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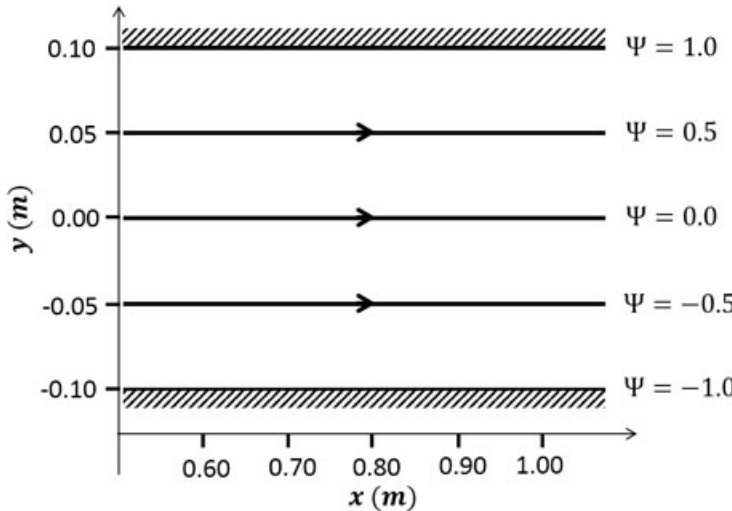
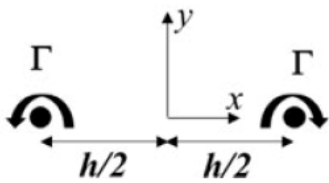
**SUB: AEROSPACE ENGINEERING (AE)**

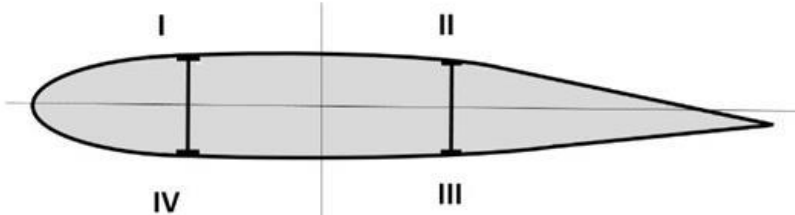
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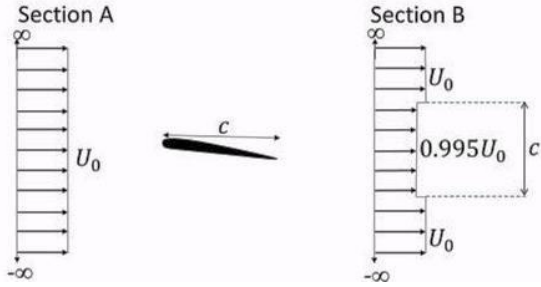
**Instructions:**

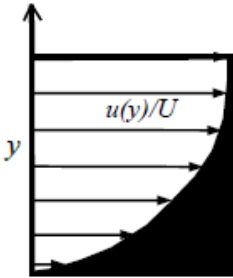
1. Ensure that all pages are printed.
2. Use Black ball pen only
3. Change in option is not allowed
4. There is no negative marking
5. Use of non-programmable scientific calculator is allowed


1.	Match the appropriate engine (in right column) with the corresponding aircraft (in left column) for most efficient performance of the engine.			
	a. Low speed transport aircraft		i. Ramjet	
	b. High subsonic civilian aircraft		ii. Turboprop	
	c. Supersonic fighter aircraft		iii. Turbojet	
	d. Hypersonic aircraft		iv. Turbofan	
2.	A	a – iv, b – iii, c – i, d – ii	B	a – ii, b – i, c – iii, d – iv.
	C	a – i, b – ii, c – iv, d – iii	D	a – ii, b – iv, c – iii, d – i.
	Vortex flow occurs at _____			
	A	Leading edge	B	Trailing edge
3.	C	Chord	D	Chamber line
	The moment coefficient measured about the centre of gravity and about aerodynamic centre of a given wing-body combination are 0.0065 and -0.0235 respectively. The aerodynamic centre lies 0.06 chord lengths ahead of the centre of gravity. The lift coefficient for this wing-body is _____.			
	A	0 to 0.10	B	0.11 to 0.20
	C	0.30 to 0.40	D	0.45 to 0.55
4.	A stream line is			
	A	The line of equal velocity in a flow	B	The line along which the rate of pressure drop is uniform
	C	The line along the geometrical centre of the flow	D	Fixed in space in steady flow
	Under what condition a glider should be operated to ensure minimum glide angle?			
5.	A	Maximum $C_L/C_D$	B	Minimum $C_L/C_D$
	C	Maximum $C_L/C_D^{3/2}$	D	Minimum $C_L/C_D^{3/2}$

