

OUTSTANDING TEACHING, LEARNING AND ASSESSMENT TECHNICAL SKILLS NATIONAL PROGRAMME

Output 8 Copy of BTEC Units Criteria CBE linked to PBL tasks
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Unit	Subject	P1
1	Health, Safety and Welfare in Construction and the Built Environment	outline the roles and responsibilities of people assigned specific health and safety duties at work
2	Sustainable Construction	describe six different features of the natural environment that must be considered at the planning stage of a construction project
3	Mathematics in Construction and the Built Environment	use the main functions of a scientific calculator to perform calculations, applying manual checks to results
4	Science and Materials in Construction and the Built Environment	describe the basic factors in simple scientific terms that influence human comfort in the internal environment
5	Construction Technology and Design in Construction and Civil Engineering	describe the factors that influence the design process
6	Building Technology in Construction	explain the different forms of low-rise construction currently used for domestic and commercial buildings
7	Project Management in Construction and the Built Environment	identify the various stages of the construction process for a low-rise domestic or commercial building

8	Graphical Detailing in Construction and the Built Environment	identify the use of equipment and media used to produce manual graphical information
10	Surveying in Construction and Civil Engineering	identify linear surveying terminology
14	Structural Mechanics in Construction and Civil Engineering	explain the behaviour of beams and columns under load
15	Building Surveying in Construction	describe the role of the building surveyor
16	Mechanical and Electrical Services in Construction	explain the distribution of cold water by direct and indirect systems
17	Building Regulations and Control in Construction	examine the factors that have influenced the historical development of building control
18	Computer-aided Drafting and Design for Construction	describe the advantages, compared to other methods, of producing drawings electronically using a CADD package
19	Further Mathematics in Construction and the Built Environment	apply transposition techniques to mathematical formulae and expressions
21	Project in Construction and the Built Environment	identify a construction project and possible solutions

22	Design Procedures in Construction	describe the roles and responsibilities of designers, advisers and regulators associated with building design
29	Construction in Civil Engineering	describe fundamental techniques, processes, plant and materials used in groundworks, foundations and substructures
47	Measurement Techniques in Construction	carry out measurement techniques for length area, item, volume and number
50	Construction Design Technology	explain how materials, systems and methods are specified for construction projects
52	Structural Analysis and Design in Construction	discuss the structural concepts and design data required to carry out structural design
53	Personal and Professional Development in the Built Environment	identify employability skills, attributes and expected behaviours in employment
		Job Role And responsibility
		Design Process
		Personal and Development Skills

[illegible]

P2	P3	P4
outline the legal duties of employees and employers in relation to three pieces of health, safety and welfare legislation relevant to the construction and built environment sector	describe how to identify the hazards present in a given workplace situation, the people who may be at risk, and the possible consequences	describe the main principles and features of a typical risk assessment for a given workplace situation
explain four different forms of global pollution arising from construction projects	explain how four different forms of local pollution arising from construction projects may harm the local environment	explain four key methods used to protect the natural environment from the impact of the construction and built environment sector
use standard mathematical techniques to simplify expressions and solve problems using linear formulae	use graphical methods to solve linear and quadratic equations	use mathematical techniques to solve construction problems associated with simple perimeters, areas and volumes
describe how each factor is measured	state acceptable values for each factor	interpret underpinning concepts relating to structures under load
explain the roles and responsibilities of the design team	explain the roles and responsibilities of the production team	describe the legal implications that could arise from miscommunication
explain how the procedures used in subsoil investigation provide information for the design of substructures	describe the principles of foundation design	explain the methods used to construct different types of foundation
describe the roles and interrelationships of the members of the building team involved in resource management, planning and production	discuss the resources required to complete a construction project	explain the techniques used to plan, organise and control a construction project

