Course Overview H ES

18 August 2018 14:28

Month	Торіс	Specifics	Resources	Assessment	HW
June	Course introduction	Course expectations and assessments	PPT, Jotters	NA	
	Engineering Contexts Systems Energy	 Role of the professional engineer within a project, including communication and team working Skills and specialist knowledge required within projects Examples of social and economic impacts (positive and negative) of engineering Examples of environmental impacts (positive and negative) of engineering Sustainability of engineering solutions Emerging technologies and their impact Complex system, sub-system and control diagrams Role of negative feedback in a system Closed-loop, two-state and proportional feedback Using error detection in a closed-loop system Calculations related to energy audits: inputs energy losses efficiency Applied calculations involving efficiency, work done and power, using: Ew = Fd P = E/t Ek = ½ mv2 Ep = mgh Ee = VIt Eh = cmΔT Efficiency η = Eout/Ein = Pout/Pin 	OneNote, N5 booklet for crash Highers OneNote, N5 booklet for crash Highers OneNote, N5 booklet for crash Highers, Data booklet	Pupil will work in groups for responses. Assessed in test in October All work done in Jotters, marked over the summer	
July	Summer Holidays	Revise previous notes on Glow	OneNote		
August	Energy (week 1)	• Calculations, efficiency as above	OneNote, N5 booklet for crash Highers	Pupils work will be marked in jotters. Past paper	HW- 15

				questions attempted	
	Mechanisms (week 2)	 Motion, velocity ratio, symbols Diagrams of drive systems Selecting and calculating appropriate drive systems: simple and compound gear trains belt drives and chain drives rack and pinion worm and wheel worm and nut 	OneNote, N5 booklet for crash Highers, Fischertechnik, Yenka, Algodoo	Work in jotters marked	HW- 11
September	Mechanisms Pneumatics	 Purpose of couplings (rigid and flexible), radial and thrust bearings (plain, ball, roller, journal) Purpose of friction in brakes and clutches Calculating torque: T = Fr Calculating power in a drive system: P = 2 π nT Basic Pneumatics 	OneNote, N5 booklet for crash Highers, Fischertechnik, Yenka OneNote, N5 booklet for	Work in Jotter marked, past paper questions	HW-12 HW- 1,13
		sequential control circuits, with up to three cylindersElectro-pneumatic control circuits	crash Highers, Pneumatics kit	Past paper questions	
October	Analogue Electronics	 Variable resistors, light and temperature sensors in voltage dividers Using input transducer characteristics, relevant to the above bullet, to design voltage dividers to meet a specification Function and purpose of BJTs Designing a BJT circuit as a current amplifier Calculating the current gain (hFE) of an npn transistor Function and purpose of MOSFETs Designing a MOSFET (n-channel enhancement mode) circuit as a voltage-operated switch Comparing BJT and MOSFET transistors in a given application Function of op-amp configurations: inverting comparator difference amplifier voltage followers Calculating relationship between input and output voltages for different op-amp configurations 	OneNote, N5 booklet for crash Highers, Practical electronics components, Yenka	Work in jotters marked, Practical work marked and comments put in jotter, Past paper questions	HW- 2,3,4,7, 18, 19
November	Digital electronics	 Digital electronic control: logic functions: AND, OR, NOT, NAND, NOR, EOR and combinations with up to four inputs conversion to NAND equivalent 	OneNote, N5 booklet for crash Highers, Practical electronics components, Yenka	Work in jotters marked, Practical work marked and comments put in jotter, Past paper questions	HW- 15,16 HW- 5,6

		 developing Boolean expressions from truth tables, logic diagrams or circuit specifications constructing truth tables and logic diagrams from written specifications Programmable control: controlling a motor using pulse-width modulation control routines with up to four inputs and four outputs, processing analogue inputs using infinite and finite loops and time delays using logic and arithmetic operations to make decisions using high-level programs to monitor inputs and initiate digital outputs using high-level programs to make decisions using arithmetic and logic functions 			HW- 14
	Structures	 Equilibrium of concurrent and non-concurrent forces in 2D Resolving triangle/polygon of forces, resultant/equilibrant Calculating reaction forces in simply-supported beams or structures: where loads are not exclusively horizontal or vertical with hinge and roller supports with uniformly distributed loads (partial or full length) Using nodal analysis to calculate the size and nature of forces in frames Diagrams of structures 	OneNote, N5 booklet for crash Highers, Fischertechnik, west point bridge builder	Work in jotters marked, Practical work marked and comments put in jotter, Past paper questions	
	Materials	 Stress/strain (load/extension) graphs Properties of materials: brittleness elasticity ductility plasticity strength malleability Using strain gauges Calculating Young's Modulus of elasticity Calculating factor of safety Calculating elastic strain energy: Es = ½ Fx 	OneNote, N5 booklet for crash Highers, Strain gauge	Work in jotters marked, Practical work marked and comments put in jotter, Past paper questions	
December	Practice Task - 1	8 hour task set by last year's one		Teacher marked to SQA standard	

January	Practice task - 2 Revision	8 hour task set by teacher Working through CAS	Past Paper, revision tasks, Leckie and Leckie Course notes book,	Teacher marked to SQA standard Teacher, peer and self- marking	
February	Prelim Practice task - Finish Course assessment task	Prelim 90 marks 64% of course 8 hour task set by teacher 8 hour task set by the SQA	Prelim, compass Same as below	Teacher marked Teacher marked to SQA standard SQA assessed	
March	Assessment Task posted Revision	Office Deadline 15th March* Targeted plan based on prelim	Flyleaf's, pupil work, envelopes Past papers, revision tasks	SQA assessed centrally - only checking in school Teacher, peer and self- marking	
April	Revision	Targeted revision Second prelim	Specific Tasks Past Papers Prelim paper printed	Revision work marked Teacher mark	
May	Exam Leave	Any additional study work required			

Topics

- Engineering contexts
 Systems
 Energy
 Analogue Electronics
 Flowcharts
 Drive systems
 Structures
 Pneumatics
 Matorials

- Materials

Self	Mark	1	Pneumatics 1
Peer	r mark	2	Op amps 1
Tead	cher mark	3	Op amps 2
Self	mark	4	Op amps 3
Peer	r mark	5	Structures 1
Tead	cher mark	6	Structures 2
Self	Mark	7	Electronics 1
Peer	r mark	8	Dec 2016 op amps mix
Tead	cher mark	9	Jan 17 mix
Self	mark	10	Mech and struct
Peer	r mark	11	Drive systems*** to sort
Tead	cher mark	12	Drive systems**** to sort
Self	mark	13	Pneumatics **** to sort
Peer	r mark	14	Materials 1 ** to sort
Tead	cher mark	15	Energy** to sort
Peer	r mark	16	Logic ** to sort
Self	mark	17	Boolean *** to sort
Self	mark	18	What is an operational amplifier?
			What is an operational amplifier? Khan Academy
Self	mark	19	Transistors, How do they work ?

