COLLYER'S
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BTEC L3 Extended Certificate in Engineering
Scheme of Learning – Year 1
(Also, BTEC SOW)

Key: T=Teacher Activity   S=Student Activity   WS=Worksheet   CTB=Course Textbook   PS=Pro-Study

1st Year (2025/2026) – Term 1

Week	Lesson 1(unit1)	Lesson 2(unit1)	Lesson 3(Unit4)	Lesson 4(Unit4)
1	Welcome Introduction to the Course and Unit 2 Mode of Assessment & Grading BTEC Regulations Expectations in class and H/W& PS Workshop Code -PPE Create AutoCAD login T-P/P S- Research books in Lib	Initial Assessment Maths A1.1 Maths Recap Maths (30min) Written (30min) Library induction – Harvard referencing techniques SI Units S-1-2-1 task	Introduction to Unit 4 – Engineering Design Assessment Mode Design Theme – this year's Assignment Brief. T- WS1 S- Home Task - students to decide by the end of the first week their design project.	Engineering Drawings Mechanical Drawings Electrical Drawings Hydraulic/Pneumatic Drawings Information on Engineering Drawings, border, lines, text T- WS1 S- Home Task - Mind-map
2	A1.2.1 - Laws of Indices Laws of indices T- PowerPoint S- see workbook task	A1.2.2/A.1.2.3 -Logarithms Laws of Logarithms Change of base Common logs Natural log T- PowerPoint S- see workbook task	PDS and its formulation Primary and secondary needs T-PowerPoint S – approve student project title	First Angle Projection Third angle projection Isometric sketches BS8888 T-PowerPoint / Demo S- WS1 – Produce sketches and 1st angle drawings
3	A.1.3.1/2 -Equations of Lines & Exponential Functions Point Gradient / slope / y=mx+c T- PowerPoint S- see workbook task	A1.3.3-Simultaneous Equations and liner equations. Substitution Elimination T- PowerPoint S- see workbook task	1 and 3rd Angle Drawing (BS8888) Drawing of Pin Clamp First and Third Angle T-PowerPoint S – approve student project tit PS – Complete drawing	2D CAD – AutoCAD Introduction Basic commands / dimensions / menus – produce an engineering drawing. T-PowerPoint / Demo S- WS1 – Draw the pin clamp

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4	A1.4 .1/2/3- Factorisation Quadratic Equations Expanding and Factorizing Expanding brackets Factorizing T- PowerPoint S- see workbook task	A1.4.4/5- Quadratic Equation Formula Factorizing quadratics Completing the square Solution by formula Roots of Equations T- PowerPoint S- see workbook task	Free hand sketching Using isometric / Oblique Sketching techniques T-PowerPoint / Demonstration S – Complete FHS Pin clamp PS – Complete drawing	2D CAD – AutoCAD Introduction Drawing of Pin Clamp Full Dimensions T-PowerPoint / Demo S- WS1 – Draw the pin clamp PS/Lib – Complete the drawing
5	A2.1.1 -Radians and sectors Convert radians to degrees Degrees to radians Arc length Sectors areas T- PowerPoint S- see workbook task	A2.2.1 /2.2.4 -Trigonometric – Right Angle & Pythagoras Sine Rule Right angle triangle Sine rule using radians T- PowerPoint S- see workbook task	Introduction Fusion 360/SolidWorks Basic commands / 3D tools Drawing a cubic T-PowerPoint / Demonstration S – Complete FHS Pin clamp PS – Complete drawing	Fusion 360 / SolidWorks Drawing of pin clamp T-PowerPoint / Demonstration S – Complete FHS Pin clamp PS – Complete drawing
6	A.2.2.4 -Cosine Rule Cosine rule T- PowerPoint S- see workbook task	A.2.4.1a/b/c/d Mensuration -Surface Area & Volumes Cylinder Sphere Cone T- PowerPoint S- see workbook task	PDS – Engineering Design cycle Produce a PDS for the design challenge selected T-PowerPoint S –Produce PDS for design idea PS – Complete PDS	Engineering Materials Introduction to engineering materials T-PowerPoint S – select engineering for design idea PS – Complete drawing
7	A.3.2.1/2/3/4/5/6 Differentiation Gradients notation Leibniz notation Different for: axn, sinax, cosax T- PowerPoint S- see workbook task	A3.3 Numerical values A3.3.1/2/3/4/5 Maximum and Minimum point Gradients Rates of change Link to mechanical and electrical theory – velocity/acceleration Capacitor T- PowerPoint S- see workbook task	Engineering Materials Properties of engineering materials. T-PowerPoint / Demonstration S – select engineering for design idea, properties focus PS – Complete selection	Initial idea generation Initial ideas for an engineering solution T-PowerPoint / Demonstration S – Develop 3 ideas for design idea PS – Complete drawing

