```
Sub Macro1()
'
' Macro1 Macro
' Background on Radio and TV Systems
' "&chr(10)&"       · Radio Systems:
' "&chr(10)&"       o Focus on transmitting and receiving electromagnetic signals using frequencies in
 the AM/FM spectrum.
' "&chr(10)&"       o Applications: Communicatio
'
End Sub
Sub frm1()
'
' frm1 Macro
' VERSION 5.00
' "&chr(10)&"Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm1
' "&chr(10)&"   Caption         =   "UserForm1"
' "&chr(10)&"   ClientHeight    =   9792
' "&chr(10)&"   ClientLeft      =   108
' "&chr(10)&"   ClientTop       =   456
' "&chr(10)&"   ClientWidth     =   20004
' "&chr(10)&"   OleObjectBlob   =   "UserForm
'


End Sub
Sub Macro2()
'
' Macro2 Macro
' VERSION 5.00
' "&chr(10)&"Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm1
' "&chr(10)&"   Caption         =   "UserForm1"
' "&chr(10)&"   ClientHeight    =   9792
' "&chr(10)&"   ClientLeft      =   108
' "&chr(10)&"   ClientTop       =   456
' "&chr(10)&"   ClientWidth     =   20004
' "&chr(10)&"   OleObjectBlob   =   "UserForm
'
End Sub
Sub Macro3()
'
' Macro3 Macro
' m(t)=Ac(1+macos??mt)cos??ct,m(t) = A_c(1 + m_a \cos \omega_m t) \cos \omega_c t,
' "&chr(10)&"       where mam_a: modulation index, AcA_c: carrier amplitude, ?c\omega_c: carrier frequ
ency, ?m\omega_m: message frequency.
' "&chr(10)&"       2. FM S
'
End Sub
Sub Macro4()
'
' Macro4 Macro
' 2. FM Signal Equation:
' "&chr(10)&"
' "&chr(10)&"       f(t)=cos?(?ct+ßsin??mt),f(t) = \cos (\omega_c t + \beta \sin \omega_m t),
' "&chr(10)&"       where ß\beta: modulation index.
' "&chr(10)&"       · Demodulation:
'
End Sub
Sub Macro5()
'
' Macro5 Macro
' 2. FM Signal Equation:
' "&chr(10)&"
' "&chr(10)&"       f(t)=cos?(?ct+ßsin??mt),f(t) = \cos (\omega_c t + \beta \sin \omega_m t),
' "&chr(10)&"       where ß\beta: modulation index.
' "&chr(10)&"       · Demodulation:
'
End Sub
Sub Macro6()
'
' Macro6 Macro
'
' "&chr(10)&"       Example Calculation: For Ac=5 VA_c = 5 \, \text{V}, Am=2 VA_m = 2 \, \text{V}, fc=
100 kHzf_c = 100 \, \text{kHz}, fm=1 kHzf_m = 1 \, \text{kHz}:
' "&chr(10)&"       1. Modulation Index:
```

```
' "&chr(10)&"
' "&chr(10)&"       ma=AmAc=25
'
End Sub
Sub Macro7()
'
' Macro7 Macro
'
' "&chr(10)&"       m(t)=5[1+0.4cos?(2p·1000t)]cos?(2p·100000t).m(t) = 5 [1 + 0.4 \cos(2\pi \cdot 1000
 t)] \cos(2\pi \cdot 100000 t).
' "&chr(10)&"       2. Frequency Modulation (FM):
' "&chr(10)&"       The FM signal is expressed as:
'
End Sub
Sub Macro8()
'
' Macro8 Macro
'
' "&chr(10)&"       m(t)=5[1+0.4cos?(2p·1000t)]cos?(2p·100000t).m(t) = 5 [1 + 0.4 \cos(2\pi \cdot 1000
 t)] \cos(2\pi \cdot 100000 t).
' "&chr(10)&"       2. Frequency Modulation (FM):
' "&chr(10)&"       The FM signal is expressed as:
'
End Sub
Sub Macro9()
'
' Macro9 Macro
'
' "&chr(10)&"       m(t)=5[1+0.4cos?(2p·1000t)]cos?(2p·100000t).m(t) = 5 [1 + 0.4 \cos(2\pi \cdot 1000
 t)] \cos(2\pi \cdot 100000 t).
' "&chr(10)&"       2. Frequency Modulation (FM):
' "&chr(10)&"       The FM signal is expressed as:
'
End Sub
Sub Macro10()
'
' Macro10 Macro
'
' "&chr(10)&"       m(t)=5[1+0.4cos?(2p·1000t)]cos?(2p·100000t).m(t) = 5 [1 + 0.4 \cos(2\pi \cdot 1000
 t)] \cos(2\pi \cdot 100000 t).
' "&chr(10)&"       2. Frequency Modulation (FM):
' "&chr(10)&"       The FM signal is expressed as:
'
End Sub
Sub Macro11()
'
' Macro11 Macro
'
' "&chr(10)&"       m(t)=5[1+0.4cos?(2p·1000t)]cos?(2p·100000t).m(t) = 5 [1 + 0.4 \cos(2\pi \cdot 1000
 t)] \cos(2\pi \cdot 100000 t).
' "&chr(10)&"       2. Frequency Modulation (FM):
' "&chr(10)&"       The FM signal is expressed as:
'
End Sub
Sub Macro12()
'
' Macro12 Macro
'
' "&chr(10)&"       m(t)=5[1+0.4cos?(2p·1000t)]cos?(2p·100000t).m(t) = 5 [1 + 0.4 \cos(2\pi \cdot 1000
 t)] \cos(2\pi \cdot 100000 t).
' "&chr(10)&"       2. Frequency Modulation (FM):
' "&chr(10)&"       The FM signal is expressed as:
'
End Sub
Sub Macro13()
'
' Macro13 Macro
'
' "&chr(10)&"       The intensity of colors is calculated as:
' "&chr(10)&"
' "&chr(10)&"       Idisplay=R·gainR+G·gainG+B·gainB.I_{\text{display}} = R \cdot \text{gain}_R + G \c
dot \text{gain}_G + B \cdot \text{gain}_B.
