

Code No: 58093

Set No. 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV B.Tech. II Sem., II Mid-Term Examinations, April-2014

HYPERSONIC AERODYNAMICS

Objective Exam

Name: _____ Hall Ticket No.

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Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.

I. Choose the correct alternative:

1. The order of magnitude of the speed of sound behind the shock is []
(a) $\epsilon^{3/2} U \sin \sigma$ (b) $\epsilon^{1/2} U \sin \sigma$ (c) $\epsilon^{3/4} U \sin \sigma$ (d) $\epsilon^{5/2} U \sin \sigma$
2. Hypersonic wave riders have the following wing shape []
(a) spheroidal (b) ellipsoidal (c) caret shape (d) diamond
3. The boundary layer (δ) is defined as []
(a) $\delta \propto \frac{\sqrt{x}}{\sqrt{Re_N}}$ (b) $\delta \propto \frac{\sqrt{x}}{\sqrt{P} Re_N}$ (c) $\delta \propto \frac{Q}{\sqrt{Re_N}}$ (d) $\delta \propto \frac{\sqrt{x}}{\sqrt{Re_N}}$
4. Viscous Interaction is generally considered as strong for values []
(a) $\bar{\chi} > 3$ (b) $\bar{\chi} < 3$ (c) $\bar{\chi} = 3$ (d) $\bar{\chi} \leq 3$
5. The conventional boundary layer thickness for strong interaction is defined as, []
(a) $\delta^* \propto x$ (b) $\delta^* \propto x^{3/2}$ (c) $\delta^* \propto 1/x^{1/2}$ (d) $\delta^* \propto x^{1/2}$
6. Knudsen number is defined by []
(a) $\frac{L}{\lambda}$ (b) $\frac{1}{L}$ (c) $\frac{\lambda}{L}$ (d) $\frac{\lambda}{4}$
7. The non-dimensional number that measures the ratio of heat transferred into a fluid to the thermal capacity of fluid is []
(a) Prandtl number (b) Stanton number (c) Nusselt number (d) Grashof number
8. In Reflected mode of shock tunnel the incident shock goes through the _____ without any resistance and gets reflected at nozzle. []
(a) first diaphragm (b) second diaphragm (c) third diaphragm (d) both a & b
9. In _____ Tunnel the shock formed ahead of the piston is repeatedly reflected from the diaphragm at the far end of the tube. []
(a) Gun (b) shock (c) reflected thorough mode (d) none
10. _____ tube is a free piston driven shock tube facility uses compressed air to drive a heavy piston. []
(a) Shock (b) Gun (c) stalker (d) both a & b

Cont.....2

II Fill in the Blanks:

11. The entropy layer is a region of _____
12. The accuracy of Newtonian theory improves as free stream _____
13. The stronger interaction or higher value of $\bar{\gamma}$ corresponds to higher _____ and larger growth rate of the boundary _____.
14. For weak interaction where $K < 1$, pressure equation is given as _____
15. The shape of the shock and the detachment distance depend on factors like the _____ and the _____.
16. The stagnation streamline undergoes a large increase in _____ compared to a streamline that undergoes a _____ shock.
17. The shock tunnels are shock tube based facilities which make use of the _____ in the shock tube.
18. Shock tunnels are of two modes _____ & _____.
19. _____ wind tunnels are essentially vacuum facilities with specialized measurement devices suited to low pressure conditions.
20. HFFAF:_____.

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Set No. 2

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV B.Tech. II Sem., II Mid-Term Examinations, April-2014

HYPERSONIC AERODYNAMICS

Objective Exam

Name: _____ Hall Ticket No.

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Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.