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8	A 3.5 Integration (limits) A.3.5.1 – Area under curve A.3.5.2 – Area under curve – limits T- PowerPoint S- see workbook task	A 3.5.3 RMS – periodic function A3.5.4 – Engineering Applications A3.5.4a Work done A3.5.4b Distance travelled A3.5.4c RMS A3.5.4d Areas and Volumes T- PowerPoint S- see workbook task	Initial idea generation Initial ideas for an engineering solution T-PowerPoint/Demonstration S – Develop 3 ideas for design idea PS – Complete drawing	Produce engineering drawing for design idea 2D drawings 3D model T-PowerPoint/Demonstration S – Develop 3 ideas for design idea PS – Complete drawing
9	A2.3.1/2-Vectors and Force Systems Non-concurrent coplanar forces. B1.1.1/2 Static engineering systems Victor diagrams Graphical vector addition Analytical vector addition FBD T- PowerPoint S- see workbook task	B1.1.3 Simply Supported Beam Moments and Simply Supported Beams in equilibrium Turning Moment Simply supported Beams UDL Beams T- PowerPoint S- see workbook task	- Produce engineering drawing for design idea 2D drawings 3D model T-PowerPoint/Demonstration S – Develop 3 ideas for design idea PS – Complete drawing	Produce engineering drawing for design idea 2D drawings 3D model T-PowerPoint/Demonstration S – Develop 3 ideas for design idea PS – Complete drawing

HALF-TERM

10	B1.2 Dynamic Engineering systems B1.2.1/2/3/4/5/6/7 Direct Loading and Shear Loading Direct Stress Direct Strain Youngs Modulus Shear stress Shear strain T- PowerPoint S- see workbook task	B2.1 Dynamic engineering systems B2.1.1/2/3/4/5 Velocity, displacement & acceleration. SUVAT Constant acceleration formula Laws of motion T- PowerPoint S- see workbook task	Produce engineering drawing for design idea 2D drawings 3D model T-PowerPoint/Demonstration S – Develop 3 ideas for design idea PS – Complete drawing	Produce engineering drawing for design idea 2D drawings 3D model T-PowerPoint/Demonstration S – Develop 3 ideas for design idea PS – Complete drawing

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11	B2.2 Dynamic Parameters B2.2.1/2/3/4/5/Force, friction and torque Force, friction, T- PowerPoint S- see workbook task	B2.2.6/7/8/9 -Work and power, Energy, Mechanical Work, Power/2 KE, PE T- PowerPoint S- see workbook task	Manufacturing Processes Introduction to manufacturing processes, one-off/batch/mass Primary and Secondary Processes T-PowerPoint/Demonstration in the workshop S – Develop 3 ideas for design idea PS – Complete drawing	Manufacturing Processes Introduction to manufacturing processes, one-off/batch/mass Primary and Secondary Processes T-PowerPoint/Demonstration - demonstration in the workshop S – Develop 3 ideas for design idea PS – Complete drawing
12	B2.2.7/8/9 -Newton's laws of motion, momentum and energy Laws of motion Momentum Conservation of momentum Conservation of energy T- PowerPoint CTB- Workbook Page 26 S- see workbook task	B2.3-Angular Parameters B2.3.1/2/3/4 Angular and liner velocity, Centripetal acceleration Power Kinetic rotation energy T- PowerPoint CTB- Workbook Page 27 S- HW1 S- see workbook task	Developing Finial Solution and Model 2D/3D/ Report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/process	Developing Finial Solution and Model 2D/3D/report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/processes
13	B2.4 Mechanical Power and Transmission Pullies/gears/ chain B2.4.1 Mechanical advantage systems B2.4.3 Velocity ratio Efficiency Friction Effects T- PowerPoint CTB- Workbook Page 28 S- see workbook task	B3 Fluid Engineering Systems B3.1.1./2/3/4/ Submerged Surfaces Hydrostatic pressure, hydrostatic thrust. Average hydrostatic pressure Centre of pressure T- PowerPoint CTB- Workbook Page 29 S- see workbook task	Developing Finial Solution and Model 2D/3D/ Report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/process	Developing Finial Solution and Model 2D/3D/ Report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/process