6.	<p>The streamlines of a steady two dimensional flow through a channel of height 0.2m are plotted in the figure, where <math>\psi</math> is the stream function in <math>\text{m}^2/\text{s}</math>. The volumetric flow rate per unit depth is</p> <div></div>											
	A	1.0 $\text{m}^2/\text{s}$	B	2.0 $\text{m}^2/\text{s}$								
	C	0.5 $\text{m}^2/\text{s}$	D	0.1 $\text{m}^2/\text{s}$								
7.	<p>Geometric Altitude</p> <table><tr><td>A</td><td>Pressure differential with respect to Pressure at Sea Level</td><td>B</td><td>Physical distance between aircraft and reference (e.g. Sea Level)</td></tr><tr><td>C</td><td>Difference in density with International Standard Atmosphere (ISA) temperature</td><td>D</td><td>Distance between Center of Earth and parallel surfaces around the spherical earth. Gravitational potential same on a surface</td></tr></table>				A	Pressure differential with respect to Pressure at Sea Level	B	Physical distance between aircraft and reference (e.g. Sea Level)	C	Difference in density with International Standard Atmosphere (ISA) temperature	D	Distance between Center of Earth and parallel surfaces around the spherical earth. Gravitational potential same on a surface
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8.	<p>Pair of infinitely long, counter-rotating line vortices of the same circulation strength <math>\Gamma</math> are situated a distance <math>h</math> apart in a fluid as shown in the figure. The vortices will</p> <div></div>											
	A	rotate counterclockwise about the midpoint with the tangential velocity at the line vortex equal to $\Gamma/2\pi h$	B	rotate counterclockwise about the midpoint with a tangential velocity at the line vortex equal to $\Gamma/4\pi h$								
	C	translate along +y direction with velocity at the line vortex equal to $\Gamma/2\pi h$	D	translate along +y direction with velocity at the line vortex equal to $\Gamma/4\pi h$								
9.	<p>What is lapse rate?</p> <table><tr><td>A</td><td>Change of temperature with respect to altitude</td><td>B</td><td>Change of temperature with respect to pressure</td></tr><tr><td>C</td><td>Change of pressure with respect to altitude</td><td>D</td><td>Change of temperature with respect to density</td></tr></table>				A	Change of temperature with respect to altitude	B	Change of temperature with respect to pressure	C	Change of pressure with respect to altitude	D	Change of temperature with respect to density
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C	Change of pressure with respect to altitude	D	Change of temperature with respect to density									

10.	Which of the following options can result in an increase in the Mach number of a supersonic flow in a duct?			
	A	Increasing the length of the duct	B	Adding heat to the flow
	C	Removing heat from the flow	D	Inserting a convergent divergent section with the same cross-sectional area at its inlet and exit planes
11.	An aircraft is flying at Mach 0.5 at 3000 m. The following data are given: What is the energy height of this aircraft? $\rho_{3000} = 0.9091 \text{ [kg/m}^3]$ $T_{3000} = 268.65 \text{ [K]}$ $W = 20000 \text{ [N]}$			
	A	4376 m	B	87513 kJ
	C	7356 m	D	31578 kJ
12.	The positive high angle of attack condition is obtained in a steady pull out maneuver at the largest permissible angle of attack of wing. Under this condition, at which of the following regions of the wing does the maximum tension occur?			
				