I. Choose the correct alternative:

1. Viscous Interaction is generally considered as strong for values []
(a) $\bar{X} > 3$ (b) $\bar{X} < 3$ (c) $\bar{X} = 3$ (d) $\bar{X} \leq 3$
2. The conventional boundary layer thickness for strong interaction is defined as, []
(a) $\delta^* \propto x$ (b) $\delta^* \propto x^{3/2}$ (c) $\delta^* \propto 1/x^{1/2}$ (d) $\delta^* \propto x^{1/2}$
3. Knudsen number is defined by []
(a) $\frac{L}{\lambda}$ (b) $\frac{1}{L}$ (c) $\frac{\lambda}{L}$ (d) $\frac{\lambda}{4}$
4. The non-dimensional number that measures the ratio of heat transferred into a fluid to the thermal capacity of fluid is []
(a) Prandtl number (b) Stanton number (c) Nusselt number (d) Grashof number
5. In Reflected mode of shock tunnel the incident shock goes through the _____ without any resistance and gets reflected at nozzle. []
(a) first diaphragm (b) second diaphragm (c) third diaphragm (d) both a & b
6. In _____ Tunnel the shock formed ahead of the piston is repeatedly reflected from the diaphragm at the far end of the tube. []
(a) Gun (b) shock (c) reflected thorough mode (d) none
7. _____ tube is a free piston driven shock tube facility uses compressed air to drive a heavy piston. []
(a) Shock (b) Gun (c) stalker (d) both a & b
8. The order of magnitude of the speed of sound behind the shock is []
(a) $\epsilon^{3/2} U \sin \sigma$ (b) $\epsilon^{1/2} U \sin \sigma$ (c) $\epsilon^{3/4} U \sin \sigma$ (d) $\epsilon^{5/2} U \sin \sigma$
9. Hypersonic wave riders have the following wing shape []
(a) spheroidal (b) ellipsoidal (c) caret shape (d) diamond
10. The boundary layer (δ) is defined as []
(a) $\delta \propto \frac{x}{\sqrt{C Re_N}}$ (b) $\delta \propto \frac{x}{\sqrt{P Re_N}}$ (c) $\delta \propto \frac{Q}{\sqrt{Re_N}}$ (d) $\delta \propto \frac{x}{\sqrt{Re_N}}$

Cont.....2

II Fill in the Blanks:

11. For weak interaction where $K < 1$, pressure equation is given as _____
12. The shape of the shock and the detachment distance depend on factors like the _____ and the _____.
13. The stagnation streamline undergoes a large increase in _____ compared to a streamline that undergoes a _____ shock.
14. The shock tunnels are shock tube based facilities which make use of the _____ in the shock tube.
15. Shock tunnels are of two modes _____ & _____.
16. _____ wind tunnels are essentially vacuum facilities with specialized measurement devices suited to low pressure conditions.
17. HFFAF: _____.
18. The entropy layer is a region of _____
19. The accuracy of Newtonian theory improves as free stream _____
20. The stronger interaction or higher value of $\bar{\chi}$ corresponds to higher _____ and larger growth rate of the boundary _____.

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Set No. 3

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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HYPERSONIC AERODYNAMICS

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Name: _____ Hall Ticket No.

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Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.

I. Choose the correct alternative:

1. Knudsen number is defined by []
(a) $\frac{L}{\lambda}$ (b) $\frac{1}{L}$ (c) $\frac{\lambda}{L}$ (d) $\frac{\lambda}{4}$
2. The non-dimensional number that measures the ratio of heat transferred into a fluid to the thermal capacity of fluid is []
(a) Prandtl number (b) Stanton number (c) Nusselt number (d) Grashof number
3. In Reflected mode of shock tunnel the incident shock goes through the _____ without any resistance and gets reflected at nozzle. []
(a) first diaphragm (b) second diaphragm (c) third diaphragm (d) both a & b
4. In _____ Tunnel the shock formed ahead of the piston is repeatedly reflected from the diaphragm at the far end of the tube. []
(a) Gun (b) shock (c) reflected thorough mode (d) none
5. _____ tube is a free piston driven shock tube facility uses compressed air to drive a heavy piston. []
(a) Shock (b) Gun (c) stalker (d) both a & b
6. The order of magnitude of the speed of sound behind the shock is []
(a) $\epsilon^{3/2} U \sin \sigma$ (b) $\epsilon^{1/2} U \sin \sigma$ (c) $\epsilon^{3/4} U \sin \sigma$ (d) $\epsilon^{5/2} U \sin \sigma$
7. Hypersonic wave riders have the following wing shape []
(a) spheroidal (b) ellipsoidal (c) caret shape (d) diamond
8. The boundary layer (δ) is defined as []
(a) $\delta \propto \frac{x}{\sqrt[3]{C} Re_N}$ (b) $\delta \propto \frac{x}{\sqrt[3]{P} Re_N}$ (c) $\delta \propto \frac{Q}{\sqrt[3]{R} Re_N}$ (d) $\delta \propto \frac{x}{\sqrt[3]{R} Re_N}$
9. Viscous Interaction is generally considered as strong for values []
(a) $\bar{X} > 3$ (b) $\bar{X} < 3$ (c) $\bar{X} = 3$ (d) $\bar{X} \leq 3$
10. The conventional boundary layer thickness for strong interaction is defined as, []
(a) $\delta^* \propto x$ (b) $\delta^* \propto x^{3/2}$ (c) $\delta^* \propto 1/x^{1/2}$ (d) $\delta^* \propto x^{1/2}$

