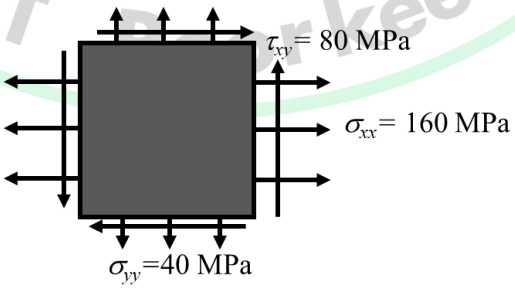
Airplane speed	80 m/s
Lift coefficient, C_L	0.8
Aspect ratio	6
Oswald efficiency factor	0.8
Zero-lift drag coefficient	0.02

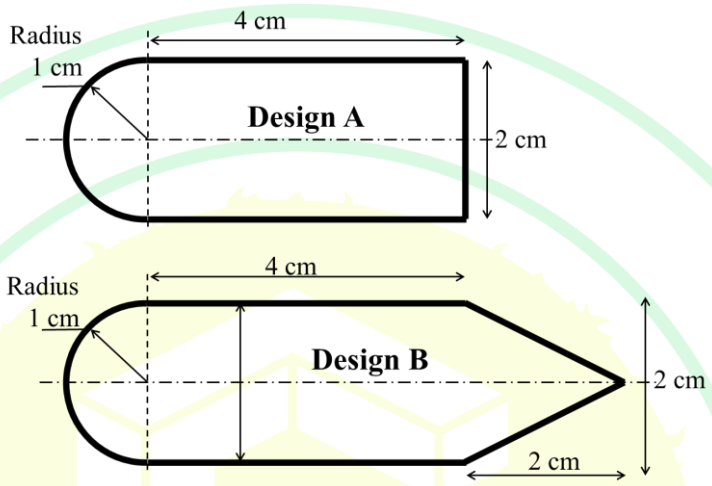
Q.53 F and G denote two points on a spacecraft's orbit around a planet, as indicated in the figure. O is the center of the planet, P is the periapsis, and the angles are as indicated in the figure. If OF $= 8000$ km, OG $= 10000$ km, $\theta_F = 0$ deg, and $\theta_G = 60$ deg, the eccentricity of the spacecraft's orbit is ____ (*rounded off to two decimal places*).



Q.54 While taking off, the net external force acting on an airplane during the ground roll segment can be assumed to be constant. The airplane starts from rest. S_{LO} and V_{LO} are the ground roll distance and the lift-off speed, respectively. αV_{LO} ($\alpha > 0$) denotes the airplane speed at 0.5 S_{LO}. Neglecting changes in the airplane mass during the ground roll segment, the value of α is _____ (*rounded off to two decimal places*).

Q.55	A 1 m long rod of 1 cm × 1 cm cross section is subjected to an axial tensile force of 35 kN. The Young's modulus of the material is 70 GPa. The cross-section of the deformed rod is 0.998 cm × 0.998 cm. The Poisson's ratio of the material is _____ (*rounded off to one decimal place*).
Q.56	For a three-bar truss loaded as shown in the figure, the magnitude of the force in the horizontal member AB is ___N (*answer in integer*).
	
Q.57	A uniform rigid bar of mass 3 kg is hinged at point F, and supported by a spring of stiffness k=100 N/m, as shown in the figure. The natural frequency of free vibration of the system is ____rad/s (*answer in integer*).
	

Q.58	A prismatic vertical column of cross-section $a \times 0.5a$ and length l is rigidly fixed at the bottom and free at the top. A compressive force P is applied along the centroidal axis at the top surface. The Young's modulus of the material is 200 GPa and the uniaxial yield stress is 400 MPa. If the critical value of P for yielding and for buckling of the column are equal, the value of $\left(\frac{l}{a}\right)$ is _____(*rounded off to one decimal place*).
	
Q.59	A thin flat plate is subjected to the following stresses: $\sigma_{xx} = 160$ MPa; $\sigma_{yy} = 40$ MPa; $\tau_{xy} = 80$ MPa. Factor of safety is defined as the ratio of the yield stress to the applied stress. The yield stress of the material under uniaxial tensile load is 250 MPa. The factor of safety for the plate assuming that material failure is governed by the von Mises criterion is _____ (*rounded off to two decimal places*).
	

Q.60	Two designs A and B, shown in the figure, are proposed for a thin-walled closed section that is expected to carry only torque. Both A and B have a semi-circular nose, and are made of the same material with a wall thickness of 1 mm. With strength as the only criterion for failure, the ratio of maximum torque that B can support to the maximum torque that A can support is__ (*rounded off to two decimal places*).
	
Q.61	An ideal turbofan with a bypass ratio of 5 has core mass flow rate, $\dot{m}_{a,c}$= 100 kg/s. The core and the fan exhausts are separate and optimally expanded. The core exhaust speed is 600 m/s and the fan exhaust speed is 120 m/s. If the fuel mass flow rate is negligible in comparison to $\dot{m}_{a,c}$, the static specific thrust ($T/\dot{m}_{a,c}$) developed by the engine is ____ Ns/kg (*rounded off to the nearest integer*).
Q.62	Air at temperature 300 K is compressed isentropically from a pressure of 1 bar to 10 bar in a compressor. Eighty percent of the compressed air is supplied to a combustor. In the combustor, 0.88 MJ of heat is added per kg of air. The specific heat at constant pressure is C_p = 1005 J/kg/K and the specific heat ratio is γ = 1.4. The temperature of the air leaving the combustor is ___ K (*rounded off to one decimal place*).

Q.63	A monopropellant liquid rocket engine has 800 injectors of diameter 4 mm each, and with a discharge coefficient of 0.65. The liquid propellant of density 1000 kg/m^3 flows through the injectors. There is a pressure difference of 10 bar across the injectors. The specific impulse of the rocket is 1500 m/s. The thrust generated by the rocket is _____ kN (*rounded off to one decimal place*).
Q.64	An ideal ramjet with an optimally expanded exhaust is travelling at Mach 3. The ambient temperature and pressure are 260 K and 60 kPa, respectively. The inlet air mass flow rate is 50 kg/s. Exit temperature of the exhaust gases is 700 K. Fuel mass flow rate is negligible compared to air mass flow rate. Gas constant is R= 287 J/kg/K, and specific heat ratio is $\gamma = 1.4$. The thrust generated by the engine is ___ kN (*rounded off to one decimal place*).
Q.65	A single-stage axial compressor, with a 50 % degree of reaction, runs at a mean blade speed of 250 m/s. The overall pressure ratio developed is 1.3. Inlet pressure and temperature are 1 bar and 300 K, respectively. Axial velocity is 200 m/s. Specific heat at constant pressure, C_p = 1005 J/kg/K and specific heat ratio, $\gamma = 1.4$. The rotor blade angle at the outlet is ___ degrees (*rounded off to two decimal places*).