describe correct drawing standards and conventions	describe manual presentation techniques	explain techniques and uses of different types of CAD information
carry out linear surveys, using appropriate equipment, to produce accurate drawings	identify levelling surveying terminology	carry out levelling surveys, using appropriate equipment, to produce accurate drawings
determine reactive forces and plot shear force and bending moment diagrams for a simply supported beam	determine reactive forces and plot shear force and bending moment diagrams for a cantilever beam	determine the forces acting in a determinate frame using mathematical and graphical techniques
describe how the building surveyor interacts with other members of the building team	outline the qualification route to professional status	describe the procedures and techniques used in the performance of building surveys
explain, with the use of clear and accurate diagrams, the provision and distribution of hot water by direct and indirect systems	explain the provision of above and below ground drainage systems	explain the installation of single-phase electrical systems
discuss the legislation and documentation associated with building control, and their application	identify the various Approved Documents that comprise the Building Regulations	describe the application and enforcement of the Building Regulations
describe the software and hardware required to produce CADD drawings	prepare a template drawing using a CADD system, saving it to a file	use 2D CADD features to produce a hard copy of a graphical drawing showing a plan, section and elevation at different scales
use arithmetical techniques to determine values for properties of sections, including irregular areas and volumes	use differential calculus techniques to solve algebraic, trigonometric and logarithmic expressions	use integral calculus to solve simple algebraic, trigonometric and exponential expressions
use appropriate techniques to identify the best solution for the construction project	produce a specification for the construction project	produce a plan for the construction project

identify the design needs of the client	explain technical, environmental and legislative constraints on building design	explain the stages of the design and construction process in terms of the Royal Institute of British Architects Plan of Work
describe the plant and materials used in groundworks, foundations, substructures and superstructures	describe how physical conditions, financial requirements and environmental constraints impact on civil engineering works	produce method statements specifying the plant, materials and methods to be used in two separate civil engineering projects
use dimension paper following the take off process	outline the contents of SMM7	outline the contents of CESMM
describe how common building materials fail in use	describe preventative and remedial measures used to reduce or eliminate the failure of building materials	explain the terms buildability and sustainability
analyse structural elements to ascertain their adequacy	produce a suitable section size for a single-grade glued laminated beam	produce a suitable design for a load-bearing timber stud partition
identify their own abilities and development needs	explain the importance of the presentation of technical information	identify the range of career opportunities in the built environment sector
Legal	H&S	Sustainability
Project Planning	Building processes	CAD
Surveying Process	Industry Discussion (Wider Impact on or of Sector)	

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P5	P6	P7
select control measures for a given workplace situation to reduce risks and meet legal requirements, using workplace health and safety policies	describe the role of the individual in accident recording and reporting procedures.	
explain three different, fit-for-purpose sustainable construction techniques.		
use trigonometric techniques to solve simple 2D construction problems	use geometric techniques to solve simple construction problems	use graphical techniques to solve practical construction problems
predict simple structural behaviour from given data	identify the main performance criteria relating to the specification of a range of vocationally relevant construction materials	describe the production and/or manufacturing processes for two vocationally relevant construction materials
produce written communications between members of the design and production teams	describe construction methods using relevant terminology	create specifications for construction details, providing suitable instructions for the construction team
explain the principles of superstructure design	describe the techniques used to construct and finish the component elements of a superstructure	explain the implications of environmental issues and legislative constraints on building construction
explain the management procedures used to monitor and control resources when organising construction projects	discuss examples of resource planning and management documentation	create planning documentation, including bar charts, networks and schedules, for typical low-rise domestic or commercial projects

describe the benefits of using CAD for the production and management of graphical information	interpret graphical drawings, details, schedules and specifications	produce 2D and 3D graphical drawings using manual drafting techniques
identify angular terminology	carry out angular measurements, using appropriate equipment, and calculations	identify setting out terminology
determine the maximum stress in a short column under axial and eccentric loads	produce suitable section sizes for axially loaded columns	produce suitable section sizes for simply supported beams subject to combined loading
identify the equipment used to perform building surveys	identify legislation relevant to building surveys	describe health, safety and welfare issues associated with building surveys
explain the installation of gas supply systems		
explain the approval procedures used in building control	evaluate the documentation used to support building control	discuss the powers of local authority building control officers and approved inspectors
use 3D CADD features to produce a simple virtual model, plotting out various views that are fit for purpose		
use statistical methods to produce accurate and appropriate solutions to construction engineering problems		
carry out the construction project	maintain a project file	monitor progress and suggest solutions of problems that arise

