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*	Sidhartha Sondh	**Date of Submission of QP**	26/11/2020
Subject*	4AN3 - Fluid Mechanics (Old)	**Date of Examination***	03/12/2020
Email Id of Faculty:*	sidharthasondh@soaneemrana.org	**Course***	B.Tech (Mechatronics Engineering)
Phone Number of Faculty*	963 455 7511	**Semester***	Semester : 4

Student Name		**Student Reg No.**	

Part A

Question : 1*

Write short notes on the following. Draw neat diagrams wherever necessary.
a) Different stages of transition from laminar to turbulent
b) Effect of turbulence
c) Metacenter and Metacentric Height
d) Rotation and vorticity

Lesson Plan*	14	**Topic***	Fundamentals	**Source***	Self

Question : 2*

Prove the intensity of the pressure at a point in a fluid at rest is the same in all the directions.

Lesson Plan* 11 **Topic*** Pressure intensity **Source*** Self

Question : 3*

Differentiate between:
(i) Gauge pressure and Vacuum pressure
(ii) Stress and Pressure
(iii) Vorticity and Circulation

Lesson Plan* 4 **Topic*** Basics **Source*** Self

Question : 4*

Explain the relationship between vorticity and rotationality.

Lesson Plan* 11 **Topic*** Rotational flow **Source*** Self

Part B

Question : 1*

For a steady flow taking place through variable cross section duct, derive an expression for the mass continuity equation.

Lesson Plan* 10 **Topic*** Continuity equation **Source*** Self

Question : 2*

Consider the following steady, incompressible, two-dimensional velocity field: V=(u,v)=x^2 i+(-2xy-1)j. Is this flow rotational or irrotational? Justify your answer.

Lesson Plan*	11	**Topic***	Rotational flow	**Source***	Fluid Mechanics- Funda

Question : 3*

A horizontal water pipe of diameter 15cm converges to 7.5cm dia. If the pressure at the two stations is 400Kpa and 150Kpa respectively. Calculate velocity at both stations and the flow rate of the water.

Lesson Plan*	18	**Topic***	Bernoulli Equation	**Source***	Fluid Mechanics- Funda

Question : 4*

The resulting force F of a supersonic plane during flight can be considered as dependent upon the length of the aircraft l, velocity v, air viscosity μ, air density ρ, and bulk modulus of air K. Expess the functional relationship between these variables and the resisting force and show that the resisting force is a function of Reynolds number and Mach number.

Lesson Plan*	35	**Topic***	Dimensional analysis	**Source***	Self

Question : 5

Check whether the flow defined by the stream function ψ=2xy is irrotational? If so, determine the corresponding velocity potential.

Lesson Plan	28	**Topic**	Steam function	**Source**	FMHM by RK Bansal

Question : 6

Air enters a nozzle steadily at 2.21 kg/m3 and 30 m/s and leaves at 0.762 kg/m3 and 180 m/s. If the inlet area of the nozzle is 80 cm2, determine (a) the mass flow rate through the nozzle, and (b) the exit area of the nozzle.

Lesson Plan	10	**Topic**	Continuity equation	**Source**	Fluid Mechanics- Funda

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.