Registration No.: 11010961001

23241ASE15121
Paper Code: A

Course Code:ASE204
Course Title:AERODYNAMICS-II

Time Allowed: 01:30hrs. **Max Marks: 30**

Read the following instructions carefully before attempting the question paper.
1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.
2. This question paper contains 30 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.
3. All questions are compulsory.
4. Do not write or mark anything on the question paper and/or on rough sheet(s) which could be helpful to any student in copying, except your registration number on the designated space.
5. Submit the question paper and the rough sheet(s) along with the OMR sheet to the invigilator before leaving the examination hall.

Q(1) Which of the following statements about an incompressible flow field is/are TRUE? When a flow field is said to be incompressible
(a) Volumetric strain rate of any fluid element in the flow is zero.
(b) the fluid of the flow must be incompressible.
(c) the time derivative of the fluid density is zero.
(d) the fluid of the flow must be rotational.

CO1,L1

Q(2) The basis for Bernoulli's principle is:
(a) Conservation of Momentum
(b) Conservation of Energy
(c) Hydrostatic force balance and first Law of Thermodynamics
(d) Conservation of Mass

CO1,L1

Q(3) Shock waves often make their initial appearance during an aircraft's ____ flying regime
(a) Transonic (b) Subsonic (c) Hypersonic (d) Supersonic

CO1,L1

Q(4) In a _____ flow, Bernoulli's equation is applicable
(a) Rotational (b) Viscous (c) Incompressible (d) Supersonic

CO1,L1

Q(5) Total pressure at a point is defined as the pressure when the flow is brought to rest
(a) Isentropically (b) Adiabatically (c) Isothermally (d) Isobarically

CO1,L1

Q(6) A diverging passage _____a subsonic flow towards zero velocity and _____a supersonic flow towards maximum isentropic speed
(a) Decelerates, Accelerates (b) Accelerates, Decelerates
(c) Decelerates, Decelerates (d) None of the above

CO1,L1

Q(7) A convergent passage _____a subsonic flow towards zero velocity and _____a supersonic flow towards maximum isentropic speed
(a) Decelerates, Accelerates (b) Accelerates, Decelerates
(c) Decelerates, Decelerates (d) None of the above

CO1,L1

Q(8) An aircraft is flying at an altitude of 8 km where the ambient temperature is 250K. Find the Mach number at 30 m/s
(a) 1.25 (b) 1.0 (c) 0.946 (d) 0.0946

CO1,L1

Q(9) Which of the following approximation about a simple compressible flow field is/are TRUE? When a flow field is said to be incompressible
(a) Unsteady flow approximation (b) Perfect gas assumption
(c) Body force considered (d) Surface force is considered

CO1,L1

Q(10) For a projectile travelling in air, the Mach angle is found to be 30o C. Determine the speed of sound if the temperature of the air is -7o C
(a) 326.92 m/s (b) 326.92 km/s (c) 320.9 m/s (d) 320.9 km/s

CO1,L1

Q(11) What relationship does total enthalpy in a stationary shock wave have?
(a) Constant (b) h2 < h1 (c) h02 < h01 (d) h2 > h1

CO1,L3

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Q(12) Which of the following approximation about a Normal shock wave is/are TRUE? When a flow field is said to be compressible
(a) Perpendicular to the flow stream
(b) Inclind to the flow stream
(c) Frictional flow
(d) Heat addition to the eflow

CO1,L3

Q(13) Which attribute or properties determine the flow characteristics of the moving wave?
(a) Direction (b) Temperature (c) Time (d) Both direction and time

CO1,L3

Q(14) The _____ is the fundamental governing equation for the normal shock in a perfect gas
(a) Hugoniot equation
(b) Prandtl meyer equation
(c) Fanno flow equation
(d) Rayleigh flow equation

CO1,L3

Q(15) As per the prandtl's relation for stationary normal shock
(a) $M_1^2 = 1/M_2^2$
(b) $M_1^2 = M_2^2$
(c) $M_1^2 < M_2^2$
(d) $M_1^2 > M_2^2$

CO1,L3

Q(16) The speed at which a typical shock moves through still air
(a) equivalent to the sound speed in steady air
(b) smaller than the speed of sound
(c) larger than the speed of sound
(d) All the above

CO1,L3

Q(17) Stagnation temperature across the Normal shock
(a) Constant (b) Increases (c) Decreases (d) None of the above

CO1,L3

Q(18) The deflrction angle of the cancave angle of the wall is called
(a) Flow deflection angle (b) Deviation angle (c) Both a and b (d) None of the above

CO1,L3

Q(19) A slip line is a thermodynamic and flow quantity discontinuity where _____ and _____ are continuous
(a) Pressure and angle
(b) Temperatire and density
(c) Pressure and temperature
(d) None of the above

CO1,L3

Q(20) Flow travels from within a molecule's mean free route to
(a) supersonic to subsonic state
(b) subsonic state
(c) supersonic state
(d) subsonic to supersonic state

CO1,L3

Q(21) Fluid properties along each Mach line is _____. Hence the Mach line straight line
(a) Increases (b) Decreases (c) Constant (d) None of the above

CO3,L2

Q(22) A ideal gas moves at supersonic speed into a smooth, airtight passage. As the gas flows through the passage, it is preferred that its static pressure rise. The passage area should:
(a) be converging-diverging (b) increase (c) remain constant (d) decrease

CO3,L2

Q(23) For the purpose of compressible fluid flow through a blocked converging-diverging route from a storage tank
(a) the flow in the diverging section must be supersonic
(b) the mass flow rate through the channel cannot be increased by changing the storage tank conditions
(c) the pressure at the exit will be equal to the sonic pressure
(d) none of the above

CO3,L2

Q(24) A Mach line
(a) is a curve which is everywhere perpendicular to the stream lines in a subsonic flow
(b) has the same slope as an arbitrary oblique shock wave
(c) is a wave which is perpendicular to the stream lines in a supersonic flow
(d) is perpendicular to the stream lines when the flow is sonic

CO3,L2

Q(25) When a compressible flow is given heat
(a) the Mach number will always increase
(b) the flow stagnation temperature will always increase
(c) the entropy may decrease
(d) the flow temperature will always increase

CO3,L2

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Q(26) Air having an initial Mach number M1=2.0. is deflected through an angle 15° by a frictionless surface. Assuming that a weak shock wave occurs calculate the downstream Mach number

(a) 0.733 (b) 0.533 (c) 0.833 (d) 1.1

CO3,L2

Q(27) Air having an initial Mach number M1=2.0. is deflected through an angle 15° by a frictionless surface. Assuming that a weak shock wave occurs calculate the Wave angle

(a) 38.38 degree (b) 45.38 degree (c) 40.000 degree (d) 37.280 degree

CO3,L2

Q(28) Air having a Mach number of unity expands around an expression corner that turns the flow through 15°. Calculate the final Mach number

(a) 1.5 (b) 1.3 (c) 1.6 (d) 1.2

CO3,L2

Q(29) Air having a Mach number of unity expands around an expression corner that turns the flow through 20°. Calculate the final Mach number

(a) 1.58 (b) 1.68 (c) 1.78 (d) 1.00

CO3,L2

Q(30) The circumstances behind a Normal shock

(a) have the same stagnation temperature

(b) lie at the intersection of the Fanno and Rayleigh lines for the flow

(c) both (a) and (b) are true

(d) both (a) and (b) are false

CO3,L2

--End of Question paper--