	A	I	B	II
13.	C	III	D	IV
	Considering $R$ as the radius of the moon, the ratio of the velocities of two spacecraft orbiting moon in circular orbit at altitudes $R$ and $2R$ above the surface of the moon is _____			
	A	4	B	6
	C	8	D	1.25
14.	The table shows the lift characteristics of an airfoil at low speeds. The maximum lift coefficient occurs at 16 degrees. Using Prandtl-Glauert rule the lift coefficient for the airfoil at the angle of attack of 6 degrees and free stream Mach number of 0.6 is _____ (round off to two decimal places)			
	Angle of Attack $\alpha$ (in degrees)		Lift Coefficient $C_L$	
	0		0.10	
	4		0.53	
	A	0.80	B	0.85
	C	0.92	D	0.70

15.	<p>Consider the following four statements regarding aircraft longitudinal stability:</p> <p>P. <math>C_{M, cg}</math> at zero lift must be positive</p> <p>Q. <math>\partial C_{M, cg} / \partial \alpha_a</math> must be negative (<math>\alpha_a</math> is absolute angle of attack)</p> <p>R. <math>C_{M, cg}</math> at zero lift must be negative</p> <p>S. Slope of <math>C_L</math> versus <math>\alpha_a</math> must be negative</p> <p>Which of the following combination is the necessary criterion for stick fixed longitudinal balance and static stability?</p>			
	A	Q and R only	B	Q, R, and S only
	C	P and Q only	D	Q and S only
16.	<p>A low speed uniform flow <math>U_0</math> is incident on an airfoil of chord <math>c</math>. In the figure, the velocity profile some distance downstream of the airfoil is idealized as shown for section B. The static pressure at section A and B is same. The drag coefficient of the airfoil is _____ (round off to 3 decimal places)</p> 			
	A	0.009 to 0.011	B	1 to 2
	C	0.1 to 0.2	D	0.2 to 0.3
17.	<p>The Power off glide range for an airplane with maximum lift to drag ratio of 18, when the glide starts at an altitude of 4 km is _____ km.</p>			
	A	4.5	B	72
	C	22	D	14
18.	<p>An oblique shock is inclined at an angle of 35 degrees to the upstream flow of velocity 517.56 m/s. the deflection of the flow due to this shock is 5.75 degrees and the temperature downstream is 182.46 K. Assume the gas constant <math>R = 287</math> J/kg.K, specific heat ratio <math>\gamma = 1.4</math> and the specific heat at constant pressure <math>C_p = 1005</math> J/kg.K. Using conservation relations, the mach number of the upstream flow can be obtained as _____ (round off to one decimal place)</p>			
	A	1.9 to 2	B	4 to 5
	C	6 to 7	D	8 to 9
19.	<p>Which of the following statements about adverse yaw of an airplane is/are correct?</p> <p>P. It is caused by flow separation resulting from large rudder deflection.</p> <p>Q. It is caused by dissimilar drag forces acting on the two halves of the wing resulting from aileron deflections of same magnitude.</p> <p>R. It can be eliminated by ensuring that the upward deflection of one aileron is greater than the downward deflection of the opposite aileron.</p>			
	A	P only	B	Q only
	C	P and R	D	Q and R

