AERONAUTICAL ENGINEERING
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1.
Air flowing at high speed in a wind tunnel has pressure and temperature equal to 0.3 atm and -100^0 C, respectively. What is the specific volume? (Take 1 atm as 1.01×10^{-5} N m^{-2})
(A) 3.2 m^3/kg
(B) 1.6 m^3/kg
(C) 0.8 m^3/kg
(D) 0.4 m^3/kg

2.
What is the indication of last two digits in an early NACA 2412 airfoil series?
(A) maximum camber number
(B) maximum thickness
(C) maximum chord
(D) maximum diameter

3.
Which type of drag does arise from the resolved components of the tangential stresses on the surface of the body, when viscous fluid flows along the surface?
(A) Trailing vortex drag
(B) Wave drag
(C) Surface friction drag
(D) Boundary layer normal-pressure drag

4.
Which one of the following statements is true for the airplane performance conditions that occur at maximum Lift/Drag ratio?
(A) Maximum range of propeller-driven airplanes
(B) Maximum flow of air
(C) Maximum fuel consumption
(D) Maximum surface area for airplanes

5.
An airfoil has the root chord of 1.8 m and tip chord of 0.9 m. What is the taper ratio?
(A) 2
(B) 1
(C) 0.5
(D) 0.25

6.
If f(x) = $\begin{cases} \frac{\cos(1+[x])}{[x]} & for\ [x] \neq 0 \\ 0 & for\ [x] = 0 \end{cases}$ where $[x]$ denotes the greatest integer $\leq x$, then

$\lim_{x\to 0^-} f(x)$
(A) is equal to 0
(B) is equal to -1
(C) does not exist
(D) is equal to 2

7.

Consider the following statements regarding the forces acting on an airplane in flight:

1. Thrust, drag, lift and weight are the forces on an airplane in flight.
2. The airplane is said to be in state of equilibrium, when thrust and drag are equal and opposite.
3. If weight is greater than lift, the airplane will sink.
4. If thrust is greater than drag, the airplane will decelerate.

Which of the above statements are correct?

(A) 1, 2 and 3 only
(B) 1, 2 and 4 only
(C) 2, 3, and 4 only
(D) 1, 2, 3 and 4

8.

Let $f : R \to R$ and $g : R \to R$ be defined by $g(x) = xf(x)$ then

(A) g is one-one if f is one-one
(B) g is a differentiable function
(C) g is integrable over any finite interval [a, b]:$a, b \in R$
(D) g is differentiable at 0 if f is continuous at 0

9.

The value of $\int_0^{\frac{\pi}{2}} \sin^5 x \cos^6 x \, dx$ is equal to

(A) $\frac{\pi}{693}$
(B) $\frac{8}{693}$
(C) $\frac{8}{369}$
(D) $\frac{\pi}{369}$

10.

Let $F(\alpha) = \begin{pmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{pmatrix}$ and $G(\beta) = \begin{pmatrix} \cos\beta & 0 & \sin\beta \\ 0 & 1 & 0 \\ -\sin\beta & 0 & \cos\beta \end{pmatrix}$ then the inverse of the matrix $F(\alpha)G(\beta)$ is

(A) $-G(\beta)F(\alpha)$
(B) $-G(-\beta)F(\alpha)$
(C) $G(-\beta)F(-\alpha)$
(D) $G(\beta)F(-\alpha)$

11.

Let $F(\omega)$ be the Fourier transform of a function $f(x)$ then

(A) $\lim_{|\omega|\to\infty} |F(\omega)| = 1$
(B) $\lim_{|\omega|\to\infty} |F(\omega)| = 0$
(C) $\lim_{|\omega|\to\infty} |F(\omega)|$ does not exist
(D) $\lim_{|\omega|\to\infty} |F(\omega)| = \frac{e}{\sqrt{\pi}}$

12.