'
```

```
    Selection.Copy
End Sub
Sub Macro14()
'
' Macro14 Macro
' Video Signals:
' "&chr(10)&"        · Luminance (YY) is:
' "&chr(10)&"
' "&chr(10)&"        Y=0.299R+0.587G+0.114B.Y = 0.299R + 0.587G + 0.114B.
' "&chr(10)&"        · Chrominance (CC) represents color differences.
'
End Sub
Sub Macro15()
'
' Macro15 Macro
' Video Signals:
' "&chr(10)&"        · Luminance (YY) is:
' "&chr(10)&"
' "&chr(10)&"        Y=0.299R+0.587G+0.114B.Y = 0.299R + 0.587G + 0.114B.
' "&chr(10)&"        · Chrominance (CC) represents color differences.
'
End Sub
Sub Macro16()
'
' Macro16 Macro
' Video Signals:
' "&chr(10)&"        · Luminance (YY) is:
' "&chr(10)&"
' "&chr(10)&"        Y=0.299R+0.587G+0.114B.Y = 0.299R + 0.587G + 0.114B.
' "&chr(10)&"        · Chrominance (CC) represents color differences.
'
    Selection.MoveDown Unit:=wdLine, Count:=203
End Sub
Sub Macro17()
'
' Macro17 Macro
' Video Signals:
' "&chr(10)&"        · Luminance (YY) is:
' "&chr(10)&"
' "&chr(10)&"        Y=0.299R+0.587G+0.114B.Y = 0.299R + 0.587G + 0.114B.
' "&chr(10)&"        · Chrominance (CC) represents color differences.
'
End Sub
Sub Macro18()
'
' Macro18 Macro
'
' "&chr(10)&"        Ft=aDt-1+(1-a)Ft-1,F_t = \alpha D_{t-1} + (1 - \alpha) F_{t-1},
' "&chr(10)&"        where:
' "&chr(10)&"        · FtF_t: Forecast for current period,
' "&chr(10)&"        · a\alpha: Smoothing constant,
' "&chr(10)&"        · Dt-1
'
End Sub
Sub Macro19()
'
' Macro19 Macro
'
' "&chr(10)&"        Ft=aDt-1+(1-a)Ft-1,F_t = \alpha D_{t-1} + (1 - \alpha) F_{t-1},
' "&chr(10)&"        where:
' "&chr(10)&"        · FtF_t: Forecast for current period,
' "&chr(10)&"        · a\alpha: Smoothing constant,
' "&chr(10)&"        · Dt-1
'
End Sub
Sub Macro20()
'
' Macro20 Macro
'
' "&chr(10)&"        Ft=aDt-1+(1-a)Ft-1,F_t = \alpha D_{t-1} + (1 - \alpha) F_{t-1},
' "&chr(10)&"        where:
' "&chr(10)&"        · FtF_t: Forecast for current period,
' "&chr(10)&"        · a\alpha: Smoothing constant,
```

```
' "&chr(10)&"       · Dt-1
'
    Selection.Copy
End Sub
Sub Macro21()
'
' Macro21 Macro
' F1=0.3(120)+0.7(100)=36+70=106 units.F_1 = 0.3(120) + 0.7(100) = 36 + 70 = 106 \, \text{units}.
' "&chr(10)&"       Advanced Calculation: Budget Optimization
' "&chr(10)&"       Budget allocation can be modeled using linear programming to maximize
'
    Selection.Copy
End Sub
Sub Macro22()
'
' Macro22 Macro
'
' "&chr(10)&"       a11x1+a12x2=b1,x1,x2=0,a_{11}x_1 + a_{12}x_2 \leq b_1, \quad x_1, x_2 \geq 0,
' "&chr(10)&"       where:
' "&chr(10)&"       · c1,c2c_1, c_2: Contribution per unit,
' "&chr(10)&"       · aija_{ij}: Resource consumptio
'
    Selection.Copy
End Sub
Sub Macro23()
'
' Macro23 Macro
' 2. Supervision in Industrial Environments
' "&chr(10)&"       Efficiency Metrics
' "&chr(10)&"       Evaluate employee performance using:
' "&chr(10)&"
' "&chr(10)&"       Efficiency=OutputStandard Output×100.\text{Efficiency} = \fr
'
    Selection.Copy
End Sub
Sub Macro24()
'
' Macro24 Macro
' Efficiency=80100×100=80%.\text{Efficiency} = \frac{80}{100} \times 100 = 80\%.
' "&chr(10)&"       3. Organization in Industrial Operations
' "&chr(10)&"       Workflow Optimization Using Queue Theory
' "&chr(10)&"       Queue theory assesses
'
    Selection.Copy
End Sub
Sub Macro25()
'
' Macro25 Macro
'
' "&chr(10)&"       Lq=?2µ(µ-?),L_q = \frac{\lambda^2}{\mu(\mu - \lambda)},
' "&chr(10)&"       where:
' "&chr(10)&"       · ?\lambda: Arrival rate,
' "&chr(10)&"       · µ\mu: Service rate.
' "&chr(10)&"       Example: Given ?=5 jobs/hour\lambda
'
    Selection.Copy
End Sub
Sub Macro26()
'
' Macro26 Macro
'
' "&chr(10)&"       Lq=528(8-5)=2524Ĩ.04 jobs.L_q = \frac{5^2}{8(8-5)} = \frac{25}{24} \approx 1.04 \,
 \text{jobs}.
' "&chr(10)&"       4. Related Experimental Topics
' "&chr(10)&"       Quality Control: Six Sigma
' "&chr(10)&"       Calculate proces
'
    Selection.Copy
End Sub
Sub Macro27()
'
' Macro27 Macro
'   Z=X-µs,Z = \frac{\text{X} - \mu}{\sigma},
```

```
' "&chr(10)&"        where:
' "&chr(10)&"        · X\text{X}: Observed value,
' "&chr(10)&"        · μ\mu: Mean,
' "&chr(10)&"        · s\sigma: Standard deviation.
' "&chr(10)&"        Application
'
    Selection.Copy
End Sub
Sub Macro28()
'
' Macro28 Macro
' o Apply inventory models like Economic Order Quantity (EOQ):
' "&chr(10)&"
' "&chr(10)&"        EOQ=2DSH,EOQ = \sqrt{\frac{2DS}{H}},
' "&chr(10)&"        where DD: Demand, SS: Ordering cost, HH: Holding cost.