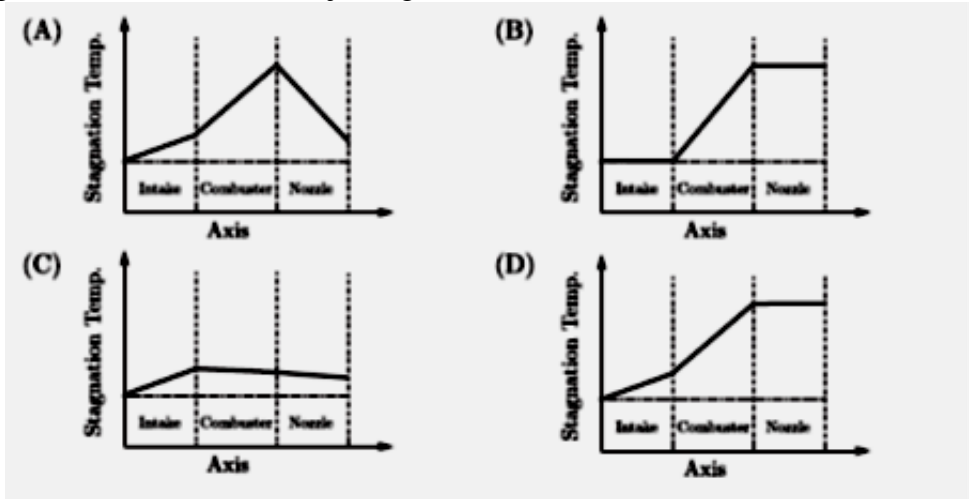
20.	A NACA 0012 airfoil has a trailing edge flap. The airfoil is operating at an angle of attack of 5 degrees with un-deflected flap. If the flap is now deflected by 5 degrees downwards, the $C_L$ versus $\alpha$ curve			
	A	shifts right and slope increases.	B	shifts left and slope increases.
	C	shifts left and slope stays the same.	D	shifts right and slope stays the same.
21.	Which of the following design parameters influence the maximum rate-of-climb for a jet-propelled airplane?			
	A	P and Q alone	B	P, Q, R and S
	C	P, Q and S alone	D	Q, R, and S alone
22.	<p>The velocity profile in an incompressible, laminar boundary layer is shown in the figure below. <math>U</math> is the free-stream velocity; <math>u(y)</math> is the stream-wise velocity component. The area of the black shaded region in the figure below represents the</p> 			
	A	boundary layer thickness.	B	momentum thickness.
	C	displacement thickness.	D	shape factor.
23.	For a given airplane with a given wing loading executing a turn in the vertical plane, under what conditions will the turn radius be minimum and the turn rate be maximum?			
	A	Highest possible $C_L$ and lowest possible load factor	B	Lowest possible $C_L$ and lowest possible load factor
	C	Lowest possible $C_L$ and highest possible load factor	D	Highest possible $C_L$ and highest possible load factor
24.	Consider a vector field given by $x\hat{i} + y\hat{j} + z\hat{k}$ . This vector field is			
	A	Divergence-free and curl-free.	B	Curl-free but not divergence-free.
	C	Divergence-free but not curl-free.	D	Neither divergence-free nor curl-free.
25.	Which one of the following is TRUE with respect to Phugoid mode of an aircraft?			
	A	Frequency is directly proportional to flight speed	B	Frequency is inversely proportional to flight speed
	C	Frequency is directly proportional to the square root of flight speed	D	Frequency is inversely proportional to the square root of flight speed
26.	The first law of thermodynamics is also known as conservation of			
	A	mass.	B	momentum.
	C	energy.	D	species.

27.	Which one of the following criteria leads to maximum turn rate and minimum radius in a level turn flight?			
	A	Highest possible load factor and highest possible velocity	B	Lowest possible load factor and lowest possible velocity
	C	Highest possible load factor and lowest possible velocity	D	Lowest possible load factor and highest possible velocity
28.	A shock wave is moving into still air in a shock tube. Which one of the following happens to the air?			
	A	static temperature increases, total temperature remains constant.	B	static temperature increases, total temperature increases.
	C	static temperature increases, total temperature decreases.	D	static pressure increases, total temperature remains constant.
29.	With increase in airfoil thickness, the critical Mach number for an airfoil is likely to			
	A	Decrease.	B	Increase.
	C	Remain unchanged	D	Be undefined
30.	A thin airfoil is mounted in a low-speed, subsonic wind tunnel, in which the Mach number is 0.1. At a point on the airfoil, the pressure coefficient is measured to be $-1.2$ . If the flow velocity is increased such that the free-stream Mach number is 0.6, the pressure coefficient at the same point on the airfoil will approximately be:			
	A	$-3.5$	B	$-2.9$
	C	$-1.5$	D	$-0.75$
31.	The pitch angle and the angle of attack for a fixed wing aircraft are equal during			
	A	wings level constant altitude flight.	B	unaccelerated climb.
	C	unaccelerated descent.	D	landing
32.	Is uniform flow around a sphere is obtained?			
	A	True	B	False
	C	None of the above	D	Not decided
33.	The load factor of an aircraft turning at a constant altitude is 2. The coefficient of lift required for turning flight as compared to level flight at the same speed will be			
	A	same	B	half
	C	double	D	four times
34.	Ram was on the bank of the river and was observing the flow of river. After sometime he got an idea and he started imagining certain points in the fluid and when he drew tangent to those points, he got direction of the flow. These lines are called as _____			
	A	Streakline	B	Pathline
	C	Streamline	D	Velocity vector
35.	Under what condition an airplane will have minimum thrust requirement for steady level flight?			
	A	Maximum $C_L/C_D$	B	Minimum $C_L/C_D$
	C	Maximum $C_L/C_D^{3/2}$	D	Minimum $C_L/C_D^{3/2}$
36.	In the figure shown below, what does the fluid particle 'A' represents from $t=0$ to $t=t$ ?			
				