The Laplace transform L(s) of $f(x) = \frac{1}{\sqrt{x}}$, $x \neq 0$ is

(A) $\frac{\pi}{s}$

(B) $\sqrt{\frac{\pi}{s}}$

(C) $\frac{e^{\pi}}{s}$

(D) $\frac{\sqrt{3}\pi}{2s}$

13.

The inverse Z transform of $F(z) = \frac{z}{z^2-6z+8}$ is

(A) $\frac{1}{8}(4^n - 2^n)$

(B) $\frac{1}{8}(4^n + 9^n)$

(C) $\frac{1}{2}(4^n - 2^n)$

(D) $\frac{1}{6}(6^n - 8^n)$

14.

A flat plate of length 1 m and width 0.5 m is placed in an air stream at 30^0C blowing parallel to it. The convective heat transfer coefficient is 30 W m^{-2} K^{-1}. What is the heat transfer if the plate is maintained at a temperature of 300^0C?

(A) 4.00 kW

(B) 4.05 kW

(C) 4.50 kW

(D) 4.55 kW

15.

How many ground-based radio transmitters are required for an instrument landing system?

(A) 2

(B) 3

(C) 4

(D) 5

16.

The inlet and outlet temperature of hot and cold fluids in a double pipe counter flow heat exchanger are 220^0C, 100^0C and 80^0C, 120^0C. What are the values of effectiveness of the exchanger and the capacity ratio respectively?

(A) 85.7 % , 0.13

(B) 90.5 % , 0.13

(C) 85.7 % , 0.33

(D) 90.5 % , 0.33

17.

If $A = \begin{pmatrix} \cos 2\theta & -\sin 2\theta \\ \sin 2\theta & \cos 2\theta \end{pmatrix}$, where θ is a real number, then A is

(A) a Hermitian matrix

(B) a skew-Hermitian matrix

(C) an orthogonal matrix

(D) a skew symmetric matrix

18.
As an airplane flying with constant velocity moves from a cold air mass into a warm air mass, how does the Mach number change?

(A) It increases
(B) It remains the same
(C) It decreases
(D) It randomly varies

19.
A hot fluid is being conveyed through a long pipe of 4 cm outer diameter and covered with 2 cm thick insulation. It is proposed to reduce the conduction heat loss to the surroundings to one-third of the present rate by further covering with same insulation material. What is the additional thickness of insulation?

(A) 8 cm
(B) 10 cm
(C) 12 cm
(D) 14 cm

20.
A skier leaves the end of a horizontal ski jump at 22 m/s and falls through a vertical distance of 3.2 m before landing. Neglecting air resistance, how far horizontally does the skier travel in the air before landing?

(A) 8.08 m
(B) 17.80 m
(C) 10.50 m
(D) 27.23 m

21.
Let v_l is the velocity of longitudinal sound waves propagating in an elastic solid cylindrical rod. What will be the velocity of these sound waves if the cross-sectional area of this solid rod is reduced to half?

(A) $\sqrt{2}\, v_l$
(B) $2\, v_l$
(C) $v_l/\sqrt{2}$
(D) $v_l/2$

22.
What is the rank of the matrix $A = \begin{pmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{pmatrix}$, where a, b, c are different real numbers with a+b+c = 0?

(A) 1
(B) 2
(C) 3
(D) 0

23.
How can thermal contact resistance between two solid bars be reduced?

(A) It can be done by decreasing the joint pressure of compression
(B) It is independent of joint pressure
(C) It can be done by increasing the joint pressure of compression
(D) It can be done by decreasing ambient gas pressure

24.
Saturated steam at 100 ℃ is condensing on the shell side of a shell-and-tube heat exchanger. The cooling water enters the tube at 30 ℃ and leaves at 70 ℃. What is the arithmetic mean temperature difference if arrangement is counter flow?