' "&chr(10)&"        Would
'
    Selection.MoveDown Unit:=wdLine, Count:=92
    Selection.Copy
End Sub
Sub Macro29()
'
' Macro29 Macro
'
' "&chr(10)&"        o Using models like Economic Order Quantity (EOQ) to optimize inventory:
' "&chr(10)&"
' "&chr(10)&"        EOQ=2DSH,EOQ = \sqrt{\frac{2DS}{H}},
' "&chr(10)&"        where DD is demand, SS is setup cost, and HH is holding cost.
'
    Selection.MoveDown Unit:=wdLine, Count:=88
    Selection.Copy
End Sub
Sub Macro30()
'
' Macro30 Macro
'
' "&chr(10)&"        1. Personality Training
' "&chr(10)&"        Background:
' "&chr(10)&"        · Focuses on developing interpersonal skills, emotional intelligence, and self-awa
reness.
' "&chr(10)&"        · Aims to enhance communication, leadership, and
'
    Selection.MoveDown Unit:=wdLine, Count:=226
    ActiveWindow.ActivePane.VerticalPercentScrolled = -171
    ActiveWindow.ActivePane.SmallScroll Down:=82
    Selection.Copy
End Sub
Sub Macro31()
'
' Macro31 Macro
' · Technical Drawing: Reading, interpreting, and confirming designs.
' "&chr(10)&"        · Wiring and Testing:
' "&chr(10)&"        o Installing circuits (up to 1000 volts AC/1500 volts DC).
' "&chr(10)&"        o Testing systems for compliance w
'
    Selection.Copy
End Sub
Sub Macro32()
'
' Macro32 Macro
' o Total impedance: $$ Z = \sqrt{R^2 + (X_L - X_C)^2}, \text{ where } X_L = 2\pi f L \text{ and } X_C
 = \frac{1}{2\pi f C}. $$
' "&chr(10)&"        · Power:
' "&chr(10)&"        o For AC systems: $$ P = VI \cos{\phi}, \text{ where } \cos{\phi} \text{
'
    Selection.Copy
End Sub
Sub Macro33()
'
' Macro33 Macro
'
' "&chr(10)&"        · Energy in Capacitors:
' "&chr(10)&"        o Stored energy: $$ E = \frac{1}{2}CV^2. $$
```

```
' "&chr(10)&"        · Fault Current:
' "&chr(10)&"       o Use Ohm’s Law to compute fault current: $$ I = \frac{V}{Z}, \text{ where
'
    Selection.MoveDown Unit:=wdLine, Count:=52
    Selection.Copy
End Sub
Sub Macro34()
'
' Macro34 Macro
'   Key Role: Integrals help analyze energy storage, system behavior over time, and power distribution in circuits.
' "&chr(10)&"        · Energy Stored in Capacitors: $$ E = \frac{1}{2} C V^2 $$ Example: For a capacitor with C=10µFC = 10 \mu F and V=230V
'
    Selection.Copy
End Sub
Sub Macro35()
'
' Macro35 Macro
' 2645 \, \text{Joules}. $$
' "&chr(10)&"        · Total Energy in a Time Period (AC Systems): Calculate energy consumption using: $$ E = \int P(t) \, dt $$. If P(t)=5sin?(2pt)P(t) = 5 \sin(2\pi t), solve: $$ E = \int_0^{1} 5 \sin(2\pi t) \, dt. $$
'
    Selection.Copy
End Sub
Sub Macro36()
'
' Macro36 Macro
'
' "&chr(10)&"        · Induced Voltage in Inductors: Voltage across an inductor is: $$ V(t) = L \frac{di(t)}{dt}. $$ Example: With L=5HL = 5H and i(t)=t2i(t) = t^2: $$ V(t) = 5 \times \frac{d(t^2)}{dt} = 10t. $$ At \( t = 2s, V(2) = 10 \times 2 = 20V. $$
'
    Selection.MoveDown Unit:=wdLine, Count:=130
End Sub
Sub Macro37()
'
' Macro37 Macro
' o Use derivatives to study transient behaviors or integrals for analyzing energy losses: $$ i(t) = C \frac{dV}{dt} $$ $$ V(t) = L \frac{di}{dt} $$
' "&chr(10)&"       4. Practical Growth Path
' "&chr(10)&"       Completing these work experiences e
'
    Selection.MoveDown Unit:=wdLine, Count:=35
    Selection.Copy
End Sub
Sub Macro38()
'
' Macro38 Macro
' Example: For a 2H2H inductor carrying I=5AI = 5A: $$ E = \frac{1}{2} \times 2 \times 5^2 = 25 \, \text{Joules}. $$
' "&chr(10)&"       c) Cumulative Power Consumption
' "&chr(10)&"       For time-dependent power P(t)P(t), energy is: $$ E = \int_{t
'
    Selection.Copy
End Sub
Sub Macro39()
'
' Macro39 Macro
'
' "&chr(10)&"       For time-dependent power P(t)P(t), energy is: $$ E = \int_{t_1}^{t_2} P(t) \, dt $$. If P(t)=100sin?(2pt)P(t) = 100 \sin(2\pi t), calculate energy over t=0t = 0 to t=1st = 1s: $$ E = \int_0^1 100 \sin(2\pi t) \, dt = \left[-\frac{100}{2\pi} \cos(2\pi
'
    Selection.MoveDown Unit:=wdLine, Count:=19
    Selection.Copy
End Sub
Sub Macro40()
'
' Macro40 Macro
'
' "&chr(10)&"       Example: For L=5HL = 5H, i(t)=t2i(t) = t^2: $$ V(t) = 5 \cdot \frac{d(t^2)}{dt} =
```

```
10t. $$ At \( t = 3s, V = 10 \cdot 3 = 30V. $$
' "&chr(10)&"       b) Charging of a Capacitor
' "&chr(10)&"       Current through a charging capaci
'
    Selection.Copy
End Sub
Sub Macro41()
'
' Macro41 Macro
'
' "&chr(10)&"       Current through a charging capacitor: $$ i(t) = C \frac{dV(t)}{dt}. $$ For V(t)=12
(1-e-tRC)V(t) = 12(1 - e^{-\frac{t}{RC}}), calculate i(t)i(t): $$ i(t) = C \cdot \frac{d}{dt}[12(1 - e
^{-\frac{t}{RC}})] = \frac{12C}{RC} e^{-\frac{t}{RC}}. $
'
    Selection.MoveDown Unit:=wdLine, Count:=54
    Selection.MoveDown Unit:=wdLine, Count:=15
    Selection.MoveUp Unit:=wdLine, Count:=1
    Selection.Copy
End Sub
Sub Macro42()
'
' Macro42 Macro
' o Perform lathe, milling, grinding, and jig boring operations (WA015-WA018).