	A	Streamline	B	Streakline

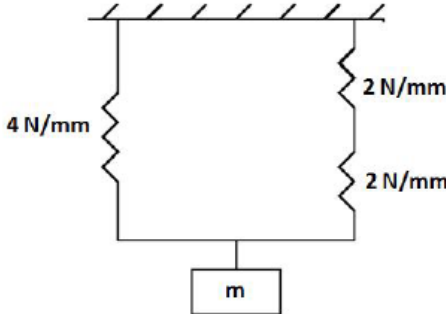
	C	Pathline	D	Velocity vector
37.	Which is the minimum requirement for pure directional stability?			
	A	Slope of yawing moment curve positive	B	Negative lift curve slope
	C	Negative pitching moment coefficient curve slope	D	Positive zero lift pitching moment coefficient
38.	The smoke particles coming out from the chimney falls under _____			
	A	Streamline	B	Streakline
	C	Path line	D	Position vector
39.	Satellite velocity is maximum at _____ for an elliptical orbit.			
	A	apogee	B	perigee
	C	focal point	D	infinity
40.	What is the effect of change in Reynold's number on friction factor in turbulent flow?			
	A	As the Reynold's number increases the friction factor increases in turbulent flow	B	As the Reynold's number increases the friction factor decreases in turbulent flow
	C	change in Reynold's number does not affect the friction factor in turbulent flow	D	unpredictable
41.	The propulsive efficiency of a ramjet engine is lower than that of a low bypass turbofan engine operating under the same conditions and producing the same thrust, primarily because the ramjet engine.....			
	A	has larger kinetic energy lost in the exhaust jet.	B	has lower thrust power.
	C	is not self-starting.	D	has higher thrust to weight ratio.
42.	While flying at Mach 2.0, 11 km altitude and producing the same thrust, what is the correct order from the lowest thrust specific fuel consumption (TSFC) to the highest TSFC ?			
	A	Turbofan, Ramjet, Turbojet	B	Ramjet, Turbojet, Turbofan
	C	Turbofan, Turbojet, Ramjet	D	Turbojet, Turbofan , Ramjet
43.	A De Laval nozzle is to be designed for an exit Mach number of 1.5. The reservoir conditions are 1 atm (gauge), 20°C and $\gamma = 1.4$ . Assuming Shock free flow in nozzle, the exit absolute pressure in atm is, _____ (in three decimal places)			
	A	1.544	B	0.682
	C	0.655	D	0.544
44.	Among the following engines which one has the maximum specific impulse?			
	A	Cryogenic Rocket	B	Solid Propellant Rocket
	C	Liquid Propellant Rocket	D	SCRAM Jet
45.	In the vane-less space between the impeller and the diffuser vanes in a Centrifugal Compressor, the angular momentum varies in the following manner in the radial direction			
	A	Increases	B	Remains constant
	C	Decreases	D	First increases and then decreases
46.	For a turbine stage, which one of the following losses occurs due to the turning of the wall boundary layer through an angle due to curved surface?			
	A	Profile loss	B	Tip clearance loss
	C	Secondary flow loss	D	Annulus loss

