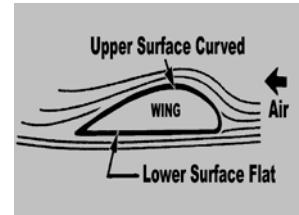
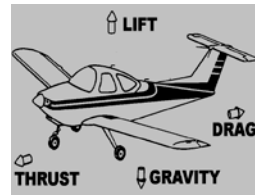


Engineering Studies

(HSC Course)



<http://www.boeing.com/companyoffices/aboutus/tours/>

AERONAUTICAL ENGINEERING

The Engineering Report 4 & Class Assignments No 1 - 6

INSTRUCTIONS:

1. All work is to be submitted on A4 paper stapled together at the top LHS of the page and placed in a plastic sleeve. (*Work will not be accepted in plastic display folders*)
2. Headers and footers:
 - a. Place the subject name at the top LHS of each page
 - b. Place the module name at the top RHS of each page
 - c. Place your name at the bottom LHS of each page
 - d. Place the page numbers at the bottom RHS of each page
3. Steps:
 - a. Write the question first - in red preferably (include any question drawing i.e. scan or paste them onto your page)
 - b. Then present your analysis of the problem, include Free Body Diagrams.
 - c. Next is the working-out with the answer made bold or underlined. (*No marks will be awarded if there is no working-out shown!*)
4. Start a new page with every assignment. Correct question numbering is important.

Ingleburn High School
Faculty of Technology and Applied Studies

Engineering Studies - ASSESSMENT TASK
STAGE 6
Cover Sheet

Task No: 4Date due: 2017Topic: AERONUTICAL ENGINEERING

Marks: _____ / 325

HSC course weighting: (Stage 6 Only)

Engineering Reports: 25% ÷ 5 Reports

Class Assignments: 25% ÷ ? Assignments

Task: *(Full details on page 3)*

- Submit all Class Assignments completes for this module.
- Submit the Engineering Report for this module.

Method of Assessment:

Homework research task and class work

TEACHER EXPECTATIONS

We expect you to do your best work at all times. Use clear written communication including correct spelling and appropriate language structure. Students who do not meet the following basic outcomes will be required to redo this work as a learning experience and your original marks given will stand.

Assessment Criteria:

You will be assessed on your ability to:

H1.1 - SCOPE OF THE PROFESSION: describes the scope of engineering and critically analyses current innovations
H1.2 - MATERIALS SCIENCE: differentiates between properties of materials and justifies the selection of materials, components and processes in engineering
H2.1 - MATERIALS ENGINEERING: determines suitable properties, uses and applications of materials in engineering
H2.2 - IMPACT OF ENGINEERING: analyses and synthesises engineering applications in specific fields and reports on the importance of these to society
H3.1 - MECHANICS: demonstrates proficiency in the use of mathematical, scientific and graphical methods to analyse and solve problems of engineering practice
H3.2 - ENGINEERS REPORT: uses appropriate written, oral and presentation skills in the preparation of detailed engineering reports
H3.3 - GRAPHICAL COMMUNICATION SKILLS: develops and uses specialised techniques in the application of graphics as a communication tool
H4.1 - TECHNOLOGICAL INOVATIONS: investigates the extent of technological change in engineering
H4.2 - TECHNOLOGICAL HISTORY: applies knowledge of history and technological change to engineering- based problems
H4.3 - IMPACT OF TECHNOLOGY CHANGE: appreciates social, environmental and cultural implications of technological change in engineering and applies them to the analysis of specific problems
H5.1 - TEAM WORK: works individually and in teams to solve specific engineering problems and in the preparation of engineering reports
H5.2 - TIME MANAGEMENT: selects and uses appropriate management and planning skills related to engineering
H6.1 - PROBLEM SOLVING SKILLS: demonstrates skills in research and problem-solving related to engineering
H6.2 - ENGINEERING METHODOLOGY: demonstrates skills in analysis, synthesis and experimentation related to engineering

Marking Criteria for Assessment Task:

	No	Mk	Total
<u>A. The Engineering Report Content</u>			
i. The Aeronautical Engineering Profession	1	1	30
ii. Materials Analysis:	1	1	30
iii. Mechanics Analysis:	1	1	30
Report Presentation			
iv. Power point presentation:	1	1	10
v. Presenters:	1	1	10
Total for Report			110
<u>B. Class Assignments</u>			
Assignment 1 - History	1	1	40
Assignment 2 – Propulsion systems	1	1	40
Assignment 3 - Testing of materials	1	1	40
Assignment 4 - Materials	1	1	45
Assignment 5 – corrosion	1	1	20
Assignment 6 – Communication	1	1	30
Total for Assignments			215
TOTAL FOR MODULE			325

Marking guidelines (Indicators)

Code	School Report Levels	Grade	% Mark	Mark	2005 BOS Grade - General Performance Descriptors:
1	Highly Developed	A	100 - 86	10 - 9	Extensive applied knowledge & understanding of content - Achieved a very high level of competence
2	Competent	B	85 - 76	8 - 7	Thorough knowledge & understanding of content - Achieved a high level of competence
3	Developing	C	75 - 56	6 - 5	Sound knowledge & understanding of content - Achieved adequate level of competence
4	Experiencing Difficulty	D	55 - 41	4	Basic knowledge & understanding of content - Achieved a limited level of competence
		E	40 - 0	3 - 0	Elementary knowledge & understanding of some content - Achieved very limited level of competence

Feedback to students:

The teacher will provide written or verbal feedback. Comments will inform students about such things as:

- Verbal one to one review
- Class review teacher/class
- Reference to past work samples



Ingleburn High School - Faculty of Technology and Applied Studies

**Engineering Studies – Assessment Task
SUBMISSION RECEIPT**

Task No: 4

Date due: 2017

Topic: AERONUTICAL ENGINEERING

Student name: _____

Date submitted: ____/____/____

Class: _____

Teachers signature: _____

AERONUTICAL ENGINEERING – (TEAM WORK)

The Engineering Report

Date due: ___/___/___

110 Marks

You are required to form teams of 2-3 students. Each student will eventually present a section of the report to the class. Working with your team use Power Point Software to develop a class presentation which is to include the following:

i. The Aeronautical Engineering Profession: (30 Marks)

Research and complete a report on one aspect of the Aeronautical Engineering Profession which may include:

- | | |
|---|--|
| <ul style="list-style-type: none"> • Aerospace design and development • Performance of pilots and stress • Testing planes • Instrument design | <ul style="list-style-type: none"> • Maintenance • Teaching of aeronautics • Turbine production • Space flight |
|---|--|

ii. Materials Analysis: (30 Marks)

PLC Aeronautics has just employed you as an aeronautical engineer. They are planning a new single engine propeller called the Vortex. This is to be a small four seater high powered, high performance plane, and to fit with this image, composite materials are being considered for the propeller.

The company is undecided whether to use a carbon fibre reinforced composite or a 2024 aluminium alloy.

- a. Determine the properties of each and their suitability.
- b. Compare the cost of using each material
- c. Discuss how each material would be made into the propeller shape.

iii. Mechanics Analysis: (30 Marks)

- a. If each wing is to be 4.8m long and the lift force acting at 45% of the distance from the wing root, what will be the bending moment if the lift force is 9kN?
- b. What will be the bending stress if $I_{xx} = 1.8 \times 10^{-6} \text{ m}^4$ and $y=20\text{mm}$?
- c. Present a solution to an Aeronautical Engineering mechanics problem you have found in Schlenker and solved.

PRESENTATION:**iv. Power point presentation: (10 Marks)**
ICT skills**v. Presenters: (10 Marks)**
Speaker, clarity and confidence**Notes**

- Don't copy the work word for word you must use your own words.
- Assignments not handed in on time will be dealt with according to the school assessment policy statement given to you.

AERONUTICAL ENGINEERING

Assignment No.1

Date due: ___/___/___

History**Marks 60**

1.1 Complete the following questions

(18 mks)

1. What is a patent?
2. What was the name of the first manned aircraft to fly?
3. What are ailerons? Who developed them?
4. What was the first turbojet aircraft to fly?
5. Name the British fighter jet to enter service during WWII
6. What is the Saab J21 famous for?
7. The F-III was the first production jet to use what technology? Why was this technology used?
8. What do STOL and VTOL stand for?
9. What aerodynamic feature did the Saab Viggen use to gain STOL capabilities?
10. What makes the Harrier such an important jet?
11. What material family is made extensive use of in the Eurofighter Typhoon
12. Why was the de Havilland Comet such an important passenger aircraft?
13. What aircraft, made by Boeing, set them up for a prosperous future with passenger jets?
14. Why did the VC10 mount the engines at the tail and not under the wings?
15. What makes the Boeing 747 such an important plane in the development of passenger jets?
16. What was the first supersonic transport to enter service?
17. Explain the term, fuselage
18. What is the vertical stabiliser?

1.2 Trace the history of manned flight, from the earliest birdmen up until the modern jet aircraft of today. (Remember to use diagrams and pictures in your report)

(20 mks)

1.3 Discuss what we could see in the future with relation to aviation and/or flight.

(2 mks)

AERONUTICAL ENGINEERING

Assignment No.2

Date due: ___/___/___

Propulsion Systems**40 Marks**

Briefly describe each of the following Propulsion systems

(5 each)

- 2.1 Four-stroke engine
- 2.2 Gas Turbine engine
- 2.3 Jet
- 2.4 Turbo jet
- 2.5 Turboprop
- 2.6 Rocket
- 2.7 Ramjet
- 2.8 Pulsejet

AERONUTICAL ENGINEERING

Assignment No.3

Date due: ___/___/___

Testing of Materials**40 Marks**

Non destructive testing of parts in the aeronautical industry is important to determine the structural integrity of each part. Using diagrams, describe how each of the following tests would be carried out on aircraft. (10 each)

- 3.1 Magnetic Particle Inspection
- 3.2 Dye Penetration Inspection
- 3.3 X-Ray Inspection
- 3.4 Ultrasonic Testing

AERONUTICAL ENGINEERING

Assignment No.4

Date due: ___/___/___

Materials**45 Marks**

Modern Aircraft are made from many types of materials. With regard to the four listed below;

- Write a short report on each metal
- listing its main properties that would make it useful in the construction of aircraft (5 each)

4.1 Titanium

4.2 Copper

4.3 Monel

4.4 Magnesium

4.5 Aluminium Silicon - (discuss structure, properties and Heat treatment)

4.6 Aluminium Silicon-Magnesium - (discuss structure, properties and Heat treatment)

4.7 Aluminium Copper - (discuss structure, properties and Heat treatment)

4.8 Polymers used in aircraft

4.9 Composites used in aircraft

AERONUTICAL ENGINEERING

Assignment No.5

Date due: ___/___/___

Corrosion**20 Marks**

Corrosion is the deterioration of a metal.

- 5.1 Explain how corrosion can occur (a diagram would help)

- 5.2 What types of corrosion control and protection can be used to prevent the destructive influence of corrosion on an aircraft. (Use diagrams from the Schlenker text book to explain)

5.3

AERONUTICAL ENGINEERING

Assignment No.6

Date due: ___/___/___

Communication**30 Marks**

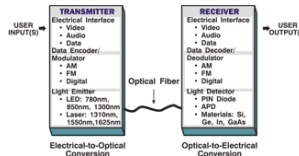
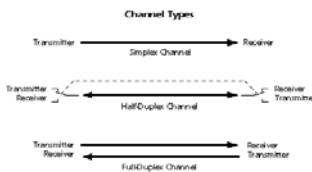
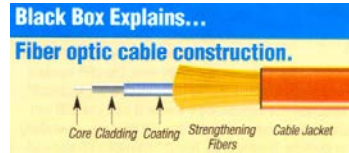
- 6.1 Make a freehand pictorial sketch of at least two simple aircraft components (found through research on the internet) NOTE: One component must contain a threaded portion.

- 6.2 Use the freehand sketches drawn to accurately re-draw each of the two components in orthogonal projection using a set scale.(Use technical sketching techniques learnt in class)

- 6.3 Select one of the drawings and use CAD software to re-draw it.

Engineering Studies

(HSC Course)



TELECOMMUNICATIONS ENGINEERING

The Engineering Report 5
&
Class Assignments No 1 - 6

INSTRUCTIONS:

1. All work is to be submitted on A4 paper stapled together at the top LHS of the page and placed in a plastic sleeve. (Work will not be accepted in plastic display folders)
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Ingleburn High School
Faculty of Technology and Applied Studies

Engineering Studies - ASSESSMENT TASK
STAGE 6
Cover Sheet

Task No: 5Date due: 2017Topic: TELECOMMUNICATIONS ENGINEERING

Marks: _____ / 350

*Preliminary course weighting: (Stage 6 Only)**Engineering Reports: 25% ÷ 5 Reports**Class Assignments: 25% ÷ ? Assignments***Task:** *(Full details on page 3)*

- Submit all Class Assignments completes for this module.
- Submit the Engineering Report for this module.

Method of Assessment:

Homework research task and class work

TEACHER EXPECTATIONS

We expect you to do your best work at all times. Use clear written communication including correct spelling and appropriate language structure. Students who do not meet the following basic outcomes will be required to redo this work as a learning experience and your original marks given will stand.

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H6.1 - PROBLEM SOLVING SKILLS: demonstrates skills in research and problem-solving related to engineering
H6.2 - ENGINEERING METHODOLOGY: demonstrates skills in analysis, synthesis and experimentation related to engineering

Marking Criteria for Assessment Task:

	<i>No</i>	<i>Mk</i>	<i>Total</i>
<u>A. The Engineering Report Content</u>			
Question 1.			
a. .			10
b. .			10
c. .			10
Question 2. .			10
Question 3. .			10
Question 4. .			10
Question 5. .			10
Total for Report			70
 <u>B. Class Assignments</u>			
Assignment 1 - Training			40
Assignment 2 - Television			40
Assignment 3 – Morse code and Digital Signals			50
Assignment 4 – Fibre Optics			40
Assignment 5 – Mobile Telephones and Satellite Communication			60
Assignment 6 – The Future in Telecommunication			50
Total for Assignments			280
<hr/> TOTAL FOR MODULE <hr/>			350

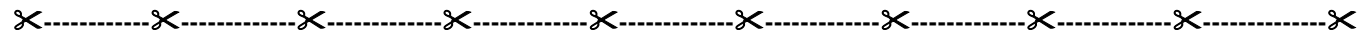
Marking guidelines (Indicators)

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3	Developing	C	75 - 56	6 - 5	Sound knowledge & understanding of content - Achieved adequate level of competence
4	Experiencing Difficulty	D	55 - 41	4	Basic knowledge & understanding of content - Achieved a limited level of competence
		E	40 - 0	3 - 0	Elementary knowledge & understanding of some content - Achieved very limited level of competence

Feedback to students:

The teacher will provide written or verbal feedback. Comments will inform students about such things as:

- Verbal one to one review
- Class review teacher/class
- Reference to past work samples



Ingleburn High School - Faculty of Technology and Applied Studies

**Engineering Studies – Assessment Task
SUBMISSION RECEIPT**

Task No: 5

Date due: 2017

Topic: TELECOMMUNICATIONS ENGINEERING

Student name: _____

Date submitted: ____/____/____

Class: _____

Teachers signature: _____

TELECOMMUNICATIONS ENGINEERING

The Engineering Report

Date due: ___/___/___

Marks 70

You are a telecommunications engineer for “CallSat”. They are a new mobile telephone company which makes software and hardware for global satellite communication. They require a report that is to be presented to the board of directors that answers the following questions.

1. Outline the difference between:
 - a. Synchronous satellite orbit 10
 - b. Geosynchronous satellite orbit 10
 - c. Asynchronous satellite orbit 10
2. Why is a polar orbit desirable as opposed to a geosynchronous orbit? 10
3. What type of polymer casting should be used for a new handset? 10
4. To connect the satellite telephone system to terrestrial telephone systems it is necessary to connect the satellite receivers with existing telephone networks. What type of fiber optic cable will be used? 10
5. Draw a flow chart of the way a satellite telephone will connect to an existing landline telephone. (Hint: refer to this site www.iridium.com) 10

The report must be between 2 - 5 pages in length.

The Report must contain the following:

- **A title page**
- **The aim**
- **The Report**
- **Conclusion and or Recommendations**
- **References** - it is necessary to show where you found each piece of information. For example at the end of this assignment you are required to name the web site, textbook, etc) publisher, author, date of publication and page number) Relate this information back to each part of the text as 1. 2.3. 4. etc.

Notes

- *Don't copy the work word for word you must use your own words.*
- *Assignments not handed in on time will be dealt with according to the school assessment policy statement given to you.*

TELECOMMUNICATIONS ENGINEERING

Assignment No.1

Date due: ___/___/___

Training**Marks 40**

Investigate the TAFE and UNIVERSITY courses related to Telecommunications Engineering.

1.1 Explain the work roll you would perform as an engineer in this field if you chose to complete:

- i. a TAFE course 5
- ii. a university course 5

OUTLINE THE FOLLOWING:

- 1.2 Availability and length of courses 5
- 1.3 scholarships available 5
- 1.4 Flexibility of the courses 5
- 1.5 Prospects for employment on completion of course 5
- 1.6 Insert some job adds you have found in the paper for this field of engineering 10

TELECOMMUNICATIONS ENGINEERING

Assignment No.2

Date due: ___/___/___

Television (TV)**Marks 40**

2.1 Write a short report on the invention of television. (Use diagrams / pictures)

- | | |
|---|----|
| a. Find out who invented it | 5 |
| b. when and where it happened and what inspired the work | 5 |
| c. What was the quality of those early pictures? | 5 |
| d. What is the latest emerging technology in TV hardware?
(Outline the advantages and disadvantages of the two most emerging technologies) | 5 |
| e. Explain the emerging TV broadcasting technology soon to take over. | 10 |
| f. How does a modern TV work? | 10 |

TELECOMMUNICATIONS ENGINEERING

Assignment No.3

Date due: ___/___/___

Morse Code**Marks 50**

3.1 Find the international Morse Code. Write your full name using this code. 2

Digital Signals

3.2 In relation to digital signals what do the following words refer to

- a. Quantization 2
- b. Sampling 2
- c. Coding 2

3.3 Write the following numbers using an 8-bit code

- a. 222 5
- b. 251 5
- c. 203 5
- d. 199 5

3.4 On a CD we use a 16-bit code. What numbers would the following sequences represent? Show how you arrived at these numbers.

- a. 1011101010111001 5
- b. 1110001101010110 5
- c. 1011111010101100 5

3.5 In regard to the simple analogue signal shown below.

- a. You are to draw on a 4-bit scale a quantized representation of the signal (sampling rate of 20 readings per second) 5
- b. You are to draw an accurate representation of the digital signal 2

TELECOMMUNICATIONS ENGINEERING

Assignment No.4

Date due: ___/___/___

Fibre Optics**Marks 40**

- 4.1 Draw a diagram of a single optical fibre and label the following parts
- a. Cladding 5
 - b. Buffer coating 5
 - c. Core 5
- 4.2 How does an optical fibre transmit light? (a diagram would help) 5
- 4.3 In regard to an optical fibre, what does the term Attenuation mean? 5
- 4.4 How are optical fibbers made? (you are to describe this process in your own words) 5
- 4.5 List the advantages of fibre optics 5
- 4.6 List any disadvantages of using Fibre optic cables. 5

TELECOMMUNICATIONS ENGINEERING

Assignment No.5

Date due: ___/___/___

Mobile Telephones**Marks 60**

- | | | |
|-----|--|---|
| 5.1 | What does the term Cell Phone mean? | 5 |
| 5.2 | Draw a diagram of how Cell Phone areas are arranged to maximise coverage | 5 |
| 5.3 | How does the Network know where your mobile phone is at anyone time? | 5 |
| 5.4 | Mobile Phones use two frequencies at once (CB Radio only uses one at a time) what is the significance of this? | 5 |
| 5.5 | List some of the problems associated with Mobile Phone use. | 5 |

Satellite Communication

- | | | |
|------|--|----|
| 5.6 | What is a Geostationary Satellite? | 5 |
| 5.7 | What is one use of a Geostationary Satellite? | 5 |
| 5.8 | What is an Orbital Satellite? | 5 |
| 5.9 | What is one use for an Orbital Satellite? | 5 |
| 5.10 | How does a Satellite stay in orbit? | 5 |
| 5.11 | What is the major advantage of a Geostationary Communications Satellite over Microwave Towers in a communications network? Think about the curve of the Earth. Use a diagram to help you answer. | 10 |

TELECOMMUNICATIONS ENGINEERING

Assignment No.6

Date due: ___/___/___

The Future in Telecommunication**Marks 50***(Use diagrams as much as possible to explain your answers)*

- | | | |
|-----|---|----|
| 6.1 | What is “ Wireless Communication Technology ” and how does it work? | 10 |
| 6.2 | What is “ Bluetooth ” and how does it work? | 5 |
| 6.3 | Give a specific example of “ Bluetooth ” at work with a one particular type of hardware. | 5 |
| 6.4 | Outline the advantages of “ Bluetooth ” technology over conventional wireless technology | 5 |
| 6.5 | What is “ BlackBerry ” and how does it work? | 10 |
| 6.6 | What is “ GPS ” and how does it work? | 10 |
| 6.7 | What is IP Telephony (IPT) and how does it work? | 5 |