



MINISTRY RESEARCH AND EDUCATION TALL  
 UNIVERSITY COUNTRY JAKARTA  
**FACULTY MIPA**  
**PROGRAM STUDIES PHYSICS - EDUCATION**  
**PHYSICS**  
**EXAM END SEMESTER (UAS)**  
**COMPUTING PHYSICS (3 credits)**

<b>Date</b>	: 15 June 2023
<b>Time</b>	: 100 minute
<b>Device Which allowed</b>	: Open book, Calculator scientific
<b>Lecturer</b>	: Dr. B. Heru Iswanto, M.Sc Handjoko Permana, M.Sc goddess Mulyati, M.Sc

**Instruction Processing:**

- Do it question in a way manually on sheet answer.
- Write Name, NIM, subject, And lecturer guardian
- Do it question with ballpoint.
- Results calculation Enough until 4 decimal
- Results cheat / Work The same will given mark **ZERO**

1. (35 points) **Numerical Integrals** . The work done by gas undergoing expansion isothermal can be calculated with the equation:

$$W = \int P dV$$

where  $P$  and  $V$  are the pressure and volume of the gas. If the results of measuring the pressure and volume of the gas in the following table, calculate the work done by the gas (in kJ) using the combination rule trapezoid, rule Simpson's 1/3, and Simpson's 3/8 rule.

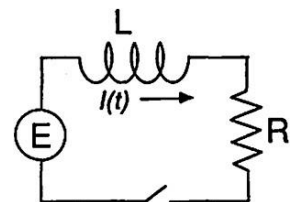
$P$ (kPa)	336	294.4	266.4	260.8	260.5	249.6	193.6	165.6
$V$ ( $m^3$ )	0.5	2	3	4	6	8	10	11

2. (30 points) **Numerical Differential** : The following is data on the distance traveled by the rocket ( $y$ ) to time ( $t$ ):

$t$ (s)	0	25	50	75	100	125
$y$ (km)	0	32	58	78	92	100

Use differentiation numeric For estimate speed And acceleration rocket every moment.

3. (35 points) **Ordinary Differential Equations** : A circuit as in the image has inductance  $L = 50$  H, resistance  $R = 20$  Ohm, and voltage source  $E = 10 \sin(t)$  Volts. At  $t = 0$  there is no electric current Which flow,  $I(0) = 0$  . When the switch closed then current will flow equal to  $I(t)$  according to the equation:



$$L \frac{dI}{dt} + R I = E$$

- Make it count current electricity on  $t = 0.3$  s use method Runge-Kutta 2nd order with  $h = 0.1$
- Make it count error from results calculation the.