(A) 50 ℃
(B) 40 ℃
(C) 30 ℃
(D) 20 ℃

25.
At a point in an airflow the pressure, temperature and velocity are 1 atm, 320 K, and 1000 m/s respectively. What is the total temperature at this point? (Assume the ratio of specific heats as 1.4 and specific gas constant as 287 J kg^{-1} K^{-1})

(A) 671.8 K
(B) 718.8 K
(C) 781.8 K
(D) 817.8 K

26.
The relationship between the velocity induced by a vortex tube and the strength (circulation) of the vortex tube can be predicted by

(A) Helmholtz's law
(B) Prandtl's law
(C) Biot-Savart's law
(D) Froude's law

27.
Consider the following statements for the case of steady flow:

1. The magnitude and direction of the velocity vectors at all points are fixed, invariant with time.
2. Streamlines are different from pathlines.
3. Streamlines and pathlines are identical.

Which of the above statements are correct?

(A) 1 only
(B) 1 and 2
(C) 3 only
(D) 1 and 3

28.
A small mass of 0.2 kg is attached to one end of a helical spring and produces an extension of 15mm. The mass is now pulled down 10 mm and set into vertical oscillation of amplitude 10 mm. What is the period of oscillation?

(A) 0.25 s
(B) 0.65 s
(C) 0.85 s
(D) 0.95 s

29.
One way to cool an ideal gas is to let it expand. When a certain gas under a pressure of 5×10^6 Pa at 25 ℃ is allowed to expand to 3 times its original volume, its final pressure becomes 1.07×10^6 Pa. What is the final temperature of the system?

(A) 162 K
(B) 191 K
(C) 262 K
(D) 291 K

30.
A thin convex refracting surface of radius of curvature 15 cm separates two media of refractive indices $\frac{4}{3}$ and 1.50. An object is kept in the first medium at a distance of 240 cm from the surface. What is the image's position in the second medium from the refracting surface?

(A) 270 cm
(B) 370 cm
(C) 470 cm
(D) 570 cm

31.
Three engines operate between reservoirs separated in temperature by 300 K. The reservoir temperatures are as follows:
Engine A: $T_h = 1000$ K, $T_c = 700$ K
Engine B: $T_h = 800$ K, $T_c = 500$ K
Engine C: $T_h = 600$ K, $T_c = 300$ K
Rank the engines in order of their theoretically possible efficiency, from highest to lowest.

(A) A, B, C
(B) B, C, A
(C) C, B, A
(D) C, A, B

32.
At an outdoor market, a bunch of bananas attached to the bottom of a vertical spring of force constant 16 N/m is set into oscillatory motion with amplitude of 20 cm. It is observed that the maximum speed of the bunch of bananas is 40 cm/s. What is the weight of the bananas in newtons?

(A) 34.8 N
(B) 39.2 N
(C) 46.4 N
(D) 49.9 N

33.
A train moving at a speed of 40 m/s sounds its whistle, which has a frequency of 500 Hz. What is the frequency heard by a stationary observer as the train approaches the observer? (Assume that the ambient temperature is 24^0C and speed of sound as 345 m/s)

(A) 257 Hz
(B) 317 Hz
(C) 426 Hz
(D) 566 Hz

34.
Consider the flow of air over a small flat plate that is 5 cm long in the flow direction and 1 m wide. The free-stream conditions correspond to standard sea level, and the flow velocity is 120 m/s. Assuming laminar flow, what is the boundary layer thickness at the downstream edge (the trailing edge)? (Assume density and dynamic viscosity of air as 1.225 kg m^{-3} and 1.789×10^{-5} kg m^{-1} s^{-1} respectively)

(A) 8.95×10^{-3} m
(B) 5.72×10^{-4} m
(C) 5.67×10^{-3} m
(D) 4.06×10^{-4} m

35.
Consider the Northrop F-5 fighter airplane, which has a wing area of 15.79 m^2. The wing is generating 80000 N of lift. For a flight velocity of 402.34 kmph at standard sea level, what is the lift coefficient? (Take density as 1.225 kg m^{-3})