47.	Which one of the following aero engines has the highest propulsive efficiency?			
	A	Turbojet engine without afterburner	B	Turbojet engine with afterburner
	C	Turbofan engine	D	Ramjet engine
48.	A small rocket having a specific impulse of 200 s produces a total thrust of 98kN, out of which 10 kN is the pressure thrust. Considering the acceleration due to gravity to be 9.8 m/s <sup>2</sup> , the propellant mass flow rate in kg/s is			
	A	55	B	45
	C	50	D	60
49.	A cruise missile with an ideal ramjet engine is flying at Mach 4.0 at an altitude where the ambient temperature is 100 K. Consider ratio of specific heats 1.4 and specific gas constant 287 J /kgK. If the stagnation temperature in the combustion chamber is 2310K, the speed of the exhaust gases in m/s is _____			
	A	1690.6	B	1880.5
	C	1900	D	2000.2
50.	The stoichiometric fuel-to-air ratio in an aircraft engine combustor varies with the compressor pressure ratio as follows:			
	A	Increases linearly	B	Decreases linearly
	C	Is Independent	D	Increases non linearly
51.	A rocket nozzle is designed to produce maximum thrust at an altitude, $H_8 = km$ from the sea level. The nozzle operates in			
	A	under-expanded condition for $H_8 > km$	B	under-expanded condition for $H_8 < km$
	C	sonic exit condition for $H_8 > km$	D	unchoked condition for $H_8 < km$
52.	For a single stage impulse turbine with a rotor diameter of 2.5 m and a speed of 2500 rpm, the absolute flow speed is 708.42 m/s. if the nozzle angle is 67.5°, the axial velocity component in m/s is _____			
	A	710	B	543.23
	C	352.6	D	271.11
53.	In turbomachines Peripheral speed is directly proportional to			
	A	inlet flow condition	B	inlet diameter
	C	Stator blade angles	D	Rotor Blade angles
54.	A liquid flows through pipes 1 and 2 with the same flow velocity. If the ratio of their pipe diameters $d_1 : d_2$ be 3:2, what will be the ratio of the head loss in the two pipes?			
	A	3:2	B	2:3
	C	9:4	D	4:9
55.	An ideal Brayton cycle, operating between the pressure limits of 1 bar and 6 bar, has minimum and maximum temperatures of 300 K and 1500 K. The ratio of specific heats of the working fluid is 1.4. The approximate final temperatures in Kelvin at the end of expansion processes is			
	A	700	B	800
	C	900	D	1000
56.	The modified gas power cycle used to increase net power output is Brayton cycle with _____			
	A	Intercooling	B	Regeneration
	C	Intercooling and regeneration	D	Reheating



57.	Air at 20°C and 1 bar flows over a plate 75 cm long at a velocity of 35 m/s. Density 1.23 kg/m <sup>3</sup> , Dynamic viscosity = $2 \times 10^{-5}$ kg/ms, Conductivity K = 0.0272 W/m°C, and specific heat Cp = 1.007 kJ/kg°C, Pr = 0.7. Upto which distance from the leading edge flow is laminar?			
	A	21.2 cm	B	22.5 cm
	C	23.2 cm	D	24.5 cm
58.	Which one of the following shows the CORRECT variation of stagnation temperature along the axis of an ideal ram jet engine?			
				
	A	A	B	B
	C	C	D	D
59.	Hot gas (ratio of specific heats $\gamma=1.33$ ) at a temperature of 1450 K enters into an axial turbine and expands isentropically. Assume that the kinetic energy of the gas across the turbine is negligible. If the ratio of inlet to outlet pressures of the turbine is 9.5, then the approximate temperature (in K) of gas exiting the turbine is _____.			
	A	720.63	B	750.36
	C	815.46	D	825.25
60.	In a Brayton cycle with perfect intercooling (Two stages of compression) the inlet and outlet pressures of 1 bar and 6 bar. The intermediate pressure of compressed air is			
	A	1.44	B	2.44
	C	3.00	D	3.44
61.	$F_s = -kx$ , which shows relations among spring force, spring constant and spring stretch, represents _____.			
	A	Hook's Law	B	Kirchhoff's Law
	C	2 <sup>nd</sup> Law of Newton	D	Principle of Momentum
62.	Mohr's circle represents _____.			
	A	Critical Plane Analysis	B	Two dimensional graphical representation of the transformation for the Cauchy stress tensor.
	C	Stress analysis in skin panels of wings.	D	Bending of spar of vertical fin in T tail configuration
63.	The X and Y- axis of Mohr's circle represent _____.			
	A	Normal stress and shear stress.	B	shear stress and normal stress

