



**School of Aeronautics (Neemrana)**

APPROVED BY DIRECTOR GENERAL OF CIVIL AVIATION, MINISTRY OF CIVIL AVIATION, GOVT. OF INDIA  
APPROVED BY ALL INDIA COUNCIL FOR TECHNICAL EDUCATION & AFFILIATED TO RAJASTHAN TECHNICAL UNIVERSITY, KOTA  
& BIKANER TECHNICAL UNIVERSITY, BIKANER, RUN & MANAGED BY L. N. VERMA MEMORIAL SOCIETY

**School of Aeronautics**

APPROVED BY DIRECTOR GENERAL OF CIVIL AVIATION, MINISTRY OF CIVIL AVIATION, GOVT. OF INDIA  
RUN AND MANAGED BY LAXMI NARAIN VERMA MEMORIAL SOCIETY, REGISTERED,  
DELHI ADMINISTRATION, UNDER SOCIETIES REGISTRATION ACT XXI OF 1860.



## Question Paper for Internal Assessment Examination (Theory) - Credit 4

### Instructions for Students/Faculty: Mid Term I (Total 80 Marks, 2 HRS. Syllabus from Unit-1)

- Part A: Total number of questions to be given are ten (5 from CO1 and 5 from CO2), 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 (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2). They are long answer type (**Not More Than 50 Words for Question**), each carrying 5 marks. Total 20 marks.
- Part C: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2). They are numerical answer type / fully elaborative type (**Not More Than 70 Words for Question**) \*, each carrying 10 marks. Total 40 marks.

### Mid Term II (Total 120 Marks, 2.5 HRS., Syllabus from Unit-2)

- Part A: Total number of questions to be given are ten (5 from CO3 and 5 from CO4), each carrying 4 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 40 marks.
- Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer four (2 from CO3 and 2 from CO4). They are long answer type (**Not More Than 50 Words for Question**), each carrying 7 marks. Total 28 marks.
- Part C: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer four (2 from CO3 and 2 from CO4). They are numerical answer type / fully elaborative type (**Not More Than 70 Words for Question**) \*, each carrying 13 marks. Total 52 marks.

### Mid Term III (Total 120 Marks, 2.5 HRS., Syllabus from Unit-3)

- Part A: Total number of questions to be given are ten (5 from CO5 and 5 from CO6), each carrying 4 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 40 marks.
- Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must answer four (2 from CO5 and 2 from CO6). They are long answer type (**Not More Than 50 Words for Question**), each carrying 7 marks. Total 28 marks.

- Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must answer four (2 from CO5 and 2 from CO6). They are numerical answer type / fully elaborative type (**Not More Than 70 Words for Question**) \*, each carrying 13 marks. Total 52 marks.

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

**Instructions for Faculties:**

There should be total 6 Course Outcomes (COs) for each subject.

- Mid Term Question Papers are to be submitted as per Course Outcomes (COs) which should be divided equally in Part A, Part B and Part C according to Mid Term Examination and Credit Point.
- In Mid Term-1, the questions are to be given from CO1 and CO2. In Mid Term-2, the questions are to be given from CO3 and CO4. Similarly, in Mid Term-3, the questions are to be given from CO5 and CO6.
- FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'C' OF QUESTION PAPER**

**INSTRUCTION FOR STUDENTS**

- 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 AND STUDENTS DETAILS**

<b>Type of Exam</b>	Mid Term 2	<b>Date of Submission</b>	20/07/21
<b>Name of Faculty</b>	PANKAJ KUMAR	<b>Date of Examination</b>	26-Jul-21
<b>Course</b>	B.Tech (Aeronautical Engg)	<b>Semester</b>	Semester 2
<b>Batch</b>	20, 21, AE-3 MT-06	<b>Subject</b>	2FY2-01 Engineering Mathematics II (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)

<b>Course Objective :</b>	<ol style="list-style-type: none"> <li>To develop the use of matrix algebra techniques that is needed by engineers for practical applications.</li> <li>To make the students appreciate the purpose of using differential</li> </ol>
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	<p>calculus to solve engineering problems.</p> <ol style="list-style-type: none"> <li>3. To familiarize the student with functions of several variables. This is needed in many branches of engineering.</li> <li>4. To make the students understand various techniques of integration.</li> <li>5. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.</li> <li>6. To gain knowledge on primary level of Engineering mathematics and its application that they would find useful in their disciplines.</li> </ol>		
<b>Course Outcome :</b>	<p><b>CO 1.</b> Use the matrix algebra methods for solving practical problems.  <b>CO 2.</b> Apply differential calculus tools in solving various application problems.  <b>CO 3.</b> Obtain differential calculus ideas on several variable functions.  <b>CO 4.</b> Manipulate different methods of integration in solving practical problems.  <b>CO 5.</b> Appreciate multiple integral ideas in solving areas, volumes and other practical problems.  <b>CO 6.</b> Utilize mathematical ideas to solve the practical problems in the society.</p>		
<b>Email I'd</b>	pankajkumar@soaneemrana.org	<b>Phone No.</b>	8769828628
<b>Student Name</b>		<b>Student Reg No.</b>	
<b>Part A</b>			
<p><b>FOR MIDTERM 1 - Part A:</b> Total number of questions to be given are ten (5 from CO1 and 5 from CO2), each carrying 2 marks and are compulsory to attend. There is no choice.  <b>FOR MIDTERM 2 - Part A:</b> Total number of questions to be given are ten (5 from CO3 and 5 from CO4), each carrying 2 marks and are compulsory to attend. There is no choice.  <b>FOR MIDTERM 3 - Part A:</b> Total number of questions to be given are ten (5 from CO5 and 5 from CO6), each carrying 2 marks and are compulsory to attend. There is no choice.</p>			
<b>All the questions are compulsory to attend.</b>			
<b>1. WRITE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.</b>			CO 3
<b>Question: 1</b>	Explain symbol D in solving linear differential equation.		
<b>Lesson Plan No.:17</b>	<b>Topic: Linear differential Equation with constant coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>	