(A) 0.16
(B) 0.24
(C) 0.44
(D) 0.66

36.
The pressure at a point on the wing of an airplane is 7.58×10^4 N/m^2. The airplane is flying with a velocity of 70 m/s at conditions associated with a standard altitude of 2000 m. What is the pressure coefficient at this point on the wing? (For a standard altitude of 2000 m, the pressure of air is 7.95×10^4 N/m^2 and density is 1.0066 kg/m^3)

(A) -1.92
(B) -1.50
(C) -1.37
(D) -1.22

37.
In an airplane fuselage, the stiffeners

(A) are helpful in preventing buckling
(B) are helpful in supporting lateral load
(C) cannot prevent buckling
(D) cannot support longitudinal load

38.
Which one of the following instruments is used principally for the measurement of pressure in engine fuel and oil systems?

(A) Manifold Pressure Gauge
(B) Pressure Transmitter System
(C) Ratiometer Pressure Indicator
(D) Pressure Switch

39.
Which one of the following equipments consists of devices like receiver, a loop antenna, a sense antenna and a breading indicator?

(A) Instrument Landing System (ILS)
(B) Automatic Direction Finder (ADF)
(C) Distance Measure Equipment (DME)
(D) Transmitting Equipment (TE)

40.
What is the operating range and receiving range of a Distance Measurement Equipment (DME) of aircraft instruments?

(A) operates in 960 MHz to 1713 MHz UHF range and receiving in 1151 MHz to 1213 MHz range
(B) operates in 960 MHz to 1713 MHz UHF range and receiving in 1014 MHz to 1213 MHz range
(C) operates in 960 MHz to 1215 MHz UHF range and receiving in 1014 MHz to 1213 MHz range
(D) operates in 960 MHz to 1215 MHz UHF range and receiving in 1025 MHz to 1150 MHz range

41.
The radiant flux incident on the surface of a body is called

(A) total hemispherical absorptivity
(B) monochromatic hemispherical irradiation
(C) monochromatic hemispherical absorptivity
(D) total hemispherical irradiation

42.
Consider the following statements for the effects of Aircraft engine performance due to compressor contamination:

1. contamination of the compressor blades changes their aerodynamic shape.
2. reduces the airflow area.
3. more power and higher rotor speeds are required to achieve the desired compressor pressure ratio.

Which of the above statements are correct?

(A) 1, 2 and 3
(B) 1 and 3 only
(C) 1 and 2 only
(D) 2 and 3 only

43.
In the Nose-gear shock strut, the link used to connect the strut cylinder to the piston and axle is called

(A) Drag Link
(B) Torque Link
(C) Side Brace Link
(D) Overcenter Link

44.
What is the meaning of straight polarity in arc welding?

(A) the condition when the electrode is positive and the base metal or work is positive.
(B) the condition when the electrode is earthed and the base metal or work is positive.
(C) the condition when the electrode is positive and the base metal or work is earthed.
(D) the condition when the electrode is negative and the base metal or work is positive.

45.
Which one of the following hydraulic fluids is phosphate ester-base fluid?
(A) MIL-0-5606
(B) MIL-0-83282
(C) Barco 882
(D) Skydrol 500B-4

46.
The pigment in paints is used to
(A) hold the solvent in liquid form
(B) provide the color and durability
(C) dissolve the binder and carries it through the spray gun
(D) dissolve the solvent

47.
A chemical process in which cotton is exposed to the action of a strong caustic solution that tends to shrink the material and give it a silky appearance is called
(A) Calendaring
(B) Bias
(C) Selvage
(D) Mercerizing

48.
For a given wing-body combination, the aerodynamic center lies 0.05 chord length ahead of the center of gravity. The moment coefficient about the aerodynamic center is -0.016. If the lift coefficient is 0.45, what is the moment coefficient about the center of gravity?
(A) 0.0023
(B) 0.0032
(C) 0.0056
(D) 0.0065