	C	principal normal stress and principal shear stress	D	principal shear stress and principal normal stress
64.	The greatest divergence in predicting the yield stress for distortion between the Tresca's criteria and Von-Mises criteria occurs at _____			
	A	Uniaxial tension/compression	B	Balanced biaxial stress
	C	Pure shear stress	D	Always predicts equal stress
65.	Resilience can also be termed as _____			
	A	Stress energy	B	Strain energy
	C	Modulus	D	Tenacity
66.	In which of the following cases, is Castiglione theorem applicable?			
	A	Yielding support, non-linear elastic material	B	Non-yielding support, linear elastic material
	C	Yielding support, linear elastic material	D	Non-yielding support, non-linear elastic material
67.	In most cases, for a given loading maximum stress and deflection of an indeterminate structure are _____ than that of a determinate one.			
	A	Smaller	B	Larger
	C	Larger for small load	D	Smaller for larger load
68.	Which type of structure would cost less in terms of supports?			
	A	Statically indeterminate	B	Statically determinate
	C	Depends upon loading	D	Both will cost equally
69.	Aircraft Controls can be made using _____			
	A	Copper	B	Brass
	C	Steel	D	Wrought iron
70.	_____ has maximum Strength/ Weight ratio.			
	A	Semimonocoque structure	B	Monologue Structure
	C	Honeycomb Structure	D	Truss type structure
71.	Which of the following is not used to manufacture a wing-tip bow?			
	A	PVC	B	Aluminum alloy
	C	Chrome-molybdenum	D	Stainless steel
72.	For both plane stress as well as plain strain case the equilibrium equation in x-direction is _____			
	A	$\partial \sigma_x / \partial x + \partial \tau_{zx} / \partial z = 0$	B	$\partial \sigma_x / \partial x + \partial \tau_{yx} / \partial y = 0$
	C	$\partial \sigma_x / \partial x + \partial \tau_{yx} / \partial y + \partial \tau_{zx} / \partial z + X = 1$	D	$\partial \sigma_x / \partial x + \partial \tau_{yx} / \partial y + X = 0$
73.	There are _____ strain components for a three dimensional case.			
	A	8	B	4
	C	3	D	6
74.	_____ provide stiffness in bending of wing.			
	A	Skin Panels	B	Spars and Vertical Stiffeners
	C	Wing Ribs and Stringers	D	All of Above
75.	_____ is the strongest structural component of fuselage.			
	A	Bulkhead	B	Former
	C	Skin Panel	D	Longeron
76.	A mass of 1 kg is attached to the end of a spring with a stiffness of 0.7 N/mm. The critical damping coefficient of this system is			
	A	1.4 N-s/m	B	18.52 N-s/m
	C	52.92 N-s/m	D	529.2 N-s/m
77.	Which of the following relations is true when springs are connected in parallel? where K = spring stiffness			

	A	$K_e = K_1 + K_2$	B	$(1 / K_e) = (1/K_1) + (1/ K_2)$
	C	$K_e = (1/K_1) + (1/ K_2)$	D	None of the above
78.	The ratio of the maximum displacement of the forced vibration to the deflection due to the static force, is known as			
	A	damping factor	B	damping coefficient
	C	logarithmic decrement	D	magnification factor
79.	The effective stiffness of the spring-mass system as shown in the figure below is ____ N/mm.			
				
	A	8	B	4
	C	1	D	5
80.	A damped single degree-of-freedom system is vibrating under a harmonic excitation with an amplitude ratio of 2.5 at resonance. The damping ratio of the system is _____			
	A	0.1	B	0.2
	C	0.4	D	0.8
81.	The eigen values of a real skew-symmetric matrix are			
	A	Always zero.	B	always pure imaginary
	C	Either zero or pure imaginary	D	always real
82.	A is a 5 x 6 real matrix and $Ax = b$ is an inconsistent system of equations. The highest possible rank of A is			
	A	5	B	6
	C	7	D	4
83.	Given the matrix $A = \begin{bmatrix} 4 & 5 \\ 0 & 3 \end{bmatrix}$ then the eigen values are			
	A	4,0	B	4,5
	C	4,1	D	4,3
84.	The Taylor's expansion for $f(x) = 3 + 2\cos x - 4\sin x$ is			
	A	$5 - 4x - x^2 + \frac{2x^3}{3} + \frac{x^4}{12} + \dots$	B	$5 - 4x - x^2 + \frac{2x^3}{3} + \frac{x^4}{24} + \dots$
	C	$5 - 4x - x^2 + \frac{2x^3}{3} - \frac{x^4}{24} + \dots$	D	$5 - 4x - x^2 - \frac{2x^3}{3} + \frac{x^4}{24} + \dots$
85.	For $0 \leq x < \infty$ , the critical point of the function $f(x) = e^{-x} - 2e^{-2x}$ occurs at			
	A	$x = \ln 4$	B	$x = \ln 2$
	C	$x = \ln 16$	D	$x = 0$
86.	If $u = x^6 y z \ln \frac{x-y+z}{x+y+z}$ then the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$ is			
	A	$u$	B	$2u$
	C	$6u$	D	$8u$