' "&chr(10)&"       o Program and operate CNC machines (WA0113-WA0116).
' "&chr(10)&"       · Mechanical Maintenance:
' "&chr(10)&"       o Diagnose and repair mechan
'
    Selection.MoveDown Unit:=wdLine, Count:=36
    Selection.Copy
End Sub
Sub Macro43()
'
' Macro43 Macro
'
' "&chr(10)&"       o Torque: $$ T = F \cdot r, \text{ where } F \text{ is force and } r \text{ is rad
ius.} $$
' "&chr(10)&"       o Power transmitted in shafts: $$ P = \frac{2\pi \cdot T \cdot N}{60}, \text{ wher
e } N \text{ is rotational speed (RPM).} $$
'
    Selection.Copy
End Sub
Sub Macro44()
'
' Macro44 Macro
'
' "&chr(10)&"       o Use integral calculations to analyze flow rates in hydraulic systems: $$ Q = \in
t v \cdot A \, dt, \text{ where } v \text{ is velocity and } A \text{ is cross-sectional area.} $$
' "&chr(10)&"       · Stress Analysis:
'
    Selection.MoveDown Unit:=wdLine, Count:=128
    Selection.Copy
End Sub
Sub Macro45()
'
' Macro45 Macro
'
' "&chr(10)&"       · Fluid Dynamics:
' "&chr(10)&"       o Analyze flow rates using integrals: $$ Q = \int v \cdot A \, dt $$
' "&chr(10)&"       · Mechanical Stress:
' "&chr(10)&"       o Stress in materials: $$ \sigma = \frac{F}{A}, \text{ wh
'
    Selection.Copy
End Sub
Sub Macro46()
'
' Macro46 Macro
'
' "&chr(10)&"       · Mechanical Stress:
' "&chr(10)&"       o Stress in materials: $$ \sigma = \frac{F}{A}, \text{ where } F = \text{force and
 } A = \text{area.} $$
' "&chr(10)&"       · Torque in Systems:
' "&chr(10)&"       o Torque transmi
'
```

```
    Selection.MoveDown Unit:=wdLine, Count:=69
    ActiveWindow.ActivePane.VerticalPercentScrolled = 209
    Selection.Copy
End Sub
Sub Macro47()
'
' Macro47 Macro
'
' "&chr(10)&"       The NCV (National Certificate Vocational) and NATED (National Accredited Technical
 Education Diploma) programs offer specialized modules in electrical engineering, focusing on practica
l and theoretical knowledge in areas like electrical panels
'
    Selection.MoveDown Unit:=wdLine, Count:=43
    Selection.Copy
End Sub
Sub Macro48()
'
' Macro48 Macro
' o Panel design and layout.
' "&chr(10)&"       o Circuit breakers and fuses.
' "&chr(10)&"       o Safety standards and regulations.
' "&chr(10)&"       · Experimental Applications:
' "&chr(10)&"       o Assemble and test electrical panels
'
    Selection.MoveDown Unit:=wdLine, Count:=134
End Sub
Sub Macro49()
'
' Macro49 Macro
'
' "&chr(10)&"       · Load Distribution: Use integrals to calculate the total load on an electrical pa
nel:
' "&chr(10)&"
' "&chr(10)&"       Ptotal=?0TP(t) dt,P_{\text{total}} = \int_0^T P(t) \, dt,
' "&chr(10)&"       where P(t)P(t) is the p
'
    Selection.Copy
End Sub
Sub Macro50()
'
' Macro50 Macro
' where P(t)P(t) is the power drawn over time tt.
' "&chr(10)&"       Example: For a panel supplying P(t)=100+20t WP(t) = 100 + 20t \, \text{W} from t=0
 hrt = 0 \, \text{hr} to t=5 hrt = 5 \, \text{hr}:
' "&chr(10)&"       1. Compute:
'
    Selection.MoveDown Unit:=wdLine, Count:=23
    Selection.Copy
End Sub
Sub Macro51()
'
' Macro51 Macro
'
' "&chr(10)&"       Ptotal=(100·5+10·25)-0=750 Wh.P_{\text{total}} = (100 \cdot 5 + 10 \cdot 25) - 0 =
 750 \, \text{Wh}.
' "&chr(10)&"       Electrical Drawing:
'
'
    Selection.MoveDown Unit:=wdLine, Count:=28
    Selection.Copy
End Sub
Sub Macro52()
'
' Macro52 Macro
' · Voltage Drop Across Cables: Voltage drop is modeled as:
' "&chr(10)&"
' "&chr(10)&"       ?V=?0LIR dx,\Delta V = \int_0^L I R \, dx,
' "&chr(10)&"       where II: current, RR: resistance per unit length, LL: total length of wire.
'
    Selection.Copy
End Sub
Sub Macro53()
'
```

```
' Macro53 Macro
' where II: current, RR: resistance per unit length, LL: total length of wire.
' "&chr(10)&"        Example: For I=10 A,R=0.5 O/mI = 10 \, \text{A}, R = 0.5 \, \Omega/\text{m}, and L
=20 mL = 20 \, \text{m}:
' "&chr(10)&"        1. Compute:
'
    Selection.Copy
End Sub
Sub Macro54()
'
' Macro54 Macro
' ?V=?02010·0.5 dx=[5x]020.\Delta V = \int_0^{20} 10 \cdot 0.5 \, dx = \left[5x\right]_0^{20}.
' "&chr(10)&"        2. Result:
' "&chr(10)&"
' "&chr(10)&"        ?V=5·20-0=100 V.\Delta V = 5 \cdot 20 - 0 = 100 \, \text{V}.