explain the purpose of the drawings required to support planning approval	explain how design teams are organised	explain the use of design processes to achieve final design solutions
explain the roles and responsibilities of civil engineers in civil engineering infrastructure projects	explain the economics associated with civil engineering infrastructure projects	explain lifecycle issues associated with civil engineering infrastructure projects
produce quantities for a simple low-rise domestic property from substructure and superstructure elements	apply mathematical calculations to the measurement process	produce final summaries from quantity abstracts
analyse the technical design of a given construction project in terms of buildability and sustainability	use drawing techniques to produce construction drawings to support design proposals	
analyse structural elements made from in-situ reinforced concrete	produce designs for structural elements in in-situ reinforced concrete	analyse structural elements in steel
produce a career development plan to include experiences, qualifications and training and development	explain what is meant by professional ethics as expressed in codes required for professional practice	explain the principles of duty of care
Maths	Science	
Drawings	Financial & Economics	

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P8	P9	P10
use statistical techniques to solve practical construction problems		
describe the important features and properties of construction related materials	explain how construction materials can deteriorate in use	explain the preventive and remedial techniques used to prevent deterioration of construction materials
produce sketch designs, plans, elevations, sections and details using standard conventions and symbols		
explain the purpose of the various parts of the infrastructure required to support the construction process		

produce graphical information in the form of simple specifications and schedules.		
set out and check corner pegs for a small building using appropriate equipment and techniques.		
produce a suitable section for a mass retaining wall that is safe in overturning, sliding and settlement	explain the benefits of using computer software in structural analysis and design	
carry out a simple measured survey	carry out a dilapidation survey	carry out a condition survey
produce a specimen Building Regulations application, with all necessary documentation		
prepare a presentation for the construction project	carry out a presentation of the construction project using the appropriate skills.	

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compile data collected during building surveys	record and present survey data in appropriate formats	prepare maintenance and repair schedules

explain how continuing professional development can be planned	discuss issues of concern that affect organisations and industry	explain the potential impact of selected issues on their discipline and the industry generally

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M1	M2	M3
explain how members of the site construction team interact in terms of their health, safety and welfare roles and responsibilities	carry out a typical risk assessment for a given workplace situation using a suitable format	explain how accurate data on accidents and incidents contributes to improving health, safety and welfare in the workplace.
assess the potential environmental impact of a proposed construction project on the local natural environment	compare the four key methods used to protect the natural environment in terms of cost, effectiveness and public perception	compare sustainable construction techniques in terms of relative cost and performance.
use algebraic methods to solve linear, quadratic simultaneous linear and quadratic equations	apply appropriate algebraic methods to find lengths, angles, areas and volumes for one 2D and one 3D complex construction industry-related problem	use standard deviation techniques to compare the quality of manufactured products used in the construction industry.
produce clearly worked, accurate answers for three different calculations relating to human comfort in the internal environment	produce clearly worked, accurate answers for three different problems involving simple structures under load	make and support valid decisions relating to the specification of materials for a tutor-provided application
explain for a complex project the operation and effectiveness of the RIBA Architect's Plan of Work	compare the methods recommended for communicating design changes to other members of the design team	interpret tutor-provided construction details, using recognised technical and architectural terminology.
justify the selection of suitable materials and techniques for use in the construction of substructures for low-rise domestic and commercial buildings, for two different tutor-specified scenarios	justify the selection of suitable materials and techniques for use in the construction of superstructures for low-rise domestic and commercial buildings, for two different tutor-specified scenarios	evaluate three pieces of legislation applicable to the construction process in terms of the relevance of the legislation and the stage at which each applies
produce organisational charts to explain the group dynamics of team working	compare the advantages and disadvantages of resource management techniques	discuss the factors that may have an adverse impact on planning and organisation

compare the use of manual and CAD techniques in the production and presentation of graphical information	extract and report clear, accurate and valid information from graphical sources, details and schedules	apply manual techniques and resources to produce complex graphical information.
carry out levelling calculations using both height of collimation and rise and fall methods	use angular measurements and trigonometry to calculate heights and distances	set out and check profiles for a small building
explain the relationship between shear force and bending moment and the significance of the point of contraflexure	explain how the effective length of a column is determined under different restraint conditions	compare alternative methods of designing structural members in terms of British Standards
prepare a typical job description for a building surveyor	differentiate between the equipment, techniques and processes used in two different kinds of building survey	relate the nature of the data collected to the type of building survey being carried out.
specify hot and cold water systems in terms of materials and appropriate dimensions and/or capacities of fittings and components	specify above and below ground drainage systems in terms of materials and appropriate falls, dimensions and/or capacities of fittings and components	distinguish between electrical and gas installations in terms of important health and safety issues
explain the particular implications of the Building Regulations for low-rise domestic and commercial construction	propose answers to two queries related to interpretation of the Building Regulations	explain the procedures used to enforce the Building Regulations
explain the relationship between CADD and other software/hardware used in construction	evaluate how commands used to produce CADD drawings can impact on drawing production	explain the benefits of using CADD to produce 3D virtual models.
transpose and evaluate complex formulae for use in determining properties of sections	use first and second order differentials for the solution of industry-related problems	apply the rules of integral calculus to determine solutions for complex industry-related problems
construct the project development process	maintain detailed records throughout the project that clearly show progress made, difficulties experienced and solutions to any problems encountered.	

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M4	M5	D1
		justify the contents of a risk assessment, in terms of available control measures and what is 'reasonably practicable'
		assess the importance of addressing environmental issues for the mutual benefit of the community and individual construction firms
		independently carry out checks on calculations using relevant alternative mathematical methods, making appropriate judgements on the outcome
		analyse, in both qualitative and quantitative terms, the basic factors that affect human comfort
		evaluate the effectiveness of the RIBA Architect's Plan of Work in terms of teamwork and the introduction of design changes after construction has started
		evaluate the environmental performance of modern materials and techniques used in the construction of substructures for low-rise domestic and commercial buildings, for two different tutor-specified scenarios
		compare two software systems that can facilitate planning, organisation and control processes

		evaluate how the quality of graphical information relates to the quality of the final constructed project
		analyse the methods used for levelling surveys in terms of accuracy
		compare numerical and graphical methods of solving forces in frameworks
		justify the recommendations made in two different types of building survey reports
		evaluate the advantages and disadvantages of the direct and indirect systems used in hot and cold water supplies and suggest situations where each might be appropriate
		justify the proposed solution to two separate Building Regulation issues
		justify the use of CADD for a construction project
apply statistical methods to analyse engineering data and make realistic assessments of this data		independently solve industry related problems using appropriate mathematical techniques
		evaluate the whole project development process, making recommendations for improvements

produce a portfolio of architectural drawings based on a brief for a low-rise domestic or commercial building.		analyse the potential impact of key acts and regulations, which control the design of buildings, on final building designs
explain how infrastructure projects are developed and maintained in the public and private sectors, both separately and in partnership		justify the selection of the techniques, processes, plant and materials used in a given civil engineering project
		analyse the differences between SMM7 and CESMM in terms of the application of rules for common items
		justify specifications and quality control measures in terms of relevant reference sources
		evaluate the effects of a design brief on the final design of in-situ reinforced concrete structural elements
compare the professional development requirements of two different professional bodies	analyse the potential impact of selected issues on their discipline and the industry generally	compare the employability skills, attributes and expected behaviours of two different professional roles

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D2	D3
evaluate a given accident report and suggest improvements to workplace systems to avoid a recurrence.	
justify the use of appropriate sustainable construction techniques for a specified construction project.	
demonstrate an understanding of the limitations of certain solutions in terms of accuracy, approximations and rounding errors	
evaluate preventative and remedial techniques applicable to the failure of materials.	
appraise a set of instructions that represent design modifications to the original contract.	
evaluate the environmental performance of modern materials and techniques used in the construction of superstructures for low-rise domestic and commercial buildings, for two different tutor-specified scenarios	
evaluate a range of planning, organisational and control techniques in terms of utility and efficacy.	

produce manual graphical information to a high level technical skill	
analyse the methods used to take angular measurements in terms of trigonometric accuracy	explain the constraints on the positioning of profiles.
evaluate alternative design methods in terms of their application for a given design brief.	
evaluate the contractual obligations and legal constraints applicable to a building survey	
justify the use of single-stack above ground drainage systems, and separate below ground drainage systems, for foul and surface water in modern houses	
evaluate the specimen building regulation application, with all necessary documentation	
evaluate the impact of using 2D and 3D CADD models on design requirements	
independently apply differential calculus to the determination of maxima and minima in industry-related problems.	

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