49.
A force of 30 N is applied in the positive x-direction to a block of mass 8 kg, at rest on a frictionless surface. How fast is it going after 6 sec?
(A) 3.75 m/s
(B) 22.5 m/s
(C) 26.5 m/s
(D) 18.5 m/s

50.
The severity of the adverse pressure gradient on the main aerofoil can be reduced by which one of the following effects?
(A) Vane effect
(B) Fresh boundary layer effect
(C) Slat effect
(D) Smith effect

51.
At a particular point in a structural member, a two-dimensional stress system exists where $\sigma_x = 60$ N/mm^2, $\sigma_y = -40$ N/mm^2 and $\tau_{xy} = 50$ N/mm^2. If Young's modulus (E) = 200000 N/mm^2 and Poisson's ratio $\vartheta = 0.3$. What is the shear modulus?
(A) 142857 N/mm^2
(B) 76923 N/mm^2
(C) 71428 N/mm^2
(D) 38461 N/mm^2

52.
Which type of fatigue is caused due to vibrations excited by jet or propeller noise?
(A) Fretting fatigue
(B) Cyclic fatigue
(C) Dynamic fatigue
(D) Acoustic fatigue

53.
Which type of steel is used to manufacture aircraft arrester hooks?
(A) High carbon steel
(B) Low carbon steel
(C) Maraging steel
(D) Stainless steel

54.
A cylindrical pressure vessel has an internal diameter of 2 m and is fabricated from plates 20 mm thick. If the pressure inside the vessel is 1.5 N/mm^2, what is the longitudinal stress produced by internal pressure?
(A) 27.6 N/mm^2
(B) 29.8 N/mm^2
(C) 35.2 N/mm^2
(D) 37.5 N/mm^2

55.
A conductor has a constant current of five amperes. How many electrons pass a fixed point on the conductor in one minute?
(A) 3.12×10^{19} electrons per minute
(B) 1.87×10^{21} electrons per minute
(C) 2.57×10^{21} electrons per minute
(D) 3.85×10^{21} electrons per minute

56.
Two magnetically coupled coils with self inductances of 1.6 H and 0.1 H are connected in parallel. The mutual inductance is 0.34 H. What is the effective inductance when the coils are connected in parallel opposing?
(A) 0.0012 H
(B) 0.0187 H
(C) 0.1524 H
(D) 1.5824 H

57.
A 4-pole dc machine has a lap-wound armature with 50 slots with 16 conductors per slot. The useful flux per pole is 30 mWb. What is the speed at which machine must be driven to generate an e.m.f. of 240 V when operated as generator?
(A) 600 rev/min
(B) 500 rev/min
(C) 400 rev/min
(D) 300 rev/min

58.
The wing span of a metal aeroplane is 36 m. If the aeroplane is flying at 400 kmph, what is the e.m.f. induced between its wing tips? (Assume the vertical component of the earth's magnetic field is 40 μT)
(A) 0.76 V
(B) 0.56 V
(C) 0.36 V
(D) 0.16 V

59.
A d.c. electric motor consumes 36 MJ when connected to a 250 V supply for 1 hour. What is the amount of current drawn by the motor from mains?

(A) 0.04 A
(B) 2.4 A
(C) 40 A
(D) 2400 A

60.
How much time a current of 0.1 amperes takes to transfer a charge of 30 Coulombs?

(A) 300 seconds
(B) 30 seconds
(C) 3 seconds
(D) 0.3 seconds

61.
Which of the following is NOT a primary flight control surface of an airplane?

(A) Aileron
(B) Fuselage
(C) Elevator
(D) Rudder

62.
Deflection of the elevator creates a moment on the airplane about

(A) roll axis
(B) pitch axis
(C) yaw axis
(D) pitch and roll axis

63.
Deflection of the rudder creates a moment on the airplane about

(A) pitch axis
(B) roll axis
(C) pitch and roll axis
(D) yaw axis

64.
Which of the following devices is used to control the maximum pressure in the pneumatic system and to off-load the compressor when the system is idle?

