Question Paper For Internal Assessment Examination (Theory) - Credit 4 / 13 / SET 1

Instructions For Students / Faculty

Mid Term I (Total 80 Marks, 2 HRS. Syllabus From Beginning Of Session)

- Part A: Total number of questions to be given are ten, each carrying 2 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words For both Question & Answer)**, no objective type or fill in the blanks. Total 20 marks.
- Part B: Total number of questions to be given are six, out of which student has to answer any four. They are long answer type (**Not More Than 50 Words For Question)**, each carrying 6 marks. Total 24 marks.
- Part C: Total number of questions to be given are four, out of which student has to answer any three. They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)***, each carrying 12 marks. Total 36 marks.

Mid Term II & III (Total 120 Marks, 2.5 HRS. Syllabus From Beginning Of Session)

- Part A: Total number of questions to be given are ten, each carrying 2 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words For both Question & Answer)**, no objective type or fill in the blanks. Total 20 marks.
- Part B: Total number of questions to be given are seven, out of which student has to answer any five. They are long answer type (**Not More Than 50 Words For Question)**, each carrying 8 marks. Total 40 marks.
- Part C: Total number of questions to be given are five, out of which student has to answer any four. They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)***, each carrying 15 marks. Total 60 marks.

*** LIST OF ELABORATIVE THEORY QUESTION SUBJECTS**: NO SUBJECT UNDER CREDIT FOUR

FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICALELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'C' 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

Type of Exam	Internal Improvement Exam	**Date of Submission**	25/11/2020
Name of Faculty	Dr. Bipin Kumar Dwivedi	**Date of Examination**	03/12/2020
Course	B.Tech (Aeronautical Engineering)	**Semester**	SEMESTER : 4
Batch	-	**Subject**	4 AN4 - 04 Aerodynamics-I (Cr 4)

COURSE OUTCOMES FOR REFERENCE TO FRAME QUESTION PAPER
(Faculties are required to mention relevant Course Outcome number against the respective question in QP)

Course Outcome	3. School of Aeronautics (Neemrana)

Email I'd	bipinkumardwivedi@soaneemrana.org	**Phone No.**	931-400-9035
Student Name		**Student Reg No.**	
Part A			
Question : 1	Differentiate between laminar and turbulent boundary layer.		
2	Boundary layer	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 2	What is stream function equation of uniform flow?		
4	Potential flow	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 3	What is doublet flow?		
5	Potential flow	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 4	What is Kutta condition?		
10	Invisid incompressible flow	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 5	Define Kutta-Joukowski transformation.		
12	Invisid incompressible flow	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 6	Define thin airfoil theory.		
16	Thin airfoil theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 7	Differentiate between finite and infinite wing.		
20	Finite wing theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 8	What is critical Mach number?		
24	Finite wing theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 9	Differentiate between aerodynamic center and centre of pressure.		

26	Finite wing theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 10	What do you mean by low speed wind tunnel?		
30	wind tunnel	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Part B			
Question : 1	Derive the fundamental equation of thin airfoil theory.		
12	Thin airfoil theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 2	Prove that the moment coefficient about the quarter-chord point for the inviscid, incompressible flow over a thin symmetrical airfoil at small angle of attack ‘α’ is equal to zero.		
18	Thin airfoil theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 3	Derive the expression of lift coefficient for the inviscid, incompressible flow over a thin cambered airfoil at small angle of attack ‘α’.		
15	Thin airfoil theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 4	Explain about the Lifting line theory.		
16	Finite wing theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 5	Explain about the Biot and savart law.		
20	Finite wing theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 6	Explain the effect of ideal flow ovr rotating cylinder.		
24	Potential flow	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 7	How to calibrate low speed wind tunnel? Explain.		
34	wind tunnel	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	