87.	If $L = \lim_{x \rightarrow 0} \frac{\sin x - \tan x - x^2}{x \sin x}$ then value of L is			
	A	0	B	-1
	C	-1/3	D	-1/4
88.	For a scalar function $f(x, y, z) = x^2 + 4y^2 + 5z^2$ , the gradient at the point P(1,1,-1) is			
	A	$2\bar{i} + 8\bar{j} - 10\bar{k}$	B	$2\bar{i} + 8\bar{j} + 10\bar{k}$
	C	$2\bar{i} - 8\bar{j} + \bar{k}$	D	$2\bar{i} - 8\bar{j} - 10\bar{k}$
89.	The divergence of the vector field $3x^2z\bar{i} + 2xy^2\bar{j} + yz^2\bar{k}$ at a point (1,1,1) is			
	A	0	B	4
	C	8	D	12
90.	An unbiased coin is tossed an infinite number of times. The probability that the fourth head appears at the tenth toss is			
	A	0.052	B	0.072
	C	0.082	D	0.092
91.	A box contains 25 parts of which 10 are defective. Two are being drawn simultaneously in random manner from the box. The probability of both the parts being good is			
	A	42/125	B	7/20
	C	25/29	D	5/9
92.	A fair coin was tossed four times in succession and resulted in the following outcomes: (i) Head (ii) Head (iii) Head (iv) Head. The probability of obtaining "Tail" when the coin is tossed again is			
	A	0.025	B	0.5
	C	0.25	D	0.05
93.	Consider a differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = 0$ then the solution is			
	A	$y = c_1e^{-2x} + c_2e^x$	B	$y = c_1e^{2x} + c_2e^{-x}$
	C	$y = c_1e^{-2x} + c_2e^{-x}$	D	$y = c_1e^{2x} + c_2e^x$
94.	Solution of $(2xy + 3x^2 - y^2)dx - (2xy - x^2)dy = 0$ is			
	A	$xy^2 + x^2y - x^3 = c$	B	$-xy^2 - x^2y + x^3 = c$
	C	$xy^2 + x^2y + x^3 = c$	D	$xy^2 - x^2y - x^3 = c$
95.	Solution of the differential equation $y'' + y = \cos x \cos 2x$ is			
	A	$y = c_1 \cos x + c_2 \sin x + \frac{x}{4} - \frac{\cos 3x}{16}$	B	$y = c_1 \cos x + c_2 \sin x + \frac{x}{3} - \frac{\cos 3x}{9}$
	C	$y = c_1 \cos x + c_2 \sin x - \frac{x}{4} + \frac{\cos 3x}{16}$	D	$y = c_1 \cos x + c_2 \sin x - \frac{x}{3} + \frac{\cos 3x}{9}$
96.	If real part of an analytic function is $u(x, y) = x^2 - y^2$ then its imaginary part is			
	A	$4xy$	B	$2xy$
	C	$-4xy$	D	$-2xy$
97.	If c is a simple closed curve given by $ z  = 1$ then $\oint_c \frac{dz}{z^2 + 5}$ is equal to			

	A	0	B	1
	C	$-2\pi i$	D	$2\pi i$
98.	Inverse Laplace transforms of $\frac{1}{s^2+3s+2}$ is			
	A	$e^{-2t} + e^{-t}$	B	$e^{-2t} - e^{-t}$
	C	$-e^{-2t} + e^{-t}$	D	$-e^{-2t} - e^{-t}$
99.	The iteration formula to find the 5 <sup>th</sup> root of a positive real number $b$ by using the Newton-Raphson method is			
	A	$x_{k+1} = \frac{4x_k^5 + \sqrt[5]{b}}{5x_k^4}$	B	$x_{k+1} = \frac{4x_k^5 - \sqrt[5]{b}}{5x_k^4}$
	C	$x_{k+1} = \frac{4x_k^5 + b}{5x_k^4}$	D	$x_{k+1} = \frac{4x_k^4 - b}{5x_k^4}$
100.	Putting $n=1$ in Newton- Cote's duadrature formula becomes			
	A	Simpson's 1/3 rule	B	Trapezoidal rule
	C	Simpson's 3/8 rule	D	Euler's Rule