(A) Pressure Reducing Valve
(B) Pressure Regulator
(C) Pressure Intensifier
(D) Shut-off Valve

65.
On landing, the spoiler is deflected to

(A) increase landing distance
(B) increase landing distance and to increase drag
(C) reduce landing distance and to increase drag
(D) reduce landing distance and to reduce drag

66.
A flap is a segment of

(A) fuselage
(B) landing gear
(C) aerofoil
(D) cockpit

67.
Which one of the following relations is used to calculate magneto speed in magneto ignition system (MIS) of an aircraft?

(A) $\frac{\text{number of cylinders}}{\text{magneto sparks per revolution}}$

(B) $\frac{\text{magneto sparks per revolution}}{\text{number of cylinders}}$

(C) $\frac{\text{number of cylinders}}{2 \times \text{magneto sparks per revolution}}$

(D) $\frac{2 \times \text{magneto sparks per revolution}}{\text{number of cylinders}}$

68.
An electrical control system uses three positional sensing devices, each of which produces 1 output when the position is confirmed. These devices are to be used in conjunction with a logic network of AND and OR gates and the output of the network is to be 1 when two or more of the sensing devices are producing signals of 1. The network with suitable logic function represented as

(A) F = (A+B) . (B+C) . (C+A)

(B) F = A.B + B.C + C.A

(C) F = A.B.C + A.B + B.C + C.A

(D) F = A + B + C

69.
What minimum input voltage level is required to switch a BJT into saturation (on state), when V_{cc} = 10 V, R_b = 16 kΩ, R_c = 6.2 kΩ and β_{dc} = 20 in an n-p-n CE configuration BJT? (Assume V_{BE} = 0.7 V)

(A) 0.59 V

(B) 0.99 V

(C) 1.09 V

(D) 1.99 V

70.
If an alternating current completes 5 cycles in 8 ms, what is its frequency?

(A) 325 Hz

(B) 425 Hz

(C) 525 Hz

(D) 625 Hz

71.
A bipolar transistor has a common-emitter current gain of 125. If the transistor operates with a collector current of 50 mA, what is the value of base current?

(A) 400 μA

(B) 40 μA

(C) 4 μA

(D) 0.4 μA

72.
An electron has a velocity of 10^7 m/s when it enters a magnetic field perpendicularly to the direction of the flux. If the flux density is uniform at 0.5 mT and the axial length of the magnetic field is 2 cm. What is the radius of curvature of the electron path in the magnetic field? (Assume the ratio e/m to be 1.76×10^{11} C/kg)

(A) 11.36 cm
(B) 1.136 cm
(C) 22.72 cm
(D) 2.272 cm

73.
What is K value in $(127.24)_8 = (K)_{10}$?

(A) 87.1325
(B) 87.2135
(C) 87.3125
(D) 87.1125

74.
Which one of the following systems is most suitable for short range navigation of airplanes?

(A) Long Range Radio Aid to Navigation (LORAN)
(B) Instrument Landing System (ILS)
(C) VHF Omni-directional Range (VOR)
(D) Global Positioning System (GPS)

75.
Which one of the following engine types is having Maximum flight Mach number as 0.5?

(A) Ramjet engine
(B) Turboprop engine
(C) Turbojet engine
(D) Piston engine with propeller

76.
For a Fanno flow curve, in subsonic region friction causes

(A) irreversible deceleration of the flow with pressure rise
(B) irreversible deceleration of the flow with pressure drop
(C) irreversible acceleration of the flow with pressure drop
(D) irreversible acceleration of the flow with pressure rise

77.
The thrust of rocket engines is

(A) directly proportional to flight speed
(B) directly proportional to square of flight speed
(C) inversely proportional to flight speed
(D) independent of flight speed

