Scéimeanna Marcála *Scrúduithe Ardteistiméireachta, 2000*

Staidéar Foirgniochta *Ardleibhéal*

Marking Scheme *Leaving Certificate Examination, 2000*

Construction Studies *Higher Level*

An Roinn Oideachais & Eolaíochta
DEPARTMENT OF EDUCATION & SCIENCE

SCRÚDÚ ARDTEISTIMÉIREACHTA 2000

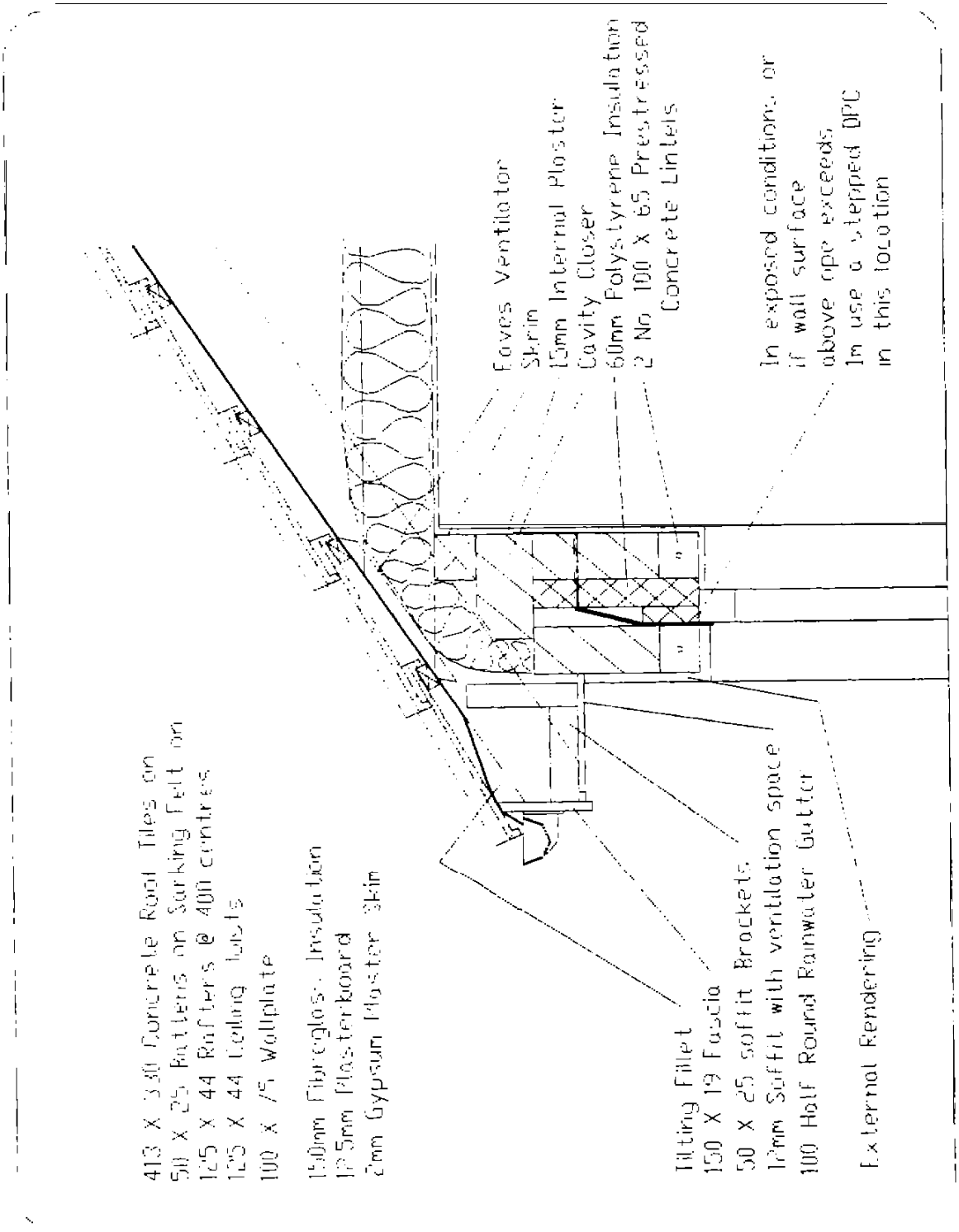
LEAVING CERTIFICATE 2000

STAIDÉAR FOIRGNÍOCHTA - ARDLEIBHÉAL

CONSTRUCTION STUDIES - HIGHER LEVEL

MARKING SCHEME

CEIST 1

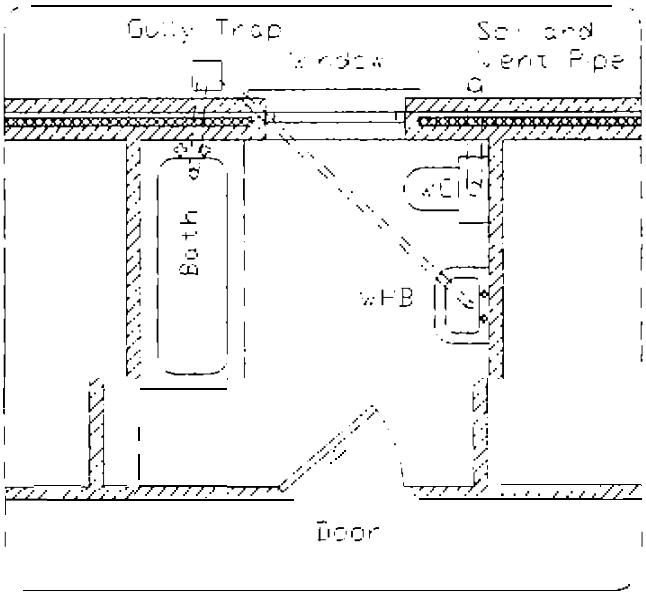


CEIST 1

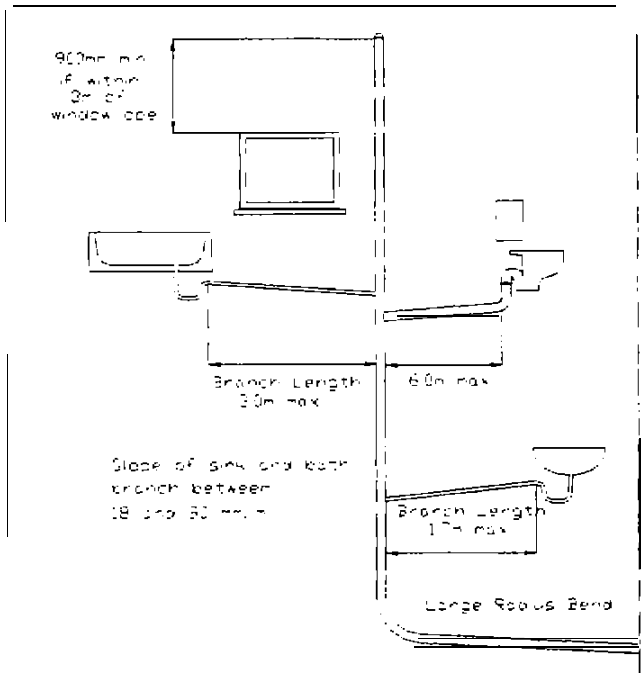
PERFORMANCE CRITERIA	MAXIMUM MARK
Roof tiles on tile **battens** correctly shown	14
Sarking felt correctly shown	4
Rafters and **joists** correctly shown	4
Wallplate correctly shown	4
Plasterboard and **skim** to ceiling correctly shown	4
Tilting fillet correctly shown	4
Fascia and **soffit brackets** correctly shown	4
Soffit with **ventilation space** correctly shown	4
Rainwater gutter correctly shown	4
External rendering correctly shown	4
Eaves ventilator correctly shown	4
Internal plastering to wall correctly shown	4
Cavity closer correctly shown	4
Insulation to cavity correctly shown	4
Insolation to ceiling correctly shown	4
Lintel(s) correctly shown	4
Tray DPC shown correctly	4
TOTAL (maximum of 15x4, 3 marks for drawing + 1 for annotation in each case)	60

CEIST 2

CEIST 2(A)



CEIST 2(c)



- AU WC discharge pipes to be 100mm diameter.

CEIST 2(B)

Reasons:

Widow

- On outer wall for ventilation
- On outer wall for light
- For accessibility for opening and closing
- Other valid reasons

Door

- Preferably on the opposite wall to the window so that through ventilation is achieved.
- Opens as shown for ease of access.
- Opens as shown to maintain privacy
- Other valid reasons

- A discharge pipe on the ground floor may be connected directly to a drain if the drop is less than 1 Sm.
- Where the drop is more than 1.5m the pipe must discharge into a ventilated stack.
- Bath waste to be 40mm diameter with a 40mm seal if on the ground floor discharging into an open gulley. Otherwise it should have a 7Smm seal.
- Wash hand basin waste pipes to be 32mm diameter with a 75 mm seal and branch length not more than 1.7m, can have a branch length up to 3.0m if using a 40mm diameter waste pipe
- Other applicable requirements in accordance with the Building Regulations

CEIST 2

PERFