Air Command Secretariat
Spitfire Block
Headquarters Air Command
Royal Air Force
High Wycombe
Buckinghamshire
HP14 4UE

Ref: 2016/10496

[redacted]

22 November 2016

Dear [redacted],

Thank you for your original email of 08 September 2016 requesting the following information:

> *'I attended RAF Cosford between 1/5/2001 and 22/5/2002 and completed the Propulsion SAC (Technician) course…I require a list of all the subjects that were covered on the course and how many hours were allocated for each subject'*

I am treating your correspondence as a request for information under the Freedom of Information Act 2000.

A search for the information requested has now been completed within the Ministry of Defence (MOD), and I can confirm that information in scope of your request is held. The information you have requested can be found enclosed at Annex A.

Please note that, when published, this information is protected by Crown Copyright and there is no automatic right of re-use. You are free to use it for your own personal, private purposes outlined as exceptions to infringement under the Copyright, Designs and Patents Act. Any other form of re-use requires permission in the form of a licence from the MOD, and any request for re-use of the source information must be made to the MOD's Directorate of Intellectual Property Rights (DIPR). Such a request should be made by emailing DIPR-CC@mod.uk.

If you are not satisfied with this response or wish to complain about any aspect of the handling of your request, then you should contact me in the first instance. If informal resolution is not possible and you are still dissatisfied then you may apply for an independent internal review by contacting the Information Rights Compliance Team, Ground Floor, MOD Main Building, Whitehall, SW1A 2HB (e-mail CIO-FOI-IR@mod.uk). Please note that any request for an internal review must be made within 40 working days of the date on which the attempt to reach informal resolution has come to an end.

If you remain dissatisfied following an internal review, you may take your complaint to the

Information Commissioner under the provisions of Section 50 of the Freedom of Information Act. Please note that the Information Commissioner will not investigate your case until the MOD internal review process has been completed. Further details of the role and powers of the Information Commissioner can be found on the Commissioner's website, http://www.ico.org.uk.

Yours sincerely,

[Original Signed]

Air Director Resources Secretariat 2B1

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 1. ELECTRONIC AIDS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	SYLL HRS (e)	No of CELLS (f)	INSTR HOURS (g)
1.0 Use appropriate electronic aids to solve problems.	BTEC 14166HH 1.1 & 1.2.	Classroom	3.00	1	3.00
		Practical	0.00		
		Total	3.00		3.00

EQUIPMENT (h)	PUBLICATIONS (i)
Scientific calculators.	National Engineering Mathematics Vol 1 – J C Yates.

FILMS/VIDEOS		
No (j)	TITLE (k)	TIME (l)

PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
1.1	Use a scientific calculator to revise the use of the four basic arithmetic operations and make use of the memory facility.	In a classroom.	Correctly.	NEM, Chap 1.
1.2	Use a scientific calculator to extend operations to include reciprocals, roots, powers and pi.	In a classroom.	Correctly.	NEM, Chap 1.
1.3	Use a scientific calculator to find the values of trigonometrical functions.	In a classroom.	Correctly.	NEM, Chap 5/6.
1.4	Use a scientific calculator to find the values of exponential, logarithmic and degree/radian functions.	In a classroom.	Correctly.	NEM, Chap 4/10.
1.5	Use a scientific calculator to find values of statistical quantities. End of 1.0	In a classroom.	Correctly.	NEM, Chap 17.

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 2. FORMULAE

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<tr><td rowspan="2">TRAINING OBJECTIVE
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(e)</td><td>No of CELLS
(f)</td><td>INSTR HOURS
(g)</td></tr>
<tr><td rowspan="4">2.0 Solve problems using formulae and also check answers by numerical substitution.</td><td rowspan="4">BTEC 14166HH
5.1, 5.2 & 6.1.</td><td>Classroom</td><td>14.00</td><td>1</td><td>14.00</td></tr>
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(k)</td><td>TIME
(l)</td></tr>
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PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
2.1	Solve simple linear equations.	In a classroom.	Correctly.	NEM, Chap 2.
2.2	Transpose formulae in which the subject appears only once, where symbols are connected by one or a combination of the following arithmetic operations: a. Addition. b. Subtraction. c. Multiplication. d. Division.	In a classroom.	Correctly.	NEM, Chap 3.
2.3	Using a logical sequence, transpose formulae in which the subject appears more than once.	In a classroom.	Correctly.	NEM, Chap 3.
2.4	Transpose formulae containing roots.	In a classroom.	Correctly.	NEM, Chap 3.
2.5	Transpose formulae containing powers.	In a classroom.	Correctly.	NEM, Chap 3.
2.6	Solve engineering problems given a formulae and check answers by substitution. End of 2.0	In a classroom.	Correctly.	NEM, Chap 3.

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 3. AREAS, PERIMETERS AND MASS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	SYLL HRS (e)	No of CELLS (f)	INSTR HOURS (g)
3.0 Evaluate problems relating to Areas, Perimeters and Mass.	BTEC 14166HH 11.	Classroom	5.00	1	5.00
		Practical	0.00		
		Total	5.00		5.00

EQUIPMENT (h)	PUBLICATIONS (i)
	National Engineering Mathematics Vol 1 – J C Yates.

FILMS/VIDEOS		
No (j)	TITLE (k)	TIME (l)

PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
3.1	State and use the formulae for calculating the area of: a. Rectangle and Square. b. Triangle. c. Parallelogram. d. Trapezium. e. Circle.	In a classroom.	Correctly.	NEM, Chap 4 & 6.
3.2	State and use the formulae for calculating the perimeter of: a. Rectangle and Square. b. Triangle. c. Parallelogram. d. Trapezium. e. Circle.	In a classroom.	Correctly.	NEM, Chap 4 & 6.

PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
3.3	State and use the formulae for calculating the volume and surface area of regular bodies including: a. Cuboid. Volume l x b x h Surface area = 2(l x b) + 2(b x h) + 2(l x h) b. Cone. Volume = $\frac{1}{3}\pi r^2 h$ Surface Area = $\pi rl + \pi r^2 (l^2 = r^2 + h^2)$ c. Cylinder Volume = $\pi r^2 h$ Surface area = $2\pi r(h + r)$ d. Sphere Volume = $\frac{4}{3}\pi r^3$ Surface Area = $4\pi r^2$	In a classroom.	Correctly.	NEM, Chap 4 & 6.
3.5	Calculate volumes of composite regular bodies.	In a classroom.	Correctly.	NEM, Chap 16.
3.6	Define the term Mass.	In a classroom.	Correctly.	
3.7	Define the term Density: a. Density = $\frac{\text{mass}}{\text{volume}}$	In a classroom.	Correctly.	
3.8	Solve problems using mass, areas, surface areas and volumes of regular bodies that relate to engineering. End of 3.0	In a classroom.	Correctly.	NEM, Chap 16.

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 4. GRAPHS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	SYLL HRS (e)	No of CELLS (f)	INSTR HOURS (g)
4.0 Draw graphs from given data and read values by interpolation and determine linear laws.	BTEC 14166HH 7.	Classroom	4.00	1	4.00
		Practical	0.00		
		Total	4.00		4.00

EQUIPMENT (h)	PUBLICATIONS (i)
	National Engineering Mathematics Vol 1 – J C Yates.

FILMS/VIDEOS		
No (j)	TITLE (k)	TIME (l)

PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
4.1	Define and label a set of Cartesian axes.	In a classroom.	Correctly.	NEM, Chap 2.
4.2	Determine scales from given data and mark axes accordingly.	In a classroom.	Correctly.	NEM, Chap 2.
4.3	Plot co-ordinates on a pair of labelled Cartesian axes.	In a classroom.	Correctly.	NEM, Chap 2.
4.4	Draw the graph for a straight-line law.	In a classroom.	Correctly.	NEM, Chap 2.
4.5	Deduce the gradient, vertical intercept and equation from a straight-line graph.	In a classroom.	Correctly.	NEM, Chap 2.
4.6	Interpolate a linear graph from given data.	In a classroom.	Correctly.	NEM, Chap 2.
4.7	Plot the graph of a quadratic equation.	In a classroom.	Correctly.	NEM, Chap 7.
4.8	Graphically solve a quadratic equation. End of 4.0	In a classroom.	Correctly.	NEM, Chap 7.

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 5. ALGEBRAIC PROBLEMS

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(b)</td><td colspan="4">ALLOCATION OF PERIODS</td></tr>
<tr><td>(c)</td><td>SYLL HRS
(e)</td><td>No of CELLS
(f)</td><td>INSTR HOURS
(g)</td></tr>
<tr><td rowspan="4">5.0 Solve problems expressed algebraically selecting the appropriate formulae using Linear, Simultaneous and Quadratic Equations.</td><td rowspan="4">BTEC 14166HH
5.1 & 6.2.</td><td>Classroom</td><td>6.00</td><td>1</td><td>6.00</td></tr>
<tr><td>Practical</td><td>0.00</td><td></td><td></td></tr>
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(j)</td><td colspan="3">TITLE
(k)</td><td>TIME
(l)</td></tr>
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</table>

PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
5.1	State the difference between dependent and independent variables.	In a classroom.	Correctly.	NEM, Chap 12.
5.2	State the relationship between two variables which are: a. Directly proportional. b. Inversely proportional.	In a classroom.	Correctly.	NEM, Chap 12.
5.3	Calculate the coefficient of proportionality from given data.	In a classroom.	Correctly.	NEM, Chap 12.
5.4	State that for inverse proportionality the product of variables is constant.	In a classroom.	Correctly.	NEM, Chap 12.
5.5	Determine the equation that is satisfied by a given pair of roots.	In a classroom.	Correctly.	NEM, Chap 7.
5.6	Solve quadratic equations using formula.	In a classroom.	Correctly.	NEM, Chap 7.
5.7	Solve a pair of linear simultaneous equations.	In a classroom.	Correctly.	NEM, Chap 9.
5.8	Solve simultaneous linear and quadratic equations.	In a classroom.	Correctly.	NEM, Chap 9.
5.9	Form and solve equations that are mathematical models of practical problems. End of 5.0	In a classroom.	Correctly.	NEM, Chap 7/9.

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

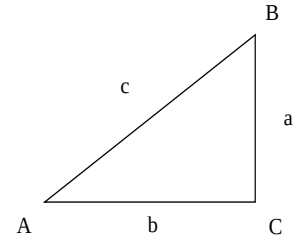
SUBJECT: 6. TRIGONOMETRICAL RELATIONSHIPS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	SYLL HRS (e)	No of CELLS (f)	INSTR HOURS (g)
6.0 Use trigonometrical relationship in an engineering context.	BTEC 14166HH 10.	Classroom	9.00	1	9.00
		Practical	0.00		
		Total	9.00		9.00

EQUIPMENT (h)	PUBLICATIONS (i)
	National Engineering Mathematics Vol 1 – J C Yates.

FILMS/VIDEOS		
No (j)	TITLE (k)	TIME (l)

PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
6.1	Define the term radian.	In a classroom.	Correctly.	NEM, Chap 4.
6.2	Define the relationship between radians and degrees.	In a classroom.	Correctly.	NEM, Chap 4.
6.3	Convert degree measure to radian and vice versa.	In a classroom.	Correctly.	NEM, Chap 4.
6.4	Express angular rotation in multiples of π radians.	In a classroom.	Correctly.	NEM, Chap 4.
6.5	Use the relationship $s = r\theta$ to calculate the length of the arc of a circle.	In a classroom.	Correctly.	NEM, Chap 4.
6.6	Use the relationship $A = \frac{1}{2}r^2\theta$ to calculate the area of a sector of a circle.	In a classroom.	Correctly.	NEM, Chap 4.
6.7	Solve problems involving lengths of arc, areas and angles.	In a classroom.	Correctly.	NEM, Chap 4.
6.8	State the trigonometrical ratios for a right angled triangle ABC as follows: $\sin A = \frac{a}{c} = \frac{\text{side opposite A}}{\text{hypotenuse}}$ $\cos A = \frac{b}{c} = \frac{\text{side adjacent to A}}{\text{hypotenuse}}$ $\tan A = \frac{a}{b} = \frac{\text{side opposite A}}{\text{side adjacent to A}}$ 	In a classroom.	Correctly.	NEM, Chap 5.
6.9	Determine values of the trigonometric ratios for angles between 0^0 and 360^0.	In a classroom.	Correctly.	NEM, Chap 5.
6.10	Define a trigonometrical identity.	In a classroom.	Correctly.	NEM, Chap 5.
6.11	Show that: $\tan A = \frac{\sin A}{\cos A}$	In a classroom.	Correctly.	NEM, Chap 5.
6.12	Show that: $\sin^2 A + \cos^2 A = 1$	In a classroom.	Correctly.	NEM, Chap 5.
6.13	Define the inverse of the trigonometrical ratios as follows: a. $\sin^{-1}\theta$ or $\arcsin \theta$. b. $\cos^{-1}\theta$ or $\arccos \theta$. c. $\tan^{-1} \theta$ or $\arctan \theta$.	In a classroom.	Correctly.	NEM, Chap 5.
6.14	Sketch the sine and cosine waveforms over one complete cycle.	In a classroom.	Correctly.	NEM, Chap 5.

PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
6.15	Sketch the tangent curve using the identity: $\tan\theta = \frac{\sin\theta}{\cos\theta}$	In a classroom.	Correctly.	NEM, Chap 5.
6.16	State the periodic properties of the sine, cosine and tangent curves.	In a classroom.	Correctly.	NEM, Chap 5.
6.17	Determine values of the trigonometric ratios for angles greater than 360^0 and for negative angles.	In a classroom.	Correctly.	NEM, Chap 5.
6.18	State the period and amplitude of: a. Sinusoidal waveforms. b. Square waveforms. c. Sawtooth waveforms.	In a classroom.	Correctly.	Course manual.
6.19	State and use the sine rule for a labelled triangle ABC in the form: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	In a classroom.	Correctly.	NEM, Chap 6.
6.20	State and use the cosine rule for a labelled triangle in the form: $a^2 = b^2 + c^2 - 2bc\ \cos A$	In a classroom.	Correctly.	NEM, Chap 6.
6.21	State the conditions under which the sine and cosine rule can be used.	In a classroom.	Correctly.	NEM, Chap 6.
6.22	Calculate the area of any triangle using any of the following formulae: a. ½bh. b. ½ ab sinC c. $\sqrt{s(s-a)(s-b)(s-c)}$	In a classroom.	Correctly.	NEM, Chap 6.
6.23	Solve problems on triangles and quadrilaterals involving the use of the sine rule, cosine rule and formulae for areas of triangles.	In a classroom.	Correctly.	NEM, Chap 6.
6.24	Define the angles of elevation and depression.	In a classroom.	Correctly.	NEM, Chap 6.
6.25	Solve problems incorporating angles of elevation and depression that relate to engineering. End of 6.0	In a classroom.	Correctly.	NEM, Chap 6.

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 7. VECTORS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	SYLL HRS (e)	No of CELLS (f)	INSTR HOURS (g)
7.0 Represent physical quantities as vectors and undertake addition and subtraction of vector quantities.	BTEC 14166HH 13.	Classroom	6.00	1	6.00
		Practical	0.00		
		Total	6.00		6.00

EQUIPMENT (h)	PUBLICATIONS (i)
	National Engineering Mathematics Vol 1 – J C Yates. BTEC National III Mathematics for Technicians – Greer & Taylor.

FILMS/VIDEOS		
N° (j)	TITLE (k)	TIME (l)

PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
7.1	Define a polar co-ordinate.	In a classroom.	Correctly.	NIII, Chap 2.
7.2	Plot polar coordinates on an argand diagram.	In a classroom.	Correctly.	NIII, Chap 2.
7.3	Define a scalar quantity.	In a classroom.	Correctly.	NEM, Chap 13.
7.4	Define a vector quantity.	In a classroom.	Correctly.	NEM, Chap 13.
7.5	Define a negative vector – a.	In a classroom.	Correctly.	NEM, Chap 13.
7.6	Define the addition of two or more vectors.	In a classroom.	Correctly.	NEM, Chap 13.
7.7	Resolve a vector into two component parts at right angles to one another.	In a classroom.	Correctly.	NEM, Chap 13.
7.8	Calculate the magnitude and direction of a vector.	In a classroom.	Correctly.	NEM, Chap 13.
7.9	Define the result of multiplying a vector by a scalar.	In a classroom.	Correctly.	NEM, Chap 13.
7.10	State the parallelogram rule for the addition of two vectors.	In a classroom.	Correctly.	NEM, Chap 13.
7.11	Determine the resultant of a – b and relate the result to the diagonal of the parallelogram.	In a classroom.	Correctly.	NEM, Chap 13.
7.12	Solve simple problems involving the addition and subtraction of vectors. End of 7.0	In a classroom.	Correctly.	NEM, Chap 13.

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 8. DECIMALS, INDICES AND PERCENTAGES

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(b)</td><td>(c)</td><td>Syll Hrs
(e)</td><td>No of CELLS
(f)</td><td>INSTR HOURS
(g)</td></tr>
<tr><td rowspan="4">8.0 Solve problems involving decimals, indices and percentages which relate to engineering subjects.</td><td rowspan="4">BTEC 14166HH
2.1, 2.3 & 2.4
Logarithms not included.</td><td>Classroom</td><td>3.00</td><td>1</td><td>3.00</td></tr>
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BTEC First Mathematics for Technicians – Greer & Taylor</td></tr>
<tr><td rowspan="3"></td><td colspan="5">FILMS/VIDEOS</td></tr>
<tr><td>N^{o}
(j)</td><td colspan="3">TITLE
(k)</td><td>TIME
(l)</td></tr>
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</table>

PART III

N^o (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
8.1	Incorporating the precedence rule for brackets, carry out the basic arithmetic operations of: a. Addition. b. Subtraction. c. Multiplication. d. Division.	In a classroom.	Correctly.	NEM, Chap 1 Section 1-1
8.2	Incorporating the precedence rule for brackets, extend the arithmetic operations to include square roots and squares.	In a classroom.	Correctly.	1-2
8.3	Reduce a number: a. to a given number of decimal places. b. To a specific number of significant figures.	In a classroom.	Correctly.	1-3
8.4	Express a denary number in standard form.	In a classroom.	Correctly.	1-9
8.5	Estimate the approximate value of an arithmetic expression.	In a classroom.	Correctly.	1-4
8.6	Solve arithmetic expressions using powers, roots and reciprocals.	In a classroom.	Correctly.	1-10
8.7	Express decimals as fractions and vice versa.	In a classroom.	Correctly.	1-5
8.8	Express decimals as percentages and vice versa.	In a classroom.	Correctly.	1-6
8.9	Define the following in terms of A^n: a. Base. b. Index. c. Power. d. Reciprocal.	In a classroom.	Correctly.	1-7
8.10	State and use the following rules of indices, where **m** and **n** are integers: a. $a^m \times a^n = a^{m+n}$ b. $a^m/a^n = a^{m-n}$ c. $(a^m)n = a^{mn}$ d. $a^0 = 1$ e. $a^{-m} = \frac{1}{a}m$ f. $a^{m/n} = \sqrt[n]{a^m}$	In a classroom.	Correctly.	1-8
8.11	Solve problems which have an engineering application. End of 8.0	In a classroom.	Correctly.	1-1 to 1-10

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 9. TABLES AND CHARTS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS			
		(c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
9.0 Evaluate and use tables and charts.	BTEC 14166HH 3.1 & 3.2	Classroom	1.00	1	1.00
		Practical	0.00		
		Total	1.00		1.00

EQUIPMENT (h)	PUBLICATIONS (i)
	National Engineering Mathematics Vol 1 – J C Yates BTEC First Mathematics for Technicians – Greer & Taylor

FILMS/VIDEOS		
N° (j)	TITLE (k)	TIME (l)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
9.1	Use conversion tables and illustrate use of Interpolation.	In a classroom.	Correctly.	BFMT, Chap 8
9.2	Use parallel scale conversion charts.	In a classroom.	Correctly.	BFMT, Chap 8
9.3	Use calibration curves.	In a classroom.	Correctly.	
9.4	Use nomographs.	In a classroom.	Correctly.	BFMT, Chap 8
9.5	Use timetables. End of 9.0	In a classroom.	Correctly.	

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 10. CALCULATIONS IN VARIOUS NUMBERING AND MEASURING SYSTEMS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
10.0 Perform calculations in various numbering and measuring systems	BTEC 14166HH 2.1, 2.2, 4.1 & 4.2	Classroom	2.00	1	2.00
		Practical	0.00		
		Total	2.00		2.00

EQUIPMENT (h)	PUBLICATIONS (i)
	BTEC First Mathematics for Technicians – Greer & Taylor

FILMS/VIDEOS		
N° (j)	TITLE (k)	TIME (l)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
10.1	Define the seven fundamental units as follows: a. Length - metre (m) b. Mass - kilogram (kg) c. Time - second (s) d. Electric current - ampere (A) e. Luminous intensity - candela (cd) f. Temperature - kelvin (k) g. Unit of substance - Mole (mol)	In a classroom.	Correctly.	BFMT, Chap 6
10.2	Define the multiples and sub-multiples of SI and their multplication factor.	In a classroom.	Correctly.	BFMT, Chap 6
10.3	Define the multiples of the following Imperial based units and their conversion factors to SI units: a. Length - inch, foot, mile 1 inch = 25.4 mm 1 foot = 0.305 m 1 mile = 1.61 km c. Areas – acre 1 acre = 0.405 ha d. Volume – pint, gallon 1 gallon = 4.55 lt e. Mass – ounce, pound, ton 1 pound = 0.454 kg 1 ton = 1020 kg	In a classroom.	Correctly.	
10.4	Solve problems involving SI and Imperial units and convert between these units.	In a classroom.	Correctly.	
10.5	Define and convert between the following number systems: a. Decimal. b. Binary. c. Octal. d. Hexadecimal.	In a classroom.	Correctly.	
10.6	Add and subtract 2 binary numbers. End of 10.0	In a classroom.	Correctly.	

PART III

TRADE TRAINING

SECTION: 4. MATHEMATICS FOR ENGINEERS

SUBJECT: 11. EXAMINATION

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS			
		(c)	SYLL HRS (e)	No of CELLS (f)	INSTR HOURS (g)
11.0 Obtain a satisfactory result in an examination.		Classroom	2.00	1	2.00
		Practical	0.00		
		Total	2.00		2.00

EQUIPMENT (h)	PUBLICATIONS (i)		
	FILMS/VIDEOS		
	No (j)	TITLE (k)	TIME (l)

PART III

No (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
11.1	Undertake and pass an examination. End of 11.0	In a classroom. Under examination conditions.	Attaining the examination pass mark.	EC AB800.

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 1. SIMPLE ELECTRICAL CIRCUIT

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
1.0 Explain the characteristics of a simple electrical circuit.	BTEC 14575F A1.	Classroom	2.00	1	2.00
		Practical	1.00	2	2.00
		Total	3.00		4.00

EQUIPMENT (h)	PUBLICATIONS (i)
	1. Course manual 2. AP3302 3. BS 3939

FILMS/VIDEOS		
N^{o} (j)	TITLE (k)	TIME (l)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
1.1	State the meaning of the terms conductor, semi-conductor and insulator.	In a classroom.	Correctly.	
1.2	Explain the meaning of the terms voltage, current, resistance and power.	In a classroom.	Correctly.	AP3302 Pt 1, Sect 1, Chap 3, 4 and 8.
1.3	State the basic units of current and voltage and describe how they are measured in a simple circuit.	In a classroom.	Correctly.	BS 3939.
1.4	Identify the symbols used for voltage, current, resistance and power.	In a classroom.	Correctly.	AP3302 Pt 1, Sect 1, Chap 3, 4 and 8.
1.5	Explain the relationship between voltage, current, resistance and power.	In a classroom.	Correctly.	
1.6	Define the term `Lethal Voltage`. End of 1.0	In a classroom.	Without error.	

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 2. RESISTORS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
2.0 Identify selected values of resistor.		Classroom	1.00	1	1.00
		Practical	0.00		0.00
		Total	1.00		1.00

EQUIPMENT (h)	PUBLICATIONS (i)
	1. Course manual 2. A 3302

FILMS/VIDEOS		
N^{o} (j)	TITLE (k)	TIME (l)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
2.1	State the methods used to indicate the ohmic value of a resistor.	In a classroom.	Correctly.	AP3302 Pt 1, Sect 1, Ch 4.
2.2	Use the "colour code" method to determine the value of a selection of resistors. End of 2.0	In a classroom, given a selection of resistors and a colour chart.	Correctly.	

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 3. DIRECT CURRENT AND ALTERNATING CURRENT

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
3.0 Explain the difference between direct current and alternating current systems.	BTEC 14575F A1.	Classroom	1.00	1	1.00
		Practical	0.00		0.00
		Total	1.00		1.00

EQUIPMENT (h)	PUBLICATIONS (i)
	1. Course manual 2. AP 3302

FILMS/VIDEOS		
N° (j)	TITLE (k)	TIME (l)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
3.1	State the meaning of the terms direct current and alternating current.	In a classroom.	Correctly.	AP3302 Pt 1, Sect 3, Ch 1.
3.2	Explain the meaning of the terms waveform and frequency.	In a classroom.	Correctly.	AP3302 Pt 1, Sect 3, Ch 1.
3.3	Identify direct current and alternating current waveforms and symbols.	In a classroom, given examples.	Correctly.	AP3302 Pt 1, Sect 3, Ch 1 and BS 3939.
3.4	State the advantages and disadvantages of direct current and alternating current in electrical systems. End of 3.0	In a classroom.	Correctly.	

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 4. ELECTROMAGNETISM

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
4.0 Explain the nature of a magnetic field and the behaviour and applications of electromagnetic circuits.	BTEC 14575F A1.	Classroom	2.00	1	2.00
		Practical	2.00	2	4.00
		Total	4.00		6.00

EQUIPMENT (h)	PUBLICATIONS (i)
	1. Course manual 2. AP 3302

FILMS/VIDEOS		
N^{o} (j)	TITLE (k)	TIME (l)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
4.1	Explain what is meant by magnetic poles and a magnetic field.	In a classroom.	Correctly.	AP3302 Pt 1, Sect 2, Ch 1 to 3 inc.
4.2	Describe the magnetic effects of an electric current in a straight conductor.	In a classroom.	Correctly.	
4.3	Describe the magnetic effects of an electric current in a coiled conductor: a. Without an iron core. b. With an iron core.	In a classroom.	Correctly.	
4.4	Explain the terms permeability and hysteresis	In a classroom.	Correctly.	
4.5	Interpret a simple circuit to demonstrate the effects described in EO 4.2 and 4.3.	In a classroom, given an instructor demonstration.	Correctly.	
4.6	Determine the direction and magnitude of the force acting on a current carrying conductor situated in a magnetic field (F = BIl).	In a classroom, given the necessary information.	Correctly.	
4.7	Explain how the principle described in EO 4.6 can be adapted to form an electric motor.	In a classroom.	Correctly.	
4.8	Identify the relay as an example of the effects described in EO 4.3 End of 4.0	In a classroom, given examples.	Correctly, under the guidance of the instructor.	

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 5. ELECTROMAGNETIC INDUCTION

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
5.0 Explain the principles of electromagnetic induction and relate them to practical applications.	BTEC 14575F A1	Classroom	2.00	1	2.00
		Practical	2.00	2	4.00
		Total	4.00		6.00

EQUIPMENT (h)	PUBLICATIONS (i)
	1. Course manuals 2. AP 3302

FILMS/VIDEOS		
N^{o} (j)	TITLE (k)	TIME (l)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
5.1	Describe the principles of electromagnetic induction	In a classroom.	Correctly.	AP3302 Pt 1, Sect 2, Chap 4 and 5.
5.2	Determine the direction and magnitude of the electromotive force (emf) induced in a conductor when it is moved at right angles to a magnetic field.	In a classroom, given all relevant data required to calculate the result.	Correctly.	
5.3	Explain how the principles described in EO 5.1 and EO 5.2 can be adapted to produce a generator.	In a classroom.	Correctly.	
5.4	Interpret a simple circuit to demonstrate the effects described in EO 5.2.	In a classroom, given an Instructor demonstration.	Correctly.	
5.5	Describe the processes of self and mutual induction.	In a classroom.	Correctly.	
5.6	Identify a transformer as an example of mutual inductance. End of 5.0	In a classroom, given examples.	Correctly.	

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 6. ELECTRONIC DEVICES

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
6.0 Identify and explain the functions of selected electronic devices.	BTEC 14575F E5	Classroom	3.00	1	3.00
		Practical	3.00	2	6.00
		Total	6.00		9.00

EQUIPMENT (h)	PUBLICATIONS (i)
	1. Course manual 2. AP 3302 3. AP 3373 4. BS 3939 5. US Mil Std 806B

FILMS/VIDEOS		
N^{o} (j)	TITLE (k)	TIME (l)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
6.1	Identify the following semi-conductor devices: a. Diode. b. Bipolar transistor. c. Thyristor. d. Operational amplifier.	In a classroom, given examples.	Correctly.	AP3302 Pt 1, Sect 6, Ch 2 and 3.
6.2	State the safety precautions to be observed when handling static sensitive devices to avoid damage from electrostatic discharge.	In a classroom.	Without error.	AP 3373 sect 5, Ch 7.
6.3	Describe the behaviour of a p-n junction diode when connected to an AC supply.	In a classroom.	Correctly.	
6.4	Construct a simple circuit to demonstrate the behaviour as described in EO 6.3	In a classroom, given a relevant circuit diagram.	Correctly.	
6.5	Describe the behaviour of a bipolar transistor as an amplifier.	In a classroom.	Correctly.	AP 3302 Pt 1, Sect 9, Chap 4.
6.6	Demonstrate the behaviour of a bipolar transistor as described in EO 6.5.	In a classroom, given required equipment.	Correctly.	
6.7	Describe the behaviour of a thyristor as a power control device.	In a classroom.	Correctly.	AP 3302 Pt 1, Sect 6, Chap 5.
6.8	Demonstrate the behaviour of a thyristor as described in EO 6.7.	In a classroom, given required equipment.	Correctly.	
6.9	State the factors which determine the relationship between the input and output voltages in a selection of operational amplifiers.	In a classroom.	Correctly.	AP 3302 Pt 1, Sect 9, Chap 3.
6.10	Construct simple circuits to demonstrate EO 6.9.	In a classroom, given relevant circuit diagrams.	Correctly.	
6.11	Describe the function of the five basic logic gates: a. AND. b. OR. c. NOT. d. NAND. e. NOR.	In a classroom.	Correctly.	
6.12	State the truth tables for the following logic gates: a. AND. b. OR. c. NOT. d. NAND. e. NOR.	In a classroom.	Correctly.	

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
6.13	Test each type of gate on a logic tutor and verify the truth tables of EO 6.12. End of 6.0	In a classroom, given a selection of logic gates and a logic tutor.	Correctly.	

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 7. CAPACITANCE

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
7. Explain the behaviour and applications of capacitors	BTEC 14575F A1 and E5.	Classroom	2.00	1	2.00
		Practical	4.00	2	8.00
		Total	6.00		10.00

EQUIPMENT (h)	PUBLICATIONS (i)
	1. Course manual 2. AP 3302

FILMS/VIDEOS		
N^{o} (j)	TITLE (k)	TIME (l)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
7.1	State what is meant by capacitance and the factors which affect it.	In a classroom.	Correctly.	AP3302 Pt 1, Sect 1, Ch 9.
7.2	State the relationship between capacitance, charge and voltage.	In a classroom.	Correctly.	
7.3	Explain what is meant by the direct current working voltage of a capacitor.	In a classroom.	Correctly.	
7.4	State the precautions which must be observed when handling a capacitor.	In a classroom.	Without error.	
7.5	Describe how voltage and current vary when a capacitor is charged/discharged via a resistor.	In a classroom.	Correctly.	1. Course Manuals 3. Chap 3 para 3.1-5
7.6	Explain what is meant by the `time constant` of a capacitive resistive (CR) circuit and the factors which affect it.	In a classroom.	Correctly.	
7.7	Construct a circuit to enable EO 7.5 and EO 7.6 to be verified.	In a classroom, given a relevant circuit diagram.	Correctly.	
7.8	Explain the following applications of capacitors: a. Navigation lights flashing units. b. High energy igniter units. End of 7.0	In a classroom.	Correctly.	

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 8. PRINTED CIRCUIT BOARDS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
8.0 Describe the construction of elementary printed circuit boards.	BTEC 14575F E5	Classroom	1.00	1	1.00
		Practical	0.00		0.00
		Total	1.00		1.00

EQUIPMENT (h)	PUBLICATIONS (i)
	1. Course manual

FILMS/VIDEOS		
N^{o} (j)	TITLE (k)	TIME (l)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
8.1	Identify single, double and multi-layer printed circuit boards.	In a classroom, given examples.	Correctly.	Course Manual
8.2	Identify the main features of printed circuit boards. a. Etched conductor pattern/tracks and lands. b. Dual in-line connectors. c. Plated through holes and eyelets. d. Edge connectors. End of 8.0	In a classroom, given a typical printed circuit board.	Correctly.	

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 9. VHF RADIO SYSTEMS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
9.0 Describe the basic principle of operation of a VHF radio system.	BTEC 14575F/G7.	Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	2.00		2.00

EQUIPMENT (h)	PUBLICATIONS (i)
	1. Course manual

FILMS/VIDEOS		
N° (j)	TITLE (k)	TIME (l)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
9.1	State the need for a VHF radio system in an aircraft.	In a classroom.	Correctly.	
9.2	State the difference between radio waves and sound waves.	In a classroom.	Correctly.	
9.3	Describe, in general terms, how sound waves are converted into radio waves and vice versa	In a classroom.	Correctly.	
9.4	State the dangers that occur during VHF radio transmissions.	In a classroom.	Correctly.	
9.5	State the precautions to be observed when in the vicinity of a transmitting VHF radio. End of 9.0	In a classroom.	Without error.	

PART III

TRADE TRAINING

SECTION: P4 ELECTRICAL PRINCIPLES

SUBJECT: 10. END OF PHASE EXAMINATION

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (e)	No of CELLS (f)	INSTR HOURS (g)
10.0 Obtain a satisfactory result in an examination of P4 electrical principles.		Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	0.00		2.00

EQUIPMENT (h)	PUBLICATIONS (i)		
		FILMS/VIDEOS		
	N^{o} (j)	TITLE (k)	TIME (l)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
10.1	Complete an end of phase examination. End of 10.0	In a classroom, under examination conditions.	Attaining the examination pass mark.	

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 1. INTERNAL AND EXTERNAL SYSTEMS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
1.0 Identify and explain internal and external systems.	BTEC 14567F A1	Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	2.00		2.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manual 2. Engineering Science – Hughes and Hughes 3. Engineering Science – W Bolton

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
1.1	Define: a. Systems and system boundaries. b. Sub-systems and sub-system boundaries. c. Interactional paths.	In a classroom.	Correctly.	1. Course manual. 2. chap 24. 3. chap 1.
1.2	Sketch simple systems - such as manufacturing processes, domestic central heating systems, internal combustion engine and domestic water tank – identifying: a. Systems and system boundaries. b. Sub-systems and sub-system boundaries. c. Interactional paths.	In a classroom.	Correctly.	1. Course manual. 2. chap 24. 3. chap 1.
1.3	Explain the effect of component interaction, particularly in fault diagnosis for such simple systems as: a. Manufacturing processes. b. Domestic central heating systems. c. Internal combustion engine. d. Domestic water tank. End of 1.0	In a classroom.	Correctly.	1. Course manual. 2. chap 24. 3. chap 1.

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 2. BLOCK DIAGRAMS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
2.0 Produce and interpret block diagrams of systems referred to in the Aircraft technology modules.	BTEC 14567F A2	Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	2.00		2.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manual 2. Engineering Science. Hughes and Hughes 3. Engineering Science. W. Bolton

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
2.1	Explain the function of block diagrams.	In a classroom.	Correctly.	1. Course manual. 2. chap 24. 3. chap 1.
2.2	Define: a. Inputs and outputs. b. Open and closed loops. c. Direction of signal flow. d. Concept of signal conditioning and modification.	In a classroom.	Correctly.	1. Course manual. 2. chap 24. 3. chap 1.
2.3	Produce and interpret simplified block diagrams - for such things as: aircraft control systems; aircraft cabin conditioning systems; and engine control systems - identifying: a. Inputs and outputs. b. Open and closed loops. c. Direction of signal flow. e. Concept of signal conditioning and modification. End of 2.0	In a classroom.	Correctly.	1. Course manual. 2. chap 24. 3. chap 1.

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 3. PRACTICAL MEASURING SYSTEMS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
3.0 Produce and interpret practical measuring systems in a block diagram form, identifying the functional elements.	BTEC 14567F A3	Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	2.00		2.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manual 2. Engineering Science. Hughes and Hughes 3. Engineering Science. W. Bolton

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
3.1	Define: a. Transducer/sensor. b. Signal conditioner/signal amplification. c. Receiver. d. Recorder. e. Display module. f. Error. g. Accuracy. h. Lag. i. Repeatability. j. Reliability.	In a classroom.	Correctly.	1. Course manual. 2. chap 24. 3. chap 1.
3.2	Produce and interpret practical measuring systems – for such quantities as: stress, strain, force, pressure, temperature, fluid flow – identifying and explaining, where applicable, the principles of operation of each of the elements detailed in EO 3.1. End of 3.0	In a classroom.	Correctly.	1. Course manual. 2. chap 24. 3. chap 1.

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 4. CONCEPTS OF FORCE

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
4.0 Explain the concepts of force.	BTEC 14567F B5	Classroom	4.00	1	4.00
		Practical	4.00	2	8.00
		Total	8.00		12.00

EQUIPMENT (g)	PUBLICATIONS (h)
Friction planes, slider blocks and various masses. LJ Mechanics equipment.	1. Course manual 2. Mechanical Engineering Science. Hannah and Hillier 3. Engineering Science. Hughes and Hughes

FILMS/VIDEOS		
N° (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
4.1	Define a force and its relationship with Newton's Laws of Motion	In a classroom.	Correctly.	1. Course Manuals 2. Chap 9 para 9.1-9.2 3. Chap 7 para 7.1-7.4
4.2	Explain that force is a vector quantity and that the characteristics of a force are as follows: a. Magnitude. b. Direction (line of action and sense). c. Point of application.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 1 para 1.1-1.11 3. Chap 2 para 2.2
4.3	Explain the relationship between mass, weight and gravitational acceleration.	In a classroom.	Correctly.	1. Course Manuals 2. Chap1 para 1.7 3. Chap 1 para 1.8
4.4	Explain the six laws of dry friction.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 4 para 4.1– 4.9 3. Chap 5
4.5	Define the following terms: a. Coefficient of friction. $F = \mu N$ b. Static friction. c. Dynamic friction. d. Angle of friction. e. Angle of repose.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 4 para 4.1– 4.9 3. Chap 5
4.6	Construct force diagrams for a body experiencing frictional forces when stationary, or moving with uniform velocity, on horizontal or inclined planes.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 4 para 4.1– 4.9 3. Chap 5
4.7	Solve friction problems from EO 4.6 above using resolution of forces or scale drawing.	In a classroom.	Correctly.	1. Course Manuals 3. Chap 5 para 5.2
4.8	Investigate the effects of friction experimentally. End of 4.0	In a classroom or laboratory.	Correctly, under the guidance of the instructor.	

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 5. CO-PLANAR FORCES

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
5.0 Explain the principles of co-planar forces.	BTEC 14567F B6	Classroom	6.00	1	6.00
		Practical	2.00	2	4.00
		Total	8.00		10.00

EQUIPMENT (g)	PUBLICATIONS (h)
Griffin and George peg board.	1. Course manuals 2. Mechanical Engineering Science. Hannah and Hillier 3. Engineering Science. Hughes and Hughes

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
5.1	Define the following terms: a. Resultant. b. Forces in equilibrium. c. Equilibrant.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 1 3. Chap 2
5.2	Resolve two or more forces into horizontal and vertical components	In a classroom.	Correctly.	1. Course Manuals 2. Chap 1 3. Chap 2
5.3	Explain the parallelogram of forces theorem.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 1 3. Chap 2
5.4	Solve simple problems involving two or more co-planar forces using the methods from EOs 5.2 and 5.3 above.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 1 3. Chap 2
5.5	Explain the triangle of forces theorem.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 1 3. Chap 2
5.6	Explain the principle of Bow's notation.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 1 3. Chap 2
5.7	Solve simple problems involving three forces in equilibrium using methods from EOs 5.5 and 5.6 above.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 1 3. Chap 2
5.8	Investigate the triangle of forces theorem practically. End of 5.0	In a classroom or laboratory.	Correctly, under the guidance of the instructor.	1. Course Manuals 2. Chap 1 3. Chap 2

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 6. MOMENTS/TORQUE

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
6.0 Determine a resultant turning moment as torque.	BTEC 14567F B8 Cross refer to D15 and D17	Classroom	4.00	1	4.00
		Practical	0.00		0.00
		Total	4.00		4.00

EQUIPMENT (g)	PUBLICATIONS (h)
LJ Mechanisms equipment.	1. Course manuals 2. Mechanical Engineering Science. Hannah and Hillier 3. Engineering Science. Hughes and Hughes. 4. Advanced Design and Technology. Norman et al.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
6.1	Define torque as a turning moment. $T = F\ r$	In a classroom.	Correctly.	1. Course Manuals 2. Chap 2
6.2	Define a couple and the turning effect of a couple.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 2 3. Chap 3 para 3.9
6.3	Solve simple problems involving torque and couples.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 2
6.4	Explain input and output speed, and torque of a simple gear train. $\frac{t_2}{t_1} = \frac{N_1}{N_2} = \frac{T_2}{T_1}$	In a classroom.	Correctly.	1. Course Manuals 2. Chap 6 para 6.16-19 4. Chap 9 para 9.3.1-3
6.5	Investigate input and output speeds of a simple gear train practically.	In a classroom or laboratory.	Correctly, under the guidance of the instructor.	
6.6	Solve simple problems involving speed and torque of simple gear trains. End of 6.0	In a classroom.	Correctly.	1. Course Manuals 2. Chap 6 para 6.16-19 4. Chap 9 para 9.3.1-3

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 7. MOMENTS AND EQUILIBRIUM

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
7. Explain the principle of moments and system equilibrium.	BTEC 14567F B9 Cross refer to B11	Classroom	2.00	1	2.00
		Practical	2.00	2	4.00
		Total	4.00		6.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manuals 2. Mechanical Engineering Science. Hannah and Hillier. 3. Engineering Science. Hughes and Hughes.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
7.1	Define the following terms: a. Moment. b. Centre of Gravity.	In a classroom.	Correctly.	1. Course Manuals 3. Chap 3 para 3.1-5
7.2	Explain the principle of moments and equilibrium of uniform simply supported and cantilever beams.	In a classroom.	Correctly.	1. Course Manuals 3. Chap 3 para 3.1-5
7.3	Determine the reactions of supports for simply supported beams carrying: a. Concentrated (point) loads. b. Uniformly distributed loads.(U.D.L) c. Combination of a) and b) above.	In a classroom.	Correctly.	1. Course Manuals 3. Chap 3 para 3.1-5
7.4	Determine the vertical reaction and fixing moment for cantilever beams carrying: a. Concentrated (point) loads. b. Uniformly distributed loads. (U.D.L) c. Combination of a) and b) above.	In a classroom.	Correctly.	1. Course Manuals 3. Chap 3 para 3.1-5
7.5	Solve simple problems involving reactions of simply supported beams under concentrated and U.D.L's.	In a classroom.	Correctly.	1. Course Manuals 3. Chap 3 para 3.1-5
7.6	Solve simple problems involving vertical reaction and fixing moment of cantilever beams, under concentrated and U.D.L's. End of 7.0	In a classroom.		1. Course Manuals 3. Chap 3 para 3.1-5

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 8. LINEAR MOTION

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
8.0 Investigate the relationship between displacement, velocity and acceleration for linear motion and angular motion.	BTEC 14567F C12	Classroom	4.00	1	4.00
		Practical	2.00	2	4.00
		Total	6.00		8.00

EQUIPMENT (g)	PUBLICATIONS (h)
Airtrack equipment.	1. Course manuals 2. Mechanical Engineering Science. Hannah and Hillier. 3. Engineering Science. Hughes and Hughes.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
8.1	Define the following terms: a. Displacement. b. Distance. c. Speed. d. Velocity. e. Acceleration.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 7 para 7.1 – 4 3. Chap 6
8.2	State the equations of linear motion with a constant acceleration: a. $v = u + at$ b. $s = ut + \frac{1}{2}at^2$ c. $s = \frac{1}{2}(u + v)t$ d. $v^2 = u^2 + 2as$	In a classroom.	Correctly.	1. Course Manuals 2. Chap 7 para 7.1 – 4 3. Chap 6
8.3	Solve practical problems relating to linear motion.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 7 para 7.1 – 4 3. Chap 6
8.4	Investigate the equations of motion experimentally.	In a classroom or laboratory.	Correctly.	
8.5	Define resultant and relative velocity	In a classroom.	Correctly, under the guidance of the instructor.	1. Course Manuals 2. Chap 7 para 7.13 – 15 3. Chap 6
8.6	Solve simple problems relating to resultant and relative velocity. End of 8.0	In a classroom.	Correctly.	1. Course Manuals 2. Chap 7 para 7.13 – 15 3. Chap 6

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 9. CONSERVATION OF MOMENTUM

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
9.0 Explain the principle of conservation of momentum for linear motion.	BTEC 14567F C13	Classroom	4.00	1	4.00
		Practical	4.00	2	4.00
		Total	8.00		12.0

EQUIPMENT (g)	PUBLICATIONS (h)
Airtrack equipment.	1. Course manuals. 2. Mechanical Engineering Science. Hannah and Hillier. 3. Engineering Science. Hughes and Hughes.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
9.1	State the concept of mass.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 9 3. Chap 7
9.2	Define Inertia.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 9 3. Chap 7
9.3	State Newton's First Law of Motion.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 9 3. Chap 7
9.4	Define the following terms: a. Momentum and impact of elastic bodies. Mv b. Impulse. Ft	In a classroom.	Correctly.	1. Course Manual. 2. Chap 9. 3. Chap 7.
9.5	State the principle of conservation of momentum. a. $m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 9. 3. Chap 7.
9.6	State Newton's Second Law of Motion and deduce F = ma.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 9. 3. Chap 7.
9.7	State Newton's Third Law of Motion.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 9. 3. Chap 7.
9.8	Solve problems involving Newton's Laws of Motion, inertia, impulse and using the conservation of momentum.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 9. 3. Chap 7.
9.9	Investigate the conservation of momentum practically. End of 9.0	In a classroom or laboratory.	Correctly, under the guidance of the instructor.	

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 10. ANGULAR MOTION

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
10.0 Explain the effects of centripetal acceleration.	BTEC 14567F C14	Classroom	2.00	1	2.00
		Practical	2.00	2	4.00
		Total	4.00		6.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manuals. 2. Mechanical Engineering Science. Hannah and Hillier. 3. Engineering Science. Hughes and Hughes.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
10.1	Define the following terms: a. Displacement. b. Distance. c. Speed. d. Velocity. e. Acceleration.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 10 para 10.1-10. 3. Chap 8 para 8.1-5.
10.2	State the equations of angular motion with constant acceleration: a. $\omega_2 = \omega_1 + \alpha t$ b. $\theta = \omega t + \frac{1}{2}\alpha t^2$ c. $\theta = \frac{1}{2}(\omega_1 + \omega_2)t$ d. $\omega_2^2 = \omega_1^2 + 2\alpha\theta$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 10 para 10.1-10. 3. Chap 8 para 8.1-5.
10.3	Solve practical problems relating to angular motion	In a classroom.	Correctly.	1. Course Manual. 2. Chap 10 para 10.1-10. 3. Chap 8 para 8.1-5.
10.4	Define centripetal acceleration and centripetal force. $a = r\omega^2$ or $a = \frac{v^2}{r}$ $F = mr\omega^2$ or $F = \frac{mv^2}{r}$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 10 para 10.1-10. 3. Chap 8 para 8.1-5.
10.5	Define the inertia reaction to the force in EO 10.4 as a consequence of Newton's Third Law.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 10 para 10.1-10. 3. Chap 8 para 8.1-5.
10.6	Explain balancing of rotating machinery, such as: car wheels, helicopter blades and gas turbine blades.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 10 para 10.1-10. 3. Chap 8 para 8.1-5.
10.7	Explain the forces on an aircraft in a balanced level turn and relate to the angle of bank. $\tan\theta = \frac{v^2}{gr}$	In a classroom.	Correctly.	1. Course Manual.

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
10.8	Solve simple problems relating to centripetal acceleration and centripetal force in situations such as: a. Aircraft banking. b. Vehicles traversing level curves. c. Engine governors. End of 10.0	In a classroom.	Correctly.	1. Course Manual. 2. Chap 10 para 10.1-10. 3. Chap 8 para 8.1-5.

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 11. THEORY OF MACHINES

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
11.0 Explain processes involving energy transfer.	BTEC 14567F D15 and D17 Cross refer to B8	Classroom	2.00	1	2.00
		Practical	2.00	2	4.00
		Total	4.00		6.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manuals 2. Mechanical Engineering Science. Hannah and Hillier. 3. Engineering Science. Hughes and Hughes.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
11.1	Describe a machine as a device for changing the magnitude and line of action of a force.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 6. 3. Chap 10.
11.2	Define a lever as the simplest form of machine.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 6. 3. Chap 10.
11.3	Define mechanical advantage and velocity ratio as applied to simple machines.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 6. 3. Chap 10.
11.4	Using systems approach, define efficiency in terms of work in, work out and losses, and relate this to power in, power out and losses-including braking systems.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 6. 3. Chap 10.
11.5	Explain the principles of a hydraulic jack, a screw jack and a simple gear train.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 6. 3. Chap 10.
11.6	Solve problems involving a hydraulic jack, a screw jack and a simple gear train.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 6. 3. Chap 10.
11.7	Define power transmitted by a shaft as: $P = 2\pi NT/60$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 6. 3. Chap 10.
11.8	Solve problems with power being transmitted through a simple gear train. End of 11.0	In a classroom.	Correctly.	1. Course Manual. 2. Chap 6. 3. Chap 10.

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 12. STEADY FLOW

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
12.0 Explain the steady flow energy equation.	BTEC 14567F D16	Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	2.00		2.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manuals. 2. Engineering Science. W. Bolton. 3. Advanced Design and Technology. Norman et al.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
12.1	Define the steady flow energy process.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 11 para 11.7 3. Chap 5
12.2	Identify the following forms in a steady flow system: a. Potential energy. ρgh b. Kinetic energy. $\frac{1}{2}\rho v^2$ c. Internal energy. u d. Flow energy. PV	In a classroom.	Correctly.	1. Course Manual. 2. Chap 11 para 11.7 3. Chap 5
12.3	State the effects of the following terms on the internal energy in a steady flow system: a. Heat added. Q b. Work done. W	In a classroom.	Correctly.	1. Course Manual. 2. Chap 11 para 11.7 3. Chap 5
12.4	Identify the terms in the steady flow energy equation. a. $\rho gh + \frac{1}{2}\rho v^2 + p + u + q + w$ b. $mgh + \frac{1}{2}mv^2 + PV + U + Q + W$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 11 para 11.7 3. Chap 5
12.5	State the steady flow energy equation as a consequence of "conservation of energy". End of 12.0	In a classroom.	Correctly.	1. Course Manual. 2. Chap 11 para 11.7 3. Chap 5

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 13. ENERGY, WORK AND POWER

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
13.0 Explain the principles of work done, potential energy, linear kinetic energy, and power.	BTEC 14567F D15 and D17	Classroom	4.00	1	4.00
		Practical	0.00		0.00
		Total	4.00		4.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manual.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
13.1	Define potential energy (PE) as energy due to position.	In a classroom.	Correctly.	Course manual.
13.2	Solve simple problems involving potential energy. PE = mgh	In a classroom.	Correctly.	Course manual.
13.3	Define kinetic energy (KE) as energy due to motion.	In a classroom.	Correctly.	Course manual.
13.4	Solve simple problems involving kinetic energy. KE =½mv^2	In a classroom.	Correctly.	Course manual.
13.5	State the principle of conservation of energy.	In a classroom.	Correctly.	Course manual.
13.6	Apply the principle of conservation of energy in solving problems involving both potential and kinetic energies where there are no energy losses.	In a classroom.	Correctly.	Course manual.
13.7	Define work as a transfer of energy. Work Done = Force x Distance (WD = FS)	In a classroom.	Correctly.	Course manual.
13.8	Apply the principle of conservation of energy to inclined planes and lifts in solving problems involving potential energy and kinetic energy, and with friction as a form of energy loss (ie, work done against friction).	In a classroom.	Correctly.	Course manual.
13.9	Define power as the rate of doing work. P = WD/t	In a classroom.	Correctly.	Course manual.
13.10	Using inclined planes and lifts, solve problems involving energy, work and power. End of 13.0	In a classroom.	Correctly.	Course manual.

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 14. MID PHASE EXAMINATION

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
14.0 Complete a mid-phase examination on TOs 3.1 to 3.11 and TO 3.13.	BTEC 14567F A1-D17	Classroom	4.00	0.00	4.00
		Practical	0.00		0.00
		Total	4.00		4.00

EQUIPMENT (g)	PUBLICATIONS (h)		
		FILMS/VIDEOS	
	N° (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
14.1	Complete a mid-phase examination on TOs 3.1 to 3.11 and TO 3.13. End of 14.0	In a classroom, under examination conditions.	Attaining the examination pass mark.	

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 15. GAS LAWS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
15.0 Explain the basic gas laws.	BTEC 14567F E18	Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	2.00		2.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manual. 2. Mechanical Engineering Science. Hannah and Hillier 3. Advanced Design and Technology. Norman et al

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
15.1	Define the following: a. Fluid, and explain the difference between gases and liquids. b. Density and relative density. c. Atmospheric pressure and the barometer. $p = \rho gh$ d. Gauge and absolute pressure. $P_{absolute} = p_{gauge} + p_{atmos}$ e. Absolute temperature, and relate between Celsius and Kelvin.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 15 para 15.1-11 3. Chap 11 para 11.6.1-2
15.2	State Boyle's Law and recognise as an isothermal process.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 15 para 15.1-11 3. Chap 11 para 11.6.1-2
15.3	Solve problems using Boyle's Law. $P_1V_1 = P_2V_2$, ($PV = C$)	In a classroom.	Correctly.	1. Course Manuals 2. Chap 15 para 15.1-11 3. Chap 11 para 11.6.1-2
15.4	State Charles' Law and recognise as an isobaric process.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 15 para 15.1-11 3. Chap 11 para 11.6.1-2
15.5	Solve problems using Charles' Law. $V_1/T_1 = V_2/T_2$, ($V/T = C$)	In a classroom.	Correctly.	1. Course Manuals 2. Chap 15 para 15.1-11 3. Chap 11 para 11.6.1-2
15.6	State the Combined Gas Law.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 15 para 15.1-11 3. Chap 11 para 11.6.1-2
15.7	Solve problems using the Combined Gas Law. $P_1V_1/T_1 = P_2V_2/T_2$, ($PV/T = C$)	In a classroom.	Correctly.	1. Course Manuals 2. Chap 15 para 15.1-11 3. Chap 11 para 11.6.1-2
15.8	State the Characteristic Gas Equation.	In a classroom.	Correctly.	1. Course Manuals 2. Chap 15 para 15.1-11 3. Chap 11 para 11.6.1-2
15.9	Solve problems using the Characteristic Gas Equation. $PV = mRT$ End of 15.0	In a classroom.	Correctly.	1. Course Manuals 2. Chap 15 para 15.1-11 3. Chap 11 para 11.6.1-2

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 16. CONTINUITY OF FLOW

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
16.0 Explain continuity and Bernoulli's equation.	BTEC 14567F E19	Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	2.00		2.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manual. 2. Mechanical Engineering Science. Hannah and Hillier. 3. Engineering Science. W. Bolton. 4. Advanced Design and Technology. Norman et al. 5. Fluid Mechanics, Level III. Madill.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
16.1	State the continuity equation for steady flow as a consequence of conservation of matter.	In a classroom.	Correctly.	1. Course Manual. 3. Chap 13. 4. Chap 12.5.1. 5. Chap 5.
16.2	Identify the terms in the continuity equation. $A_1v_1 = A_2v_2$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 21.16. 3. Chap 13. 4. Chap 12.5.1. 5. Chap 5.
16.3	Identify Bernoulli's equation as being derived from the steady flow energy equation.	In a classroom.	Correctly.	1. Course Manual. 3. Chap 13. 4. Chap 12.5.1. 5. Chap 5.
16.4	State Bernoulli's equation as a consequence of conservation of energy.	In a classroom.	Correctly.	1. Course Manual. 3. Chap 13. 4. Chap 12.5.1. 5. Chap 5.
16.5	Identify the forms of energy in Bernoulli's equation. $p + \frac{1}{2}\rho v^2 + \rho gh$	In a classroom.	Correctly.	1. Course Manual. 3. Chap 13. 4. Chap 12.5.1. 5. Chap 5.
16.6	Define the concept of "fluid head".	In a classroom.	Correctly.	1. Course Manual. 3. Chap 13. 4. Chap 12.5.1. 5. Chap 5.
16.7	Identify the terms in the "head" form of Bernoulli's equation. $\frac{p}{\rho g} + \frac{v^2}{2g} + h$	In a classroom.	Correctly.	1. Course Manual. 3. Chap 13. 4. Chap 12.5.1. 5. Chap 5.
16.8	Solve simple problems involving continuity equation and Bernoulli's equation.	In a classroom.	Correctly.	1. Course Manual. 3. Chap 13. 4. Chap 12.5.1. 5. Chap 5.

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
16.9	Define a non-flow process.	In a classroom.	Correctly.	1. Course Manual 3. Chap 13 4. Chap 11.7
16.10	Identify the terms from the steady flow energy equation relevant to a non-flow process.	In a classroom.	Correctly.	1. Course Manual 3. Chap 13 4. Chap 11.7
16.11	Identify the non-flow energy equation as the first law of thermodynamic. $Q = \Delta U + W$ End of 16.0	In a classroom.	Correctly.	1. Course Manuals 3. Chap 13 4. Chap 11.7

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 17. BERNOULLI'S EQUATION

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
17.0 Apply continuity and Bernoulli's equation.		Classroom	1.00	1	1.00
		Practical	1.00	2	2.00
		Total	2.00		3.00

EQUIPMENT (g)	PUBLICATIONS (h)
Fluids Flow Bench.	1. Course manual. 2. Engineering Science. W. Bolton. 3. Advanced Design and Technology. Norman et al. 4. Fluid Mechanics, Level III. Madill.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
17.1	Describe the following: a. Venturi meter. b. Orifice meter.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 pages 41- 43. 3. Chap 12 para 12.6.1-2. 4. Chap 6.
17.2	Solve theoretical flow problems involving fluid flow in pipelines, venturi and orifice meters. $Q_A = A_1 \times \sqrt{\frac{2gh}{\left[\frac{A_1}{A_2}\right]^2 - 1}}$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 pages 41- 43. 3. Chap 12 para 12.6.1-2. 4. Chap 6.
17.3	Define the coefficient of discharge.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 pages 41- 43. 3. Chap 12 para 12.6.1-2. 4. Chap 6.
17.4	Calculate actual flow rate from the pressure drop across an orifice plate or a venturi meter. $Q_A = Q_t x C_d$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 pages 41- 43. 3. Chap 12 para 12.6.1-2. 4. Chap 6.
17.5	Calculate fluid velocity from pitot and static pressures. $\sqrt{2g\frac{\rho_{manometer}}{\rho_{fluid}}}$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 pages 41- 43. 3. Chap 12 para 12.6.4. 4. Chap 7 pages 47-48.
17.6	Use relevant fluid equations and practical measurements to calculate the pressure drop across a venturi meter, in a practical setting.	In a laboratory.	Correctly, under the guidance of an instructor.	
17.7	Relate applications of Bernoulli's equation and the continuity equation to practical settings; e.g. fuel flow. End of 17.0	In a classroom.	Correctly.	

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 18. INCOMPRESSIBLE FLOW

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
18.0 Explain the principles of incompressible fluid flow.	BTEC 14567F E21	Classroom	1.00	1	1.00
		Practical	1.00	2	2.00
		Total	2.00		3.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manual 2. Engineering Science. W. Bolton 3. Advanced Design and Technology. Norman et al 4. Fluid Mechanics, Level III. Madill

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
18.1	Describe the velocity profile in a uniform circular duct.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 13 page 199 3. Chap 12 para 12.8.1 4. Chap 5 pages 34-35
18.2	Describe the following terms as applicable to a uniform circular duct: a. Laminar flow. b. Turbulent flow. c. Boundary flow.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 13 page 199 3. Chap 12 para 12.8.1 4. Chap 5 pages 34-35
18.3	Identify the occurrence of the effects listed in EO 18.2 in practical setting. End of 18.0	In a classroom.	Correctly.	1. Course Manual. 2. Chap 13 page 199 3. Chap 12 para 12.8.1 4. Chap 5 pages 34-35

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 19. THERMODYNAMICS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
19.0 Explain the basic thermodynamic relationships.		Classroom	6.00	1	6.00
		Practical	0.00		0.00
		Total	6.00		6.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manual. 2. Mechanical Engineering Science. Hannah and Hillier. 3. Basic Engineering Thermodynamics. Joel. 4. Advanced Design and Technology. Norman et al.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
19.1	Define the relationship between heat-energy and temperature.	In a classroom.	Correctly.	1. Course Manual. 3. Chap1 1.7-1.25
19.2	State the first law of thermodynamics for a non-flow process.	In a classroom.	Correctly.	1. Course Manual. 3. Chap1 1.7-1.25
19.3	Solve problems using the first law of thermodynamics. $Q = W + \Delta U$	In a classroom.	Correctly.	1. Course Manual. 3. Chap1 1.7-1.25
19.4	Define the following terms: a. Isovolumetric. b. Adiabatic. c. Isentropic. d. Polytropic.	In a classroom.	Correctly.	1. Course Manual. 3. Chap1 1.7-1.25
19.5	Define work done as the area under a PV diagram.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 15 p345-350 3. Chap1 1.7-1.25
19.6	Define: a. Specific heat at constant pressure. b. Specific heat at constant volume.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 15 p345-350 3. Chap1 1.7-1.25
19.7	Solve problems using: a. Specific heat at constant pressure. b. Specific heat at constant volume.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 15 p345-350 3. Chap1 1.7-1.25
19.8	Define the term: a. $PV^n = C$ (Polytropic Law)	In a classroom.	Correctly.	1. Course Manual. 2. Chap 15 p345-350 3. Chap1 1.7-1.25
19.9	Solve problems using $PV^n = C$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 15 p345-350 3. Chap1 1.7-1.25
19.10	Explain how $PV^n = C$ relates to constant pressure, volume and temperature processes.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 15 p345-350 3. Chap1 1.7-1.25
19.11	Define: $\gamma = C_p/C_v$ (Ratio of Specific Heats)	In a classroom.	Correctly.	1. Course Manual. 2. Chap 15 p345-350 3. Chap1 1.7-1.25
19.12	Solve problems using the ratio of specific heats and the polytropic process. $\gamma = C_p/C_v$ and $PV^n = C$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 15 p345-350 3. Chap1 1.7-1.251.

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
19.13	Sketch PV-Diagrams for basic engine cycles such as: a. The Otto Cycle (constant volume cycle). b. Brayton or Gas Turbine Cycle (constant pressure cycle). c. Diesel (constant volume/constant pressure cycle). End of 19.0	In a classroom.	Correctly.	1. Course Manual 4. Chap 11.8.2

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 20. EFFICIENCY

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
20.0 Determine engine power output and efficiencies.	BTEC 14567F F23	Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	2.00		2.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course notes 2. Mechanical Engineering Science. Hannah and Hillier. 3. Basic Engineering Thermodynamics. Joel.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
20.1	Explain the operation of a rope brake.	In a classroom.	Correctly.	1. Course Manual 2. Chap 20 3.Chap 15.3 3. Chap 15.7-15.15
20.2	Calculate braking torque.	In a classroom.	Correctly.	1. Course Manual 2. Chap 20 3. Chap 15.3 3. Chap 15.7-15.15
20.3	Define brake power (bp).	In a classroom.	Correctly.	1. Course Manual 2. Chap 20 3. Chap 15.3 3. Chap 15.7-15.15
20.4	Calculate brake power from brake torque.	In a classroom.	Correctly.	1. Course Manual 2. Chap 20 3. Chap 15.3 3. Chap 15.7-15.15
20.5	Define indicated mean effective pressure (imep).	In a classroom.	Correctly.	1. Course Manual 2. Chap 20 3. Chap 15.3 3. Chap 15.7-15.15
20.6	Calculate indicated power (ip) from imep.	In a classroom.	Correctly.	1. Course Manual 2. Chap 20 3. Chap 15.3 3. Chap 15.7-15.15
20.7	Define the mechanical efficiency of an engine.	In a classroom.	Correctly.	1. Course Manual 2. Chap 20 3. Chap 15.3 3. Chap 15.7-15.15
20.8	Calculate the mechanical efficiency of an engine from bp and ip. End of 20.0	In a classroom.	Correctly.	1. Course Manual 2. Chap 20 3. Chap 15.3 3. Chap 15.7-15.15

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 21. AIRSPEEDS

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
21.0 Explain the relationship between Indicated, Equivalent, Rectified and True airspeed.	BTEC 14567F G24	Classroom	2.00	1	2.00
		Practical	0.00		0.00
		Total	2.00		2.00

EQUIPMENT (g)	PUBLICATIONS (h)
Wind Generator and Pitot tube.	1. Course manual. 2. Mechanics of Flight. A. C. Kermode. 3. Aircraft Flight. Barnard and Philpott.

FILMS/VIDEOS		
N° (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
21.1	Explain the composition and characteristics of the earth's atmosphere and how it changes with altitude.	In a classroom.	Correctly.	1. Course Manual 2. Chap2 P 32-38 3. Chap7 P193-197
21.2	Explain the main requirements of the International Standard Atmosphere (ISA).	In a classroom.	Correctly.	1. Course Manual 2. Chap2 P 32-38 3. Chap7 P193-197
21.3	Explain how an airspeed instrument measures dynamic pressure and relate this to indicated airspeed.	In a classroom.	Correctly.	1. Course Manual 2. Chap2 P 32-38 2. Chap2 P 63-67 3. Chap7 P193-197
21.4	Explain how the following errors are compensated for in airspeed instruments: a. Instrument error. b. Pressure error. c. Compressibility error. d. Density error.	In a classroom.	Correctly.	1. Course Manual 2. Chap2 P 32-38 3. Chap7 P193-197
21.5	Solve simple problems related to true airspeed and equivalent airspeed. $V_1 = V\sqrt{\frac{\rho}{\rho_0}}$ Where V_1 = True airspeed V = Equivalent airspeed End of 21.0	In a classroom.	Correctly.	

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 22. LIFT AND DRAG

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
22.0 Explain the lift and drag equations relating to an aerofoil section.	BTEC 14567F G25	Classroom	1.00	1	1.00
		Practical	1.00	2	2.00
		Total	2.00		3.00

EQUIPMENT (g)	PUBLICATIONS (h)
	1. Course manuals. 2. Mechanics of Flight. A.C Kermode. 3. Aircraft Flight. Barnard and Philpott.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)
	Weight and Lift. Shell Video Unit. Thrust and Drag. Shell Video Unit.	17 min 11 min

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
22.1	Define an aerofoil.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 3. Chap 1
22.2	Define and explain each component of the lift and drag equations: a. $L = \frac{1}{2}\rho v^2 S C_L$ b. $D = \frac{1}{2}\rho v^2 S C_D$	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 3. Chap 1
22.3	Solve simple problems relating to lift and drag on an aerofoil section. End of 22.0	In a classroom.	Correctly.	

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 23. ANGLE OF ATTACK

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
23.0 Explain the effects of angle of attack and airspeed on aerofoil performance.	BTEC 14567F G26	Classroom	1.00	1	1.00
		Practical	1.00	2	2.00
		Total	2.00		3.00

EQUIPMENT (g)	PUBLICATIONS (h)
Subsonic wind tunnel and balance. Armfield 1 ft wind tunnel and pressure distribution manometer. Smoke tunnel.	1. Course manual 2. Mechanics of Flight . A. C. Kermode 3. Aircraft Flight. Barnard and Philpott.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)
	Controls and their effect. Shell Video Unit	17 min

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
23.1	Explain the effects of angle of attack and airspeed on aerofoil performance.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 3. Chap 1 & Chap 4
23.2	Define stalling angle.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 3. Chap 1 & Chap 4
23.3	Investigate practically the lift/drag ratio at various angles of attack.	In a laboratory.	Correctly, under the guidance of an instructor.	
23.4	Explain how the total drag of an aircraft affects the flight range. End of 23.0	In a classroom.	Correctly.	1. Course Manual. 3. Chap 7 page 203

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 24. BOUNDARY LAYER

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
24.0 Analyse boundary layer and boundary layer control.	BTEC 14567F G27	Classroom	1.00	1	1.00
		Practical	1.00	2	2.00
		Total	2.00		3.00

EQUIPMENT (g)	PUBLICATIONS (h)
Subsonic wind tunnel. Smoke tunnel.	1. Course manual. 2. Mechanics of Flight. A. C. Kermode 3. Aircraft Flight. Barnard and Philpott.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)
	Controls and their effect. Shell Video Unit	17 min

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
24.1	Explain laminar and turbulent flow over an aerofoil section and the transition point between them.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 2 pages 55-58 3. Chap 3 pages 69-87
24.2	Explain boundary layer separation and aerofoil stall.	In a classroom.	Correctly.	1. Course Manual. 2. Chap 2 pages 55-58 3. Chap 3 pages 69-87
24.3	Explain the reasons for and the methods used to control the boundary layer such as flaps and slats. End of 24.0	In a classroom.	Correctly.	1. Course Manual. 2. Chap 3 pages 115-123

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 25. SUBSONIC, TRANSONIC AND SUPERSONIC FLIGHT

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
25.0 Explain the concepts of transonic/supersonic flight	BTEC 14567F G28	Classroom	1.00	1	1.00
		Practical	1.00	2	2.00
		Total	2.00		3.00

EQUIPMENT (g)	PUBLICATIONS (h)
Supersonic wind tunnel.	1. Course manual. 2. Mechanics of Flight. A. C. Kermode.

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)
	Approaching the speed of sound. Shell Video Unit.	25 min
	Transonic Flight. Shell Video Unit.	20 min
	Beyond the speed of sound. Shell Video Unit.	20 min

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
25.1	Define the subsonic/transonic/supersonic speed ranges and the effect on airflow within those regions.	In a classroom.	Correctly.	1. Course Manual 2. Chap 11 pages 321-342 and pages 348-369
25.2	Define: a. Mach Number. b. Critical Mach Number. c. Mach Cone. d. Mach Angle.	In a classroom.	Correctly.	1. Course Manual 2. Chap 11 pages 321-342 and pages 348-369
25.3	Explain the formation of shock waves and the effect they have on aerofoil performance and aircraft control.	In a classroom.	Correctly.	1. Course Manual 2. Chap 11 pages 321-342 and pages 348-369
25.4	Explain how the following design features are used to minimise the problems encountered in high speed flight: a. Thin wings. b. Sweepback. c. Spoilers. d. All moving tailplanes. e. Area rule.	In a classroom.	Correctly.	1. Course Manual 2. Chap 11 pages 321-342 and pages 348-369
25.5	Explain how high speed can effect trim and centre of gravity of the aircraft and the kinetic heating effect.	In a classroom.	Correctly.	1. Course Manual 2. Chap 11 pages 321-342 and pages 348-369
25.6	Show the development of shock waves on an aerofoil section practically. End of 25.0	In a laboratory.	Correctly, under the guidance of an instructor.	

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 26. ASSIGNMENT

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
26.0 Complete an assignment covering any topic within P3.	BTEC 14567F A1-G28	Classroom	4.00	2	8.00
		Practical			
		Total	4.00		8.00

EQUIPMENT (g)	PUBLICATIONS (h)		
		FILMS/VIDEOS	
	N° (i)	TITLE (j)	TIME (k)

PART III

N^{o} (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
26.1	Complete an assignment covering any topic within P3. End of 26.0	In own time.	Attaining the assignment pass mark.	

PART III

TRADE TRAINING

SECTION: P3 ENGINEERING SCIENCE

SUBJECT: 27. END OF PHASE EXAMINATION

TRAINING OBJECTIVE (a)	REFERENCE (b)	ALLOCATION OF PERIODS (c)	Syll Hrs (d)	No of CELLS (e)	INSTR HOURS (f)
27.0 Complete an end of phase examination covering TOs 3.12 and 3.15 to 3.25		Classroom	4.00	1	4.00
		Practical	0.00		0.00
		Total	4.00		4.00

EQUIPMENT (g)	PUBLICATIONS (h)

FILMS/VIDEOS		
N^{o} (i)	TITLE (j)	TIME (k)

PART III

N° (a)	ENABLING OBJECTIVES (b)	CONDITIONS (c)	STANDARDS (d)	REFERENCE (e)
27.1	Complete an end of phase examination covering TOs 3.12 and 3.15 to 3.25. End of 27.0	In a classroom, under examination conditions.	Attaining the examination pass mark.	