<b>Question: 2</b>	Define the Particular integral	
<b>Lesson Plan No.:19</b>	<b>Topic: Linear differential Equation with constant coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 3</b>	Define simultaneous differential equation	
<b>Lesson Plan No.:20</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 4</b>	Solve the following differential equation : $(D^3 - 3D^2 + 4)y = 0 \text{ where } D = \frac{d}{dx}$	
<b>Lesson Plan No.: 19</b>	<b>Topic: Linear differential Equation with constant coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 5</b>	Write the standard form of linear differential equation of variable coefficients.	
<b>Lesson Plan No.: 22</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>2. WRITE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.</b>		CO 4
<b>Question: 6</b>	Define Homogeneous differential equation.	
<b>Lesson Plan No.: 21</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>

<b>Question: 7</b>	Mentioned various methods to solve linear differential equation of variable coefficients.	
<b>Lesson Plan No.: 22</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 8</b>	Explain the method reduction to normal form.	
<b>Lesson Plan No.: 23</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 9</b>	Explain the method of variation of parameters.	
<b>Lesson Plan No.: 24</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 10</b>	Define the Legendre's Differential equation.	
<b>Lesson Plan No.: 28</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Part B</b>		
<p><b>FOR MIDTERM 1 - Part B:</b> Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).</p> <p><b>FOR MIDTERM 2 - Part B:</b> Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).</p> <p><b>FOR MIDTERM 3 - Part B:</b> Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).</p>		
<b>3. WRITE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.</b>		CO 3
<b>Question: 1</b>	Solve the following differential equation : $\frac{d^3y}{dx^3} - 5\frac{d^2y}{dx^2} + 17\frac{dy}{dx} - 13y = 0$	

<b>Lesson Plan No.:17</b>	<b>Topic: Linear differential Equation with constant coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Manish Goyal</b>
<b>Question: 2</b>	Solve the following differential equation : $\frac{d^2y}{dx^2} + y = 0$ , gives that $y(0) = 2$ And $y\left(\frac{\pi}{2}\right) = -2$	
<b>Lesson Plan No.:18</b>	<b>Topic: Linear differential Equation with constant coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Manish Goyal</b>
<b>Question: 3</b>	Solve simultaneous differential equation : $\frac{dx}{dt} + \frac{dy}{dt} + 3x = \sin t$ , $\frac{dx}{dt} + y - x = \cos t$	
<b>Lesson Plan No.: 23</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.</b>		CO 4
<b>Question: 4</b>	Solve the following differential equation: $(1+x)^2 \frac{d^2y}{dx^2} + (1+x) \frac{dy}{dx} + y = 4 \cos \log(1+x)$	
<b>Lesson Plan No.: 24</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 5</b>	Solve the following differential equation : $(D^2 + a)y = \sec ax$	
<b>Lesson Plan No.: 22</b>	<b>Topic: Linear differential Equation with constant coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>

<b>Question: 6</b>	Solve the following differential equation : $(1 + 2x)^2 \frac{d^2y}{dx^2} - 6(1 + 2x) \frac{dy}{dx} + 16y = 8(1 + 2x)^2$	
<b>Lesson Plan No.: 25</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Part C</b>		
<p><b>FOR MIDTERM 1 - Part C:</b> Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).</p> <p><b>FOR MIDTERM 2 - Part C:</b> Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).</p> <p><b>FOR MIDTERM 3 - Part C:</b> Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).</p>		
<b>5. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.</b>		CO 3
<b>Question: 1</b>	Solve the following differential equation: $(D - 2)^2(D-3) y = 0$	
<b>Lesson Plan No.: 20</b>	<b>Topic: Linear differential Equation with constant coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 2</b>	Solve the following differential Equation : $(x + 2) \frac{d^2y}{dx^2} - (2x + 5) \frac{dy}{dx} + 2y = (x + 1)e^x$	
<b>Lesson Plan No.: 24</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 3</b>	(1) Solve the following differential equation: $\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} - (1 - \cot x)y = e^x \sin x$	

<b>Lesson Plan No.: 21</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.</b>		CO 4
<b>Question: 4</b>	Solve the following differential equation by the method of the variation of parameters : $\frac{d^2y}{dx^2} - 2 \frac{dy}{dx} = e^x \sin x$	
<b>Lesson Plan No.: 23</b>	<b>Topic: Linear differential Equation with constant coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 5</b>	Solve the following differential Equation : $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + y = \frac{\log x \sin(\log x) + 1}{x}$	
<b>Lesson Plan No.:22</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>Question: 6</b>	Solve the differential equation: $(1 - x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} + 4y = 0$ in series.	
<b>Lesson Plan No.:26</b>	<b>Topic: Linear differential Equation with variable coefficient.</b>	<b>Source: Engg Mathematics-II By Dr. Sanjay Bansal</b>
<b>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)</b>		
<b>I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.</b>		PANKAJ KUMAR