Cont.....2

II Fill in the Blanks:

11. The stagnation streamline undergoes a large increase in _____ compared to a streamline that undergoes a _____ shock.
12. The shock tunnels are shock tube based facilities which make use of the _____ in the shock tube.
13. Shock tunnels are of two modes _____ & _____.
14. _____ wind tunnels are essentially vacuum facilities with specialized measurement devices suited to low pressure conditions.
15. HFFAF:_____.
16. The entropy layer is a region of _____
17. The accuracy of Newtonian theory improves as free stream _____
18. The stronger interaction or higher value of $\bar{\chi}$ corresponds to higher _____ and larger growth rate of the boundary _____.
19. For weak interaction where $K < 1$, pressure equation is given as _____
20. The shape of the shock and the detachment distance depend on factors like the _____ and the _____.

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Set No. 4

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Name: _____ Hall Ticket No.

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Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.

I. Choose the correct alternative:

1. In Reflected mode of shock tunnel the incident shock goes through the _____ without any resistance and gets reflected at nozzle. []
(a) first diaphragm (b) second diaphragm (c) third diaphragm (d) both a & b
2. In _____ Tunnel the shock formed ahead of the piston is repeatedly reflected from the diaphragm at the far end of the tube. []
(a) Gun (b) shock (c) reflected thorough mode (d) none
3. _____ tube is a free piston driven shock tube facility uses compressed air to drive a heavy piston. []
(a) Shock (b) Gun (c) stalker (d) both a & b
4. The order of magnitude of the speed of sound behind the shock is []
(a) $\epsilon^{3/2} U \sin \sigma$ (b) $\epsilon^{1/2} U \sin \sigma$ (c) $\epsilon^{3/4} U \sin \sigma$ (d) $\epsilon^{5/2} U \sin \sigma$
5. Hypersonic wave riders have the following wing shape []
(a) spheroidal (b) ellipsoidal (c) caret shape (d) diamond
6. The boundary layer (δ) is defined as []
(a) $\delta \propto \frac{x}{\sqrt{c Re_N}}$ (b) $\delta \propto \frac{x}{\sqrt{p Re_N}}$ (c) $\delta \propto \frac{Q}{\sqrt{Re_N}}$ (d) $\delta \propto \frac{x}{\sqrt{Re_N}}$
7. Viscous Interaction is generally considered as strong for values []
(a) $\bar{X} > 3$ (b) $\bar{X} < 3$ (c) $\bar{X} = 3$ (d) $\bar{X} \leq 3$
8. The conventional boundary layer thickness for strong interaction is defined as, []
(a) $\delta^* \propto x$ (b) $\delta^* \propto x^{3/2}$ (c) $\delta^* \propto 1/x^{1/2}$ (d) $\delta^* \propto x^{1/2}$
9. Knudsen number is defined by []
(a) $\frac{L}{\lambda}$ (b) $\frac{1}{L}$ (c) $\frac{\lambda}{L}$ (d) $\frac{\lambda}{4}$
10. The non-dimensional number that measures the ratio of heat transferred into a fluid to the thermal capacity of fluid is []
(a) Prandtl number (b) Stanton number (c) Nusselt number (d) Grashof number

Cont.....2

II Fill in the Blanks:

11. Shock tunnels are of two modes _____ & _____.
12. _____ wind tunnels are essentially vacuum facilities with specialized measurement devices suited to low pressure conditions.
13. HFFAF:_____.
14. The entropy layer is a region of _____
15. The accuracy of Newtonian theory improves as free stream _____
16. The stronger interaction or higher value of $\bar{\gamma}$ corresponds to higher _____ and larger growth rate of the boundary _____.
17. For weak interaction where $K < 1$, pressure equation is given as _____
18. The shape of the shock and the detachment distance depend on factors like the _____ and the _____.
19. The stagnation streamline undergoes a large increase in _____ compared to a streamline that undergoes a _____ shock.
20. The shock tunnels are shock tube based facilities which make use of the _____ in the shock tube.