Part C

Question : 1	Obtain the equation to the streamlines for the velocity flow field given as, V= 2x^3i – 6 x^2yj.		
23	Potential flow	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 2	Consider an NACA 2412 airfoil with a 2-m chord in an airstream with a velocity of 50 m/s at standard sea level conditions. If the lift per unit span is 1353 N, what is the angle of attack?		
26	Finite wing theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 3	Consider a thin, symmetric airfoil at 1.5° angle of attack. From the results of thin airfoil theory, calculate the lift coefficient and the moment coefficient about the leading edge.		
29	Thin airfoil theory	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 4	For a doublet of strength 20m^2/s. Calculate the velocity at point P(1,2) andthe value of stream function passing through it.		
23	Invisid incompressible flow	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Question : 5	A long circular cylinder lies in an air stream having a velocity of 60m/s. There is a flow around the cylinder with circulation -400m^2/s (clockwise). Calculate the lift force per unit of cylinder.		
24	Invisid incompressible flow	FUNDAMENTAL OF AERODYNAMICS BY JHON D ANDESON	
Upload Scanned Document In Case of Numerical or Diagram For Any of The Above Questions. *(Mention question number with relevant fig / numerical / equations. Max 150 KB)*			
I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.		Yes	

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*	Ashok Bhatia	**Date of Submission of QP**	26/11/2020
Subject*	4AN6 - Machine Design (Old)	**Date of Examination***	02/12/2020
Email Id of Faculty:*	ashokbhatia@soaneemrana.org	**Course***	B.Tech (Aeronautical Engineering)
Phone Number of Faculty*	798 815 8760	**Semester***	Semester : 4

Student Name		**Student Reg No.**	

Part A

Question : 1*

Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5.

Lesson Plan*	10	**Topic***	Shaft	**Source***	Machine Design by R.s.

Question : 2*

Derive an expression for the maximum load in a bolt when a bracket with circular base is bolted to a wall by means of four bolts.

Lesson Plan*	6	Topic*	Screwed Joint	Source*	Machine Design by R.s.

Question : 3*

Design a gib and cottor joint to carry a maximum load of 35 kN. Assuming that the gib, cotter and rod are of same material and have the following allowable stresses :
σt = 20 MPa ; τ = 15 MPa ; and σc = 50 MPa

Lesson Plan*	7	Topic*	Cotter Joint	Source*	Machine Design by R.s.

Question : 4*

Write Soderberg's equation and state its application to different type of loading.

Lesson Plan*	14	Topic*	Variable Loading	Source*	Machine Design by R.s.

Part B

Question : 1*

A 150 mm diameter shaft supporting a load of 10 kN has a speed of 1500 r.p.m. The shaft runs in a bearing whose length is 1.5 times the shaft diameter. If the diametral clearance of the bearing is 0.15 mm and the absolute viscosity of the oil at the operating temperature is 0.011 kg/m-s, find the power wasted in friction.

Lesson Plan*	24	Topic*	Bearings	Source*	Machine Design by R.s.

Question : 2*

Explain the method of determining the size of the bolt when the bracket carries an eccentric load perpendicular to the axis of the bolt.

Lesson Plan*	19	**Topic***	Screwed Joint	**Source***	Machine Design by R.s.

Question : 3*

A steel solid shaft transmitting 15 kW at 200 r.p.m. is supported on two bearings 750 mm apart and has two gears keyed to it. The pinion having 30 teeth of 5 mm module is located 100 mm to the left of the right hand bearing and delivers power horizontally to the right. The gear having 100 teeth of 5 mm module is located 150 mm to the right of the left hand bearing and r

Lesson Plan*	11	**Topic***	Shaft	**Source***	Machine Design by R.s.

Question : 4*

A simply supported beam has a concentrated load at the centre which fluctuates from a value of P to 4 P. The span of the beam is 500 mm and its cross-section is circular with a diameter of 60 mm. Taking for the beam material an ultimate stress of 700 MPa, a yield stress of 500 MPa, endurance limit of 330 MPa for reversed bending, and a factor of safety of 1.3, calculate the maximum value of P. Take a size factor of 0.85 and a surface finish factor of 0.9.

Lesson Plan*	7	**Topic***	Variable Loading	**Source***	Machine Design by R.s.

Question : 5

Explain the general considerations in machine design.

Lesson Plan	2	**Topic**	Design Fundamentals	**Source**	Machine Design by R.s.

Question : 6

Select a single row deep groove ball bearing for a radial load of 4000 N and an axial load of 5000 N, operating at a speed of 1600 r.p.m. for an average life of 5 years at 10 hours per day. Assume uniform and steady load.

Lesson Plan	26	**Topic**	Bearings	**Source**	Machine Design by R.s.

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.