

Course Overview N ES

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Month	Topic	Specifics	Resources	Assessment	HW
June	Course introduction	Course expectations and assessments	PPT, Jotters	NA	
	Engineering Contexts	• Examples of applications of environmental, civil, structural, mechanical, chemical, electrical and electronic engineering • Examples of the contribution of branches of engineering to solve engineering challenges, that integrate branches of engineering • Varied roles of engineers in designing, implementing, testing and controlling complex systems • Examples of social and economic impacts (positive and negative) of engineering • Examples of environmental impacts (positive and negative) of engineering • Ways in which engineering solutions contribute to tackling climate change • Explaining how emerging technologies may provide improved solutions to engineering challenges	OneNote, BrightRed book P6+7	Pupils working as groups providing responses, individual work assessed in August	
	Systems	• Systems and sub-system diagrams • Function of a system in terms of input – process – output and feedback loops • Open- and closed-loop control • Interaction of sub-systems	OneNote, BrightRed book P8 +9	Pupils completing work in Jotter to be marked during summer. Assessment in test after Holiday.	
	Energy	• Applying the law of conservation of energy • Calculations involving forms of energy (kinetic, potential, electrical and heat) • Applied calculations involving efficiency, work done and power using: $E_w = Fd$ $P = E/t$, $E_k = \frac{1}{2} mv^2$ $E_p = mgh$ $E_e = VIt$	OneNote, BrightRed book P10 - 17, calculator	Pupils completing work in jotters to be marked during the holiday.	

		$E_h = cm\Delta T$			
July	Summer Holidays	Revise previous notes on Glow	OneNote, BrightRed book	Jotters taken to be marked Start of term test	
August	Energy (week1)	• Calculations continued from June • Energy transfers, losses and transformations in a system • Energy audits and calculation of overall efficiency Efficiency $\eta = E_{out}/E_{in} = P_{out}/P_{in}$	OneNote, BrightRed book P18 - 21, calculator	Feedback in jotters PP questions marked	HW - 1, 2
	Test	Start of term test	Mix of past paper questions covering first three topics	Working through Drive system tasks	
	Mechanisms (week 2)	• Motion in mechanical systems: rotary, linear, reciprocating and oscillating • Simple gear train systems, idler gears, diagrams and conventions for representation - appropriate British Standards symbols • Compound gear trains	OneNote, BrightRed book P60 - 62, calculator, Fischertechnik, Algodoo, Yenka		
September	Mechanisms (week 3 and 4)	• Worm and Wheel • Calculating speed (velocity) ratio of simple and compound gear trains • The effects of friction in drive systems	OneNote, BrightRed book P63 - 67, Guitar, calculator, Fischertechnik, Algodoo, Yenka	Drive system tasks completed in jotters and marked	HW - 8,9,6
	Pneumatics (week 5 and 6)	• Symbols and operation of standard pneumatic components (restrictor, uni-directional restrictor, reservoir, 5/2 valve and actuators: diaphragm and solenoid) • Pneumatic time delay circuits • Calculating relationships between force, pressure and area in single-acting and double-acting cylinders • Controlling speed and force	Practical Pneumatics kits, BrightRed book P68-77	Student tasks marked in jotters, Past paper questions	
October	Test	End of term test assessing all of the topics prior	Past paper questions from each area	All questions marked to SQA solutions	HW - 3,10
	Analogue Electronics	• Describing the function of a circuit in terms of input, process and output • Calculations involving the relationship between voltage, current and resistance (Ohm's Law) • Calculations involving resistors in series and parallel • Calculations of voltage, current, and unknown values in a fixed-voltage divider	OneNote, BrightRed book P22 - 35, Practical electronic components, Yenka	Student tasks marked in jotters, Past Paper questions	

		• Designing a voltage divider to provide an input signal for a control circuit • Interpreting information given of characteristics for an LDR and an NTC thermistor • Function of relays • Function of a protection diode in an electronic circuit • Explaining the switching function of a transistor • Operating an electronic control circuit, which includes a variable voltage divider, transistor, relay and output transducer			
November	Digital Electronics	• AND, OR and NOT gates and combinations with up to three inputs, using truth tables, logic diagrams and Boolean expressions • Examples of using microcontrollers in commercial and industrial applications • Advantages and disadvantages of microcontroller-based control systems, compared to a hard-wired electronic equivalent • Using correct symbols (start, stop, input, output, branch and loop) to construct flowcharts showing solutions to simple control programs, involving time delays and continuous and fixed loops • Using suitable commands (high, low, for...next, if...then, pause, end (or their equivalents)) to design programs to solve simple control problems, involving time delays and continuous and fixed loops	OneNote, BrightRed book P36 - 59, Arduino's, Arduino IDE, city simulation boards	Student tasks marked in jotters Practical models assessed and commented on in Jotters	HW - 7,4,5,
December	Structures	• Examples of effects of a force (tensile and compressive) • Concurrent forces and equilibrium • Using triangle of forces and free body diagrams • Non-concurrent forces and parallel forces • Moment of a force • Calculations involving the principle of moments • Balance beam, simply-supported beam and reaction forces	OneNote, BrightRed book P78 - 81, P84 -89, Practical model examples, West Point Bridge Builder	Student tasks marked in jotters,	HW - 11
	Materials	• Selecting appropriate material for a given application, with justification • Calculating the relationship between direct stress, force and area • Calculating strain	OneNote, BrightRed book P82 - 83, West Point Bridge Builder	Student tasks marked in jotters,	
January	Practice task - 1	8 hour task set by teacher (last year's task) (36% of final grade)	Task sheets, access to all resources required (Yenka)	Teacher marked to SQA standard	

	Revision	Working through CAS	Past Paper, revision tasks, Leckie and Leckie Course notes book,	Teacher, peer and self-marking	
February	Prelim	Prelim 90 marks 64% of course	Prelim, compass	Teacher marked	
	Practice task - Finish	8 hour task set by teacher - look over feedback to make alterations or re attempt parts	Same as above	Teacher marked to SQA standard	
	Course assessment task	8 hour task set by the SQA (36% of final grade)	Task sheets, access to all required resources	SQA assessed	
March	Assessment Task posted	Office Deadline 15th March*	Flyleaf's, pupil work, envelopes	SQA assessed centrally - only checking in school	
	Revision	Targeted plan based on prelim	Past papers, revision tasks	Teacher, peer and self-marking	
April	Revision	Targeted revision	Specific Tasks Past Papers	Revision work marked	
		Second prelim	Prelim paper printed	Teacher mark	
May	Exam Leave	Any additional study work required			

Topics

- ☒ Engineering contexts
- ☒ Systems
- ☒ Energy
- ☒ Analogue Electronics
- ☒ Flowcharts
- ☒ Mechanisms
- ☒ Structures
- ☒ Pneumatics

Date	Marking	HW Number	Topic
	Self Mark	1	Energy 2
	Peer mark	2	Energy 3
	Teacher mark	3	Analogue Electronics
	Self mark	4	Structures 1

Peer mark	5	Structures 2
Teacher mark	6	Pneumatics ** to make
Self Mark	7	Flowcharts** to make
Peer mark	8	Mechanisms** to make
Teacher mark	9	Mechanisms ** to make
Self mark	10	Analogue Electronics** to make
Peer mark	11	Complete Record cards of Engineering terms P94-96