'
    Selection.MoveDown Unit:=wdLine, Count:=25
    Selection.Copy
End Sub
Sub Macro55()
'
' Macro55 Macro
' 3. Control Switch Design
' "&chr(10)&"        Application of Calculus:
' "&chr(10)&"        · Switch Response Time: The behavior of a switch under a varying load is represent
ed by its resistance R(t)R(t):
'
'
    Selection.Copy
End Sub
Sub Macro56()
'
' Macro56 Macro
'
' "&chr(10)&"        I(t)=VR(t),where R(t)=R0+kt.I(t) = \frac{V}{R(t)}, \quad \text{where } R(t) = R_0
+ kt.
' "&chr(10)&"        Example: For V=230 V,R0=10 O,k=2 O/s,t=5 sV = 230 \, \text{V}, R_0 = 10 \, \Omega,
 k = 2 \, \Omega/\text{s}, t = 5 \, \text{s}:
'
    Selection.Copy
End Sub
Sub Macro57()
'
' Macro57 Macro
' Example: For V=230 V,R0=10 O,k=2 O/s,t=5 sV = 230 \, \text{V}, R_0 = 10 \, \Omega, k = 2 \, \Omega/\
text{s}, t = 5 \, \text{s}:
' "&chr(10)&"        1. Resistance after 5 s:
' "&chr(10)&"
' "&chr(10)&"        R(5)=10+2·5=20 O.R(5) = 10 +
'
    Selection.Copy
End Sub
Sub Macro58()
'
' Macro58 Macro
'
' "&chr(10)&"        I(5)=23020=11.5 A.I(5) = \frac{230}{20} = 11.5 \, \text{A}.
' "&chr(10)&"        Electrical Drawing:
' "&chr(10)&"        · Design control systems using ladder diagrams.
' "&chr(10)&"        · Include components like rela
'
    Selection.MoveDown Unit:=wdLine, Count:=25
    Selection.Copy
End Sub
Sub Macro59()
'
' Macro59 Macro
'
' "&chr(10)&"        · Refrigeration Cycle Efficiency: Coefficient of Performance (COP) integrates heat
 transfer over a cycle:
' "&chr(10)&"
' "&chr(10)&"        COP=?0TQcold dt?0TW dt,\text{COP} = \frac{\int_0^T Q_{\text{cold}} \, dt}{\int_0^T
 W \
```

```
'
    Selection.Copy
End Sub
Sub Macro60()
'
' Macro60 Macro
' where QcoldQ_{\text{cold}}: heat removed, WW: work input.
' "&chr(10)&"       Example: For Qcold=300 J/s,W=100 J/sQ_{\text{cold}} = 300 \, \text{J/s}, W = 100 \
, \text{J/s}, T=10 sT = 10 \, \text{s}:
' "&chr(10)&"       1. Compute:
'
    Selection.Copy
End Sub
Sub Macro61()
'
' Macro61 Macro
'
' "&chr(10)&"       COP=?010300 dt?010100 dt=300·10100·10=3.\text{COP} = \frac{\int_0^{10} 300 \, dt}{
\int_0^{10} 100 \, dt} = \frac{300 \cdot 10}{100 \cdot 10} = 3.
' "&chr(10)&"       Electrical Drawing:
' "&chr(10)&"       · Create schematics of refrig
'
    Selection.MoveDown Unit:=wdLine, Count:=93
    Selection.Copy
End Sub
Sub Macro62()
'
' Macro62 Macro
'
' "&chr(10)&"       where A(t)A(t): cross-sectional area of pipe at time tt, v(t)v(t): flow velocity.
' "&chr(10)&"       Example: For A(t)=0.05 m2A(t) = 0.05 \, \text{m}^2 and v(t)=2+0.5t m/sv(t) = 2 + 0
.5t \, \text{m/s} over t=0 st = 0 \, \text{s} to
'
    Selection.Copy
End Sub
Sub Macro63()
'
' Macro63 Macro
' \[ V = \int_0^4 0.05 \cdot (2 + 0.5t) \, dt = 0.05 \left[2t + 0.25t2\right]_04. \]
' "&chr(10)&"       2. Result:
' "&chr(10)&"
' "&chr(10)&"       V=0.05(8+4)=0.6 m3.V = 0.05 (8 + 4) = 0.6 \, \text{m}^3.
' "&chr(10)&"       2. Heat
'
    Selection.MoveDown Unit:=wdLine, Count:=147
    Selection.Copy
End Sub
Sub Macro64()
'
' Macro64 Macro
'
' "&chr(10)&"       2. Undertaking Electrical Material Design
' "&chr(10)&"       · Purpose:
' "&chr(10)&"       o Select and design materials for electrical systems to ensure efficiency and safe
ty.
' "&chr(10)&"       · Key Topics:
'
    Selection.MoveDown Unit:=wdLine, Count:=172
    Selection.Copy
End Sub
Sub Macro65()
'
' Macro65 Macro
' performance testing. Below, I detail how calculus can enhance each topic:
' "&chr(10)&"       1. Log Activity: Data Analysis
' "&chr(10)&"       · Application of Derivatives:
' "&chr(10)&"       o Tracking performance trends from logged data:
'
    Selection.Copy
End Sub
Sub Macro66()
'
' Macro66 Macro
```

```
'
' "&chr(10)&"
' "&chr(10)&"       dPdt=rate of progress,\frac{dP}{dt} = \text{rate of progress},
' "&chr(10)&"       where PP: performance level, tt: time.
' "&chr(10)&"       Example: If P(t)=5t2+2tP(t) = 5t^2 + 2t, the rate of progress at t=3t = 3 h
'
    Selection.Copy
End Sub
Sub Macro67()
'
' Macro67 Macro
' dPdt=10t+2  ?  dPdt=10(3)+2=32 units/hour.\frac{dP}{dt} = 10t + 2 \implies \frac{dP}{dt} = 10(3) + 2
 = 32 \, \text{units/hour}.
' "&chr(10)&"       · Optimization:
' "&chr(10)&"       o Use integrals to estimate cumulative productivity:
'
    Selection.Copy
End Sub
Sub Macro68()
'
' Macro68 Macro
'
' "&chr(10)&"       Ptotal=?0T(5t2+2t)dt.P_{\text{total}} = \int_0^T \left( 5t^2 + 2t \right) dt.