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14	B3.1.6 Fluid Flow in Tapering Pipes B3.1.6a Volumetric Flow Rate B3.1.6b mass flow rate B3.1.6g Continuity Flow Rate B3.1.6h Mass Flow Rate T- PowerPoint CTB- Workbook Page 28 S- see workbook task	B.3.1.7 Forces Acting on immersed Bodies B3.1.7a Buoyant Force B3.1.7b Gravitational Weight T- PowerPoint CTB- Workbook Page 28 S- see workbook task	Developing Finial Solution and Model 2D/3D/ Report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/process	Developing Finial Solution and Model 2D/3D/ Report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/process
15	C.1.1 Direct Current Electricity C1.1.1/3/4/4/ Conventional Current Flow Coulomb's Law T- PowerPoint CTB- Workbook Page 28 S- see workbook task	C1.1.6 Factors affecting Resistance C1.1.6a Conductor length C1.1.6b CSA C1.1.6c Resistivity C.1.16d Temp Coefficient of Resistance T- PowerPoint CTB- Workbook Page 28 S- see workbook task	Developing Finial Solution and Model 2D/3D/ Report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/process	Developing Finial Solution and Model 2D/3D/ Report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/process
16	C1.1.7 Resistors in Series and Parallel C1.1.7a/b – Resistor Networks T- PowerPoint CTB- Workbook Page 28 S- see workbook task	C1.1..8 Electrical Field Strength Uniform electrical fields T- PowerPoint CTB- Workbook Page 28 S- see workbook task	Developing Finial Solution and Model 2D/3D/ Report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/process	Developing Finial Solution and Model 2D/3D/ Report T-PowerPoint/Demonstration in the workshop S – Develop final design idea PS – Complete drawing/process

CHRISTMAS

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17	C1.1.9 Capacitors C1.1.9a/b Capacitors in Series Capacitors in Parelle T- PowerPoint CTB- Workbook Page 28 S- see workbook task	Unit 3 – Introduction to the engineering workshop H&S and processes T- Demonstration S- Workshop tasks	Unit 3 – Introduction to the engineering workshop H&S and processes T- Demonstration S- Workshop tasks	Unit 3 – Introduction to the engineering workshop H&S and processes T- Demonstration S- Workshop tasks
18	C1.1.10 – Factors affecting Capacitance C1.1.10a/b/c/d Plate space/area/ permittivity/ flus density T- PowerPoint CTB- Workbook Page 28 S- see workbook task	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution
19	C.1.1.11 Relative Permittivity and Permittivity of free space T- PowerPoint CTB- Workbook Page 28 S- see workbook task	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution
20	C1.2 Direct Current Circuit Theory C1.2.1 Ohms law C1.2.1 Power C1.2.3 Efficiency of DC circuits	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution
21	C1.2.4/5Kirchhoff Current and Voltage Laws – Introduction Nodes T- PowerPoint CTB- Workbook Page 40.41 S- see workbook task	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution

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22	C1.2.6 Charge, voltage, capacitance C1.2.7 Energy stored in capacitors C1.2.8 RC transients (capacitor/resistor) charge and discharge T- PowerPoint CTB- Workbook Page 43,44 S- see workbook task	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution

HALF-TERM

23	C1.2.4/5 Kirchoff's Voltage and Current laws. Kirchoff's voltage law Kirchoff's current law Combining Kirchoff's and Ohms law T- PowerPoint CTB- Workbook Page 42 S- see workbook task	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution
24	C1.3.1 DC power sources C1.3.2 Resistor networks containing at least 5 resistors in series and parallel combinations 1.3.3 DC circuits containing resistors and two power sources 1.3.4 – DC power source with at least two capacitors connected 1.3.5 – Electrical power T- PowerPoint CTB- Workbook Page 45, 46 S- see workbook task	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution

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25	C2.1.1 – Flux density C2.1.2 – Magnetomotive force C2.1.3 – Permeability C2.1.4 – Magnetic fields C2.1.5 – Magnetic field strength / BH curves C2.1.6 - Reluctance	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution
26	C2.2.1 – Induced emf C2.2.2 – Faraday's law C2.2.3 – Inductance C2.2.4 – Electrical efficiency	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution
27	C2.2.5/2.2.6 - Inductance	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution	Unit 3 – Produce design solution for design idea S = workshop producing design solution

EASTER

28	C3.1 – Single phase AC theory C3.1.1 waveform characteristics C3.1.2 – sinusoidal and non-sinusoidal waveforms C3.1.3 – instantaneous values C3.2 – Single-phase alternating current principles C3.2.1 – phasors	Unit 3 – Produce design solution for design idea S = workshop producing design solution Unit 3 – Presentation Skills	Unit 3 – Produce design solution for design idea S = workshop producing design solution Unit 3 – Presentation Skills	Unit 3 – Produce design solution for design idea S = workshop producing design solution Unit 3 – Presentation Skills

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	C3.2.2 – addition of two sinusoidal voltages C3.2.3 – phasor addition of two sinusoidal voltages	T - PowerPoint S- Dummy Run PS – Presentation Skills	T - PowerPoint S- Dummy Run PS – Presentation Skills	T - PowerPoint S- Dummy Run PS – Presentation Skills
29	C3.2.4 – reactance and impedance of pure R, L and C components C3.2.5 – total impedance of an inductor in series with a resistance. C3.2.6 – total impedance of a capacitor in series with a resistance.	Unit 3 – Presentation Skills T - PowerPoint S- Dummy Run PS – Presentation Skills	Unit 3 – Presentation Skills T - PowerPoint S- Dummy Run PS – Presentation Skills	Unit 3 – Presentation Skills T - PowerPoint S- Dummy Run PS – Presentation Skills
30	Revision	Unit 3 – Presentation Day T- Assessment S - Presentation	Unit 3 – Presentation Day T- Assessment S - Presentation	Unit 3 – Presentation Day T- Assessment S - Presentation
31	Revision	Unit 3 – Presentation Day T- Assessment S - Presentation	Unit 3 – Presentation Day T- Assessment S - Presentation	Unit 3 – Presentation Day T- Assessment S - Presentation
32	Study leave			
33	Study leave			

HALF-TERM

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34	WEX week			
35	Revision	Introduction to Unit 2 Engineering Sectors T- PowerPoint S – Worksheet on Sectors PS – Complete worksheet	Unit 2: Engineering Sectors and roles T - PowerPoint S – Worksheet on Sectors PS – Complete worksheet	Unit 2: Function in Companies Matrix/Hierarchy/Flat T - PowerPoint S – Worksheet on Sectors PS – Complete worksheet
36	Revision	Revision	Unit2: Management Roles T - PowerPoint S – Worksheet on Sectors PS – Complete worksheet	Unit 2: Emerging Technologies AI/Robotics/Advance Processes T - PowerPoint S – Worksheet on Sectors PS – Complete worksheet
37	Revision	Revision	Unit 2: Emerging Technologies AI/Robotics/Advance Processes T - PowerPoint S – Worksheet on Sectors PS – Complete worksheet	Unit 2: Engineering Materials Properties 1 T - PowerPoint S – Worksheet on Sectors PS – Complete worksheet
38	Revision	Revision	Unit 2: Engineering Materials Properties 2 T - PowerPoint S – Worksheet on Sectors PS – Complete worksheet	Unit 2 – Polymers 1 T - PowerPoint S – Worksheet on Sectors PS – Complete worksheet

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39	Revision	Revision	Unit 2: Polymers 2	Unit 2: In class test
			T - PowerPoint S – Worksheet on Sectors PS – Complete worksheet	S = Test
40 13/7 /26		**Summer Break**		

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