78.
Engine Pressure Ratio (EPR) is defined as

(A) the ratio of the compressor inlet pressure to the ambient pressure
(B) the ratio of the turbine exit pressure to the ambient pressure
(C) the ratio of the turbine exit pressure to the compressor inlet pressure
(D) the ratio of the compressor inlet pressure to the turbine exit pressure

79.
Across a strong normal shock, the ratio of density after the shock to that of before the shock attains a value of

(A) $\sqrt{\frac{\gamma-1}{\gamma}}$

(B) zero

(C) $\frac{\gamma+1}{\gamma-1}$

(D) infinity

80.
In a ramjet engine, the inlet static pressure rise is achieved by

(A) venturimeter

(B) nozzle

(C) diffuser

(D) tail pipe

81.
What is the surface tension in a soap bubble of 40 mm diameter when the inside pressure is 2.5 N/m^2 above atmospheric pressure?

(A) 125 N/m

(B) 0.0125 N/m

(C) 0.125 N/m

(D) 12.5 N/m

82.
A wing of a small aeroplane is rectangular in plan having a span of 12 m and chord of 1.8 m. In a horizontal flight at a speed of 200 km/h, the total aerodynamic force acting on the wing is 28 kN. If the lift drag ratio is 10, what is the coefficient of lift? (Assume ρ for air as 1.2 kg/m^3)

(A) 0.4

(B) 0.5

(C) 0.6

(D) 0.7

83.
When two hydraulic pumps are arranged in series, the resulting pump performance curve is obtained

(A) by adding flow rates at the same head

(B) by multiplying flow rates at the same head

(C) by adding heads at the same flow rate

(D) by multiplying heads at the same flow rate

84.
The radial velocity of a flow is described by $v_r = \frac{k}{\sqrt{r}}\cos\theta$. If $v_\theta = 0$ at $\theta = 0$, what is the stream function (Ψ) for the flow?

(A) $\Psi = kr\sin\theta$

(B) $\Psi = \sqrt{kr}\sin\theta$

(C) $\Psi = k\sqrt{r}\cos\theta$

(D) $\Psi = k\sqrt{r}\sin\theta$

85.
A turbine develops 9000 kW when running at 100 r.p.m. The head on the turbine is 30 m. If the head on the turbine is reduced to 18 m, what is the speed?

(A) 77.46 r.p.m.
(B) 42.38 r.p.m.
(C) 14.12 r.p.m.
(D) 53.48 r.p.m.

86.
A horizontal pipe of diameter d_1 has a sudden expansion to a diameter d_2. For maximum differential pressure condition under sudden expansion, the ratio of d_2/d_1 is

(A) 1
(B) $\frac{1}{\sqrt{2}}$
(C) $\sqrt{2}$
(D) 2

87.
Consider the following statements regarding the requirements for a good forced landing field for the airplane:

1. Firm surface, reasonably smooth, with sufficient space to effect a landing into wind.
2. The approach should be clear of obstacles such as trees, telephone wires, high tension lines, houses etc..
3. Try to choose a field that is near houses or a road so that help is readily available.

Which of the above statements are correct?

(A) 1 and 2 only
(B) 1 and 3 only
(C) 2 and 3 only
(D) 1, 2 and 3

88.
Which of the following is the tell tale sign for a pilot when the wind speed is between 25 to 31 knots?

(A) Smoke drifts and water ripples
(B) Small branches move, long waves and frequent whitecaps can be seen on water surfaces
(C) Large branches move, large waves spray and white foam crests break the surface of water bodies
(D) Small wavelets break the surface of water bodies but there are no white caps

89.
What is meant by Rime Ice?

(A) A heavy coating of glassy ice which forms when flying in dense cloud or freezing rain.
(B) A white semi-crystalline frost which covers the surface of the airplane, forms in clear air by the process of sublimation.
(C) An opaque, or milky white, deposit of ice.
(D) A drizzling falls from stratus cloud with higher water content.

90.
Consider the following statements regarding light gun signals with respect to aircraft on the ground:

1. The flashing green light signal on the ground means that the aircraft is cleared to taxi.
2. The flashing red light means the aircraft must taxi clear of the runway in use.
3. The flashing white signal means that airport is safe, landing is permitted.