' "&chr(10)&"       2. Undertaking Electrical Material Design
' "&chr(10)&"       · Voltage Drop and Power Loss:
' "&chr(10)&"       o For a cable with r
'
    Selection.Copy
End Sub
Sub Macro69()
'
' Macro69 Macro
'
' "&chr(10)&"       o For a cable with resistance RR and current II, power loss is:
' "&chr(10)&"
' "&chr(10)&"       P=?0LI2R(x)dx,P = \int_0^L I^2 R(x) dx,
' "&chr(10)&"       where R(x)R(x): resistance at length xx.
'
'
    Selection.Copy
End Sub
Sub Macro70()
'
' Macro70 Macro
'
' "&chr(10)&"       where R(x)R(x): resistance at length xx.
' "&chr(10)&"       Example: For R(x)=0.5+0.01xR(x) = 0.5 + 0.01x and I=10 AI = 10 \, \text{A}, find t
he power loss over L=10 mL = 10 \, \text{m}:
' "&chr(10)&"
'
'
    Selection.Copy
End Sub
Sub Macro71()
'
' Macro71 Macro
'   P=?010102(0.5+0.01x)dx=100?010(0.5+0.01x)dx.P = \int_0^{10} 10^2 (0.5 + 0.01x) dx = 100 \int_0^{10
} (0.5 + 0.01x) dx.
' "&chr(10)&"
' "&chr(10)&"       P=100[0.5x+0.005x2]010=100(5+0.5)=550 W.P = 100 \left[ 0.5x + 0.005x^2 \right]_0^{
10} =
'
    Selection.Copy
End Sub
Sub Macro72()
'
' Macro72 Macro
'
' "&chr(10)&"       P=100[0.5x+0.005x2]010=100(5+0.5)=550 W.P = 100 \left[ 0.5x + 0.005x^2 \right]_0^{
10} = 100 (5 + 0.5) = 550 \, \text{W}.
' "&chr(10)&"       3. Inspection of Electrical Systems
' "&chr(10)&"       · Insulation Resistance Testing:
'
```

```
    Selection.Copy
End Sub
Sub Macro73()
'
' Macro73 Macro
' . Inspection of Electrical Systems
' "&chr(10)&"        · Insulation Resistance Testing:
' "&chr(10)&"        o Use integral-based models to assess insulation decay over time:
' "&chr(10)&"
' "&chr(10)&"        R(t)=R0e-?t,R(t) = R_0 e
'
    Selection.Copy
End Sub
Sub Macro74()
'
' Macro74 Macro
'
' "&chr(10)&"        R(t)=R0e-?t,R(t) = R_0 e^{-\lambda t},
' "&chr(10)&"        where R0R_0: initial resistance, ?\lambda: decay constant.
' "&chr(10)&"        Example: For R0=100 kOR_0 = 100 \, \text{k}\Omega, ?=0.02\lambda = 0.02, find R(10
)R(10):
'
    Selection.Copy
End Sub
Sub Macro75()
'
' Macro75 Macro
'
' "&chr(10)&"        R(10)=100e-0.02·10=100e-0.281.87 kO.R(10) = 100 e^{-0.02 \cdot 10} = 100 e^{-0.2}
\approx 81.87 \, \text{k}\Omega.
' "&chr(10)&"        4. Design and Drawing of Electrical Panels
' "&chr(10)&"        · Current Distribution
'
    Selection.Copy
End Sub
Sub Macro76()
'
' Macro76 Macro
' o Use calculus to balance loads across circuits:
' "&chr(10)&"
' "&chr(10)&"        Itotal=?0TI(t)dt,I_{\text{total}} = \int_0^T I(t) dt,
' "&chr(10)&"        where I(t)I(t): current draw over time.
' "&chr(10)&"        Example: For I(
'
    Selection.Copy
End Sub
Sub Macro77()
'
' Macro77 Macro
'
' "&chr(10)&"        Example: For I(t)=5+t2I(t) = 5 + t^2, the total current over T=4 sT = 4 \, \text{s
} is:
' "&chr(10)&"
' "&chr(10)&"        Itotal=?04(5+t2)dt=[5t+t33]04=(20+21.33)-0=41.33 A.I_{\text{total}} = \int_0^4 (5
+ t^2) dt = \left[ 5
'
    Selection.Copy
End Sub
Sub Macro78()
'
' Macro78 Macro
' 5. Wiring Design
' "&chr(10)&"        · Voltage Drop Across Wiring:
' "&chr(10)&"
' "&chr(10)&"        ?V=?0LIR dx,\Delta V = \int_0^L I R \, dx,
' "&chr(10)&"        where II: current, RR: resistance per unit length.
'
    Selection.Copy
End Sub
Sub Macro79()
'
' Macro79 Macro
    ?V=?05010·0.2 dx=10·0.2·50=100 V.\Delta V = \int_0^{50} 10 \cdot 0.2 \, dx = 10 \cdot 0.2 \cdot 50
```

```
 = 100 \, \text{V}.
' "&chr(10)&"       6. Material Design for Components
' "&chr(10)&"       · Heat Dissipation in Components:
'
    Selection.Copy
End Sub
Sub Macro80()
'
' Macro80 Macro
' 6. Material Design for Components
' "&chr(10)&"       · Heat Dissipation in Components:
' "&chr(10)&"       o Use Fourier’s law for heat transfer:
' "&chr(10)&"
' "&chr(10)&"       Q=?0TkA?T dt,Q = \int_0^T k A \Delta T \, dt,
'
    Selection.MoveDown Unit:=wdLine, Count:=22
    Selection.Copy
End Sub
Sub Macro81()
'
' Macro81 Macro
'
' "&chr(10)&"       2. Analysis: Evaluate system behavior under changing conditions.
' "&chr(10)&"       3. Validation: Ensure designs meet performance and safety standards.
'
'
    Selection.MoveDown Unit:=wdLine, Count:=40
    Selection.Copy
End Sub
Sub Macro82()
'
' Macro82 Macro
'   o Offered by the Department of Higher Education and Training (DHET) in South Africa.
' "&chr(10)&"       o Combine theoretical knowledge and practical application in disciplines like engi
neering, natural sciences, and business studies.
