School of Aeronautics (Neemrana)

Question Paper For Back / Re-back Internal Assessment Examination (Theory) - Old Scheme i.e 2012 Syllabus

Instructions For Students / Faculty

Back / Re-back Internal Examination (Total 60 Marks, 2 Hrs, Syllabus From Beginning of The Session)

Total number of questions to be given are 10, each carrying 10 marks and it is compulsory to attend 2 questions from Part A and 4 questions from Part B. There is a choice of two questions out of four in part A and 4 questions out of 6 in Part B. Part A will be theoretical or derivation type **(Not More Than 70 Words For Question).** Part B will be fully numerically oriented questions **(Not More Than 70 Words For Question)**, except for the list of subjects given below. No objective type or fill in the blanks shall be given, but subpart of question can be given for both Part A & B.

* **LIST OF ELABORATIVE THEORY QUESTION SUBJECTS**: Aircraft Materials, Aircraft System, Aircraft Rules & Regulation-I, Mechanics of Composite Materials, Aircraft Design, Aircraft Rules & Regulation-II, Avionics-I, Helicopter Theory, Maintenance of Airframe and System Design, Avionics-II, Airlines and Airport Management, Maintenance of Power Plant & Systems

FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'B' OF QUESTION PAPER

STUDENT IS ALLOWED TO ENTER LATE NOT MORE THAN 15 MIN AFTER STARTING OF EXAM, AND MAY LEAVE THE EXAM HALL ON EXPIRY OF ATLEAST OF 1 Hr FROM THE STARTING TIME OF EXAMINATION

Question Paper & Student Details

Name of Faculty*	BIPIN DWIVEDI	**Date of Submission of QP**	16/03/2021
Subject*	7AN3 – Aerodynamics II (Old)	**Date of Examination***	17/03/2021
Email Id of Faculty:*	bipinkumardwivedi@soanemrana.org	**Course***	B.Tech (Aeronautical Engineering)
Phone Number of Faculty*	931 400 9035	**Semester***	Semester : 6

Student Name		**Student Reg No.**	

Part A

Question : 1*

Define the stagnation pressure, stagnation Temperature, Stagnation velocity of sound.

Lesson Plan*	3	**Topic***	1-D compressible flow	**Source***	“FUNDAMENTAL OF AER

Question : 2*

Define the area ratio (A/A*) as fraction of Mach number.

Lesson Plan* 6 **Topic*** 1-D compressible flow **Source*** “FUNDAMENTAL OF AER

Question : 3*

Define the Rankine-Hugoniot equation.

Lesson Plan* 14 **Topic*** Normal shock wave **Source*** “FUNDAMENTAL OF AER

Question : 4*

Derive Mach number relation before and after oblique shock wave.

Lesson Plan* 20 **Topic*** Oblique shock wave **Source*** “FUNDAMENTAL OF AER

Part B

Question : 1*

The pressure, temperature & Mach number at the entry of a flow passage are 2.45 bar, 26.50C &1.4 respectively. If the exit Mach number is 2.5 determine for adiabatic flow of a perfect gas (□ =1.3, R=0.469 kj/ kg K)
i) Stagnation temperature
ii) Temperature and velocity of gas at exit
iii) The flow rate per square meter of the inlet cross-section.

Lesson Plan* 3 **Topic*** 1-D compressible flow **Source*** “FUNDAMENTAL OF AER

Question : 2*

An aircraft flies at 800 km/hr at an altitude of 10,000 meters (t=223.15 K, p=0.264 bar) The air is reversibly compressed in an inlet diffuser. If the Mach number at the exit of the diffuser is 0.36 determine (a) entry Mach number and (b) velocity, pressure and temperature of air at the diffuser exit.

Lesson Plan*	6	**Topic***	1-D compressible flow	**Source***	“FUNDAMENTAL OF AER

Question : 3*

The state of a gas (=1.3, R=0.469kj/kg K)upstream of a normal shock wave is given by the following data.
Mx=2.5, Px=2 bar, Tx=275K
Calculate the Mach number, pressure, temperature and velocity of the gas downstream of the normal shock wave.

Lesson Plan*	13	**Topic***	Normal shock wave	**Source***	“FUNDAMENTAL OF AER

Question : 4*

Air approaches a symmetrical wedge angle =15° at a Mach number of 2.0. Determine for the strong and weak waves (a) wave angle, (b) pressure ratio, (c) temperature ratio and downstream Mach number of oblique shock wave.

Lesson Plan*	18	**Topic***	Oblique shock wave	**Source***	“FUNDAMENTAL OF AER

Question : 5

A supersonic flow at M1 =1.58 and p1,=1 atm expands around a sharp corner. If the pressure downstream of the corner is 0.1306 atm, calculate the deflection Angle of the corner.

Lesson Plan	24	**Topic**	Expansion wave	**Source**	“FUNDAMENTAL OF AER

Question : 6

Consider an infinitely thin flat at an angle of attack at 10° in a Mach 3 flow.
Calculate the lift and wave-drag coefficients.

Lesson Plan	28	**Topic**	Shock wave	**Source**	“FUNDAMENTAL OF AER

Upload Scanned Document In Case of Numerical or Diagram for any of the above question

Mention question number with relevant fig / numerical / equations. Max 150 KB

Choose files or drag here

I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.