Which of the above statements are correct?

(A) 1 and 2 only
(B) 1 and 3 only
(C) 2 and 3 only
(D) 1, 2 and 3

91.
Consider the following statements regarding uses of radio frequency:

1. 3 KHz – 30 KHz band used for civil communications
2. 30 MHz – 300 MHz band used for naval communications.
3. 300 MHz – 3000 MHz band used for military communications.
4. 3 GHz – 30 GHz band used for RADAR

Which of the above statements are correct?

(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 3 and 4 only
(D) 1, 2, 3 and 4

92.
Consider the following statements; On board GPS receiver in the aircraft consists of

1. An antenna tuned to satellite transmission frequencies.
2. Receiver signal processor.
3. Highly-stable crystal-controlled local clock.

Which of the above statements are correct?

(A) 1 and 2 only
(B) 1 and 3 only
(C) 2 and 3 only
(D) 1, 2 and 3

93.
Consider the following statements regarding the aircraft categories:

1. Bellanca Viking is category-I aircraft.
2. Douglas DC-6 is category-II aircraft .
3. Cessna Citation is category-III aircraft.

Which of the above statements are correct?

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2 and 3

94.
Consider the following statements with regard to aircraft certification service:

1. Administering safety standards governing the design, production, and airworthiness of civil aeronautical products.
2. Overseeing design, production, and airworthiness certification programs to ensure compliance with prescribed safety standards.
3. Providing a safety performance management system to ensure continued operational safety of aircraft.

Which of the above statements are correct?

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2 and 3

95.
Which of the following statements is related to preventive maintenance of aircraft?

(A) Inspection, overhaul, repair, preservation and the replacement of parts.
(B) Simple or minor preservation operations and replacement of small or standard parts not involving complex assembly operations.
(C) Changing the design of the aircraft from that originally certificated.
(D) Repair if not done properly, might appreciably affect weight, balance, structural strength, performance, power-plant operation.

96.
Consider the following statements: The operations offices shall maintain the operational and flight records of personnel and monitor records of each crew member in order to ensure that

1. the flight and duty time limitations are complied with crew licences, instrument ratings etc. are maintained.
2. validity of crew medical checks.
3. all proficiency checks are carried out as per the procedures and within the stipulated periods.

Which of the above statements are correct?

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2 and 3

97.
Consider the following statements: Any aircraft engaged in public transport including aerial work and flying training shall not be flown unless

1. it has been maintained in accordance with such requirements as may be specified by the Director-General of Civil Aviation or as stipulated in the approved maintenance schedule or system.
2. maintenance of the aircraft has been carried out by or under the supervision of a person licensed or approved or authorised for the purpose by the Director-General of Civil Aviation.
3. all maintenance carried out has been certified by appropriately licensed engineers, approved or authorised person within the period specified by means of such a ‘certificate’ as may be prescribed by the Director-General of Civil Aviation.

Which of the above statements are correct?

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2 and 3

98.
Consider the following statements: The certificate of airworthiness of an aircraft shall be deemed to be suspended when an aircraft

1. is modified or repaired otherwise in accordance with the provisions of these rules.
2. develops a major defect which would affect the safety of the aircraft or its occupants in subsequent flights.
3. suffers minor damage.

Which of the above statements are correct?

(A) 1 and 2 only
(B) 2 and 3 only
(C) 1 and 3 only
(D) 1, 2 and 3

99.
For how many years the Log Books of flight crew personnel and logging of flight time shall be preserved in respect of all aircraft registered in India after the date of the last entry therein?

(A) not less than two years
(B) not less than three years
(C) not less than four years
(D) not less than five years

100.
What is the minimum age on the date of application to apply for pilot's licence for Microlight aircraft?

(A) 20 years
(B) 18 years
(C) 17 years
(D) 16 years