'
    Selection.Copy
End Sub
Sub Macro83()
'
' Macro83 Macro
' 2. ICASS (Internal Continuous Assessment):
' "&chr(10)&"       o Designed to monitor student progress through class tests, assignments, and pract
ical work.
' "&chr(10)&"       o Contributes to a semester or final mark.
' "&chr(10)&"       o Re
'
    Selection.Copy
End Sub
Sub Macro84()
'
' Macro84 Macro
'   1. Marksheet Records:
' "&chr(10)&"       o Capture detailed records of student performance over time.
' "&chr(10)&"       o Include theoretical, practical, and project components.
' "&chr(10)&"       2. Tools for Assessment:
'
    ActiveWindow.ActivePane.SmallScroll Down:=41
    Selection.Copy
End Sub
Sub Macro85()
'
' Macro85 Macro
' Grade Scales:
' "&chr(10)&"       § Marks are recorded using weighted percentages:
' "&chr(10)&"       § 70%-100%: Excellent
' "&chr(10)&"       § 60%-69%: Good
' "&chr(10)&"       § 50%-59%: Satisfactory
' "&chr(10)&"       § Below 50
'
    Selection.Copy
End Sub
Sub Macro86()
```

```
'
' Macro86 Macro
' § Below 50%: Needs Improvement.
' "&chr(10)&"       3. Guidelines for Reporting:
' "&chr(10)&"       o Final marksheets must integrate ICASS results with exam marks.
' "&chr(10)&"       o Include:
' "&chr(10)&"       § Semester Marks (e.g.
'
    Selection.Copy
End Sub
Sub Macro87()
'
' Macro87 Macro
'
' "&chr(10)&"       · Marksheet Example:
' "&chr(10)&"       o Theoretical Tests: 30%
' "&chr(10)&"       o Practical Assignments: 50%
' "&chr(10)&"       o Portfolio: 20%
' "&chr(10)&"       2. Natural Sciences:
' "&chr(10)&"       · ICASS Structu
'
    Selection.Copy
End Sub
Sub Macro88()
'
' Macro88 Macro
'
' "&chr(10)&"       o Lab experiments and fieldwork reports evaluated continuously.
' "&chr(10)&"       o Emphasis on scientific method application.
' "&chr(10)&"       · Tools:
' "&chr(10)&"       o Lab evaluation rubrics to assess experimental pre
'
    Selection.Copy
End Sub
Sub Macro89()
'
' Macro89 Macro
'
' "&chr(10)&"       · ICASS Structure:
' "&chr(10)&"       o Case studies, presentations, and business plans.
' "&chr(10)&"       o Grading focus on decision-making and analysis skills.
' "&chr(10)&"       · Assessment Example:
'
    ActiveWindow.ActivePane.SmallScroll Down:=27
    Selection.Copy
End Sub
Sub Macro90()
'
' Macro90 Macro
'
' "&chr(10)&"       o Group Projects: 50%
' "&chr(10)&"       Final Statement Reports
' "&chr(10)&"       · Provide a summary of semester achievements.
' "&chr(10)&"       · Include:
' "&chr(10)&"       o ICASS mark breakdown.
'
    ActiveWindow.ActivePane.SmallScroll Down:=6
    ActiveWindow.ActivePane.LargeScroll Down:=1
    Selection.Copy
End Sub
Sub Macro91()
'
' Macro91 Macro
'
' "&chr(10)&"       1. Calculating Semester Marks Using Weighted Averages
' "&chr(10)&"       The semester mark combines the theoretical and practical components:
' "&chr(10)&"
' "&chr(10)&"       Msem=wtT+wpPwt+wp,M_{\text{sem}} = \frac{w_t T + w_p P
'
    Selection.Copy
End Sub
Sub Macro92()
'
```

```
' Macro92 Macro
'
' "&chr(10)&"       where:
' "&chr(10)&"       · TT: Theoretical component score,
' "&chr(10)&"       · PP: Practical component score,
' "&chr(10)&"       · wt,wpw_t, w_p: Weights for theoretical and practical marks.
' "&chr(10)&"       Example: If wt
'
    Selection.Copy
End Sub
Sub Macro93()
'
' Macro93 Macro
'   Example: If wt=0.6w_t = 0.6, wp=0.4w_p = 0.4, T=75T = 75, and P=85P = 85:
' "&chr(10)&"
' "&chr(10)&"       Msem=(0.6·75)+(0.4·85)0.6+0.4=45+341=79.M_{\text{sem}} = \frac{(0.6 \cdot 75) + (0
.4 \cdot 85)}{0.6 + 0.4} = \frac{45 + 34}{1} = 79
'
    Selection.Copy
End Sub
Sub Macro94()
'
' Macro94 Macro
' Msem=(0.6·75)+(0.4·85)0.6+0.4=45+341=79.M_{\text{sem}} = \frac{(0.6 \cdot 75) + (0.4 \cdot 85)}{0.6
+ 0.4} = \frac{45 + 34}{1} = 79.
' "&chr(10)&"       2. Total Final Mark Calculation
' "&chr(10)&"       The final mark combines semester marks (SS
'
    Selection.Copy
End Sub
Sub Macro95()
'
' Macro95 Macro
' F=0.4S+0.6E.F = 0.4S + 0.6E.
' "&chr(10)&"       Example: If S=79S = 79 and E=82E = 82:
' "&chr(10)&"
' "&chr(10)&"       F=0.4·79+0.6·82=31.6+49.2=80.8.F = 0.4 \cdot 79 + 0.6 \cdot 82 = 31.6 + 49.2 = 80.
8.
' "&chr(10)&"       3. St
'
    Selection.Copy
End Sub
Sub Macro96()
'
' Macro96 Macro
'
' "&chr(10)&"       · Grade Distribution Analysis: Analyze how grades are distributed across students
using measures like mean (μ\mu), variance (s2\sigma^2), and standard deviation (s\sigma):
' "&chr(10)&"
' "&chr(10)&"       μ=?xiN,s2=?(xi-μ)2N
'
    Selection.Copy
End Sub
Sub Macro97()
'
' Macro97 Macro
'
' "&chr(10)&"       Example: Grades: [75,80,85,70,90][75, 80, 85, 70, 90], N=5N = 5:
' "&chr(10)&"       1. Mean:
' "&chr(10)&"
' "&chr(10)&"       μ=75+80+85+70+905=80.\mu = \frac{75 + 80 + 85 + 70 + 90}{5} = 80.
' "&chr(10)&"       2. Vari
'
    Selection.Copy
End Sub
Sub Macro98()
'
' Macro98 Macro
'   s2=(75-80)2+(80-80)2+(85-80)2+(70-80)2+(90-80)25=50.\sigma^2 = \frac{(75-80)^2 + (80-80)^2 + (85-8
0)^2 + (70-80)^2 + (90-80)^2}{5} = 50.
' "&chr(10)&"       3. Standard Deviation:
' "&chr(10)&"
' "&chr(10)&"       s=507.07.\sigma = \s
```

```
'
    Selection.Copy
End Sub
Sub Macro99()
'
' Macro99 Macro
'
' "&chr(10)&"
' "&chr(10)&"       s=507.07.\sigma = \sqrt{50} \approx 7.07.
' "&chr(10)&"       4. Integrals for Continuous Assessment Analysis
' "&chr(10)&"       · Cumulative Marks Distribution: Use integrals to model cumulative performan
'
    Selection.Copy
End Sub
Sub Macro100()
'
' Macro100 Macro
'
' "&chr(10)&"       Mc=?0Tf(t) dt,M_c = \int_0^T f(t) \, dt,
' "&chr(10)&"       where f(t)f(t) represents marks obtained at time tt.
' "&chr(10)&"       Example: If f(t)=10+2tf(t) = 10 + 2t, compute McM_c over [0,5][0, 5]:
'
    Selection.Copy
End Sub
Sub Macro101()
'
' Macro101 Macro
'
' "&chr(10)&"       · Project Grades: Model project grading as a function of effort over time using de
rivatives:
' "&chr(10)&"
' "&chr(10)&"       dPdt=kE(t),\frac{dP}{dt} = kE(t),
' "&chr(10)&"       where E(t)E(t): effort, kk: a scaling fact
'
    Selection.Copy
End Sub
Sub Macro102()
'
' Macro102 Macro
' Natural Sciences:
' "&chr(10)&"       · Lab Precision: Evaluate experiment repeatability using statistical deviation:
' "&chr(10)&"
' "&chr(10)&"       CV=sμ×100.CV = \frac{\sigma}{\mu} \times 100.
'
'
    Selection.Copy
End Sub
Sub Macro103()
'
' Macro103 Macro
' Business Studies:
' "&chr(10)&"       · Case Study Success: Analyze assignment success using regression models to predic
t trends:
' "&chr(10)&"
' "&chr(10)&"       y=mx+b.y = mx + b.
' "&chr(10)&"       Purpose of Calculus and Stati
'
    Selection.MoveDown Unit:=wdLine, Count:=197
    Selection.Copy
End Sub
Sub Macro104()
'
' Macro104 Macro
'   M'=M-MminMmax-Mmin·100,M' = \frac{M - M_{\text{min}}}{M_{\text{max}} - M_{\text{min}}} \cdot 100,
' "&chr(10)&"       where M'M': scaled marks, Mmin,MmaxM_{\text{min}}, M_{\text{max}}: minimum and max
imum raw marks.
'
'
    Selection.MoveDown Unit:=wdLine, Count:=36
    ActiveWindow.ActivePane.VerticalPercentScrolled = 175
    Selection.Copy
End Sub
Sub Macro105()
```

```
'
' Macro105 Macro
'
' "&chr(10)&"   · Timetable Functionality:
' "&chr(10)&"   o The timetable systems used in vocational training programs need to be assessed for t
heir ability to provide functional, outcome-oriented schedules for both academic and practical trainin
g in engin
'
    Selection.MoveDown Unit:=wdLine, Count:=35
    Selection.Copy
End Sub
Sub Macro106()
'
' Macro106 Macro
' focusing on time management, outcomes, and practical application of skills.
' "&chr(10)&"   · Outcome-Based Design:
' "&chr(10)&"   The research will focus on outcome-oriented systems, where the success of students in
engineering (particul
'
    Selection.MoveDown Unit:=wdLine, Count:=40
    ActiveWindow.ActivePane.LargeScroll Down:=3
    ActiveWindow.ActivePane.VerticalPercentScrolled = 155
    Selection.Copy
End Sub
Sub Macro107()
'
' Macro107 Macro
'   · Are you interested in how industry collaborations can further improve the electrical engineering
 curriculum?
' "&chr(10)&"   · How can technology (e.g., AI, IoT, machine learning) enhance learning in electrical
engineering education?
'
    Selection.MoveDown Unit:=wdLine, Count:=61
    ActiveWindow.ActivePane.VerticalPercentScrolled = 105
    Selection.Copy
End Sub
Sub Macro108()
'
' Macro108 Macro
' Histogram & Statistical Analysis of Training & Power Systems
' "&chr(10)&"   ?? Histogram & Droitegre Equation in Module Analysis
' "&chr(10)&"   · Mathematical Representation of Learning & Power Distribution
' "&chr(10)&"   o Hist
'
    Selection.Copy
End Sub
Sub Macro109()
'
' Macro109 Macro
'
' "&chr(10)&"   Model   Variance Analysis   X1  X2  X3  X5  X6  X7  X8
' "&chr(10)&"   Y1  Variance in student training hours  ?   ?   ?   ?   ?   ?   ?
' "&chr(10)&"   Y2  Variance in attendance  ?   ?   ?   ?   ?   ?   ?
' "&chr(10)&"   Y3  Energy demand in workplace training ?   ?   ?   ?   ?   ?   ?
'
    Selection.Copy
End Sub
Sub Macro110()
'
' Macro110 Macro
'
' "&chr(10)&"   Y2  Variance in attendance  ?   ?   ?   ?   ?   ?   ?
' "&chr(10)&"   Y3  Energy demand in workplace training ?   ?   ?   ?   ?   ?   ?
' "&chr(10)&"   Y4  Energy supply fluctuations  ?   ?   ?   ?   ?   ?   ?
'
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = 115
End Sub
Sub Macro111()
'
' Macro111 Macro
' o Determine RthR_{th} by deactivating all sources (replace voltage sources with short circuits and c
urrent sources with open circuits).
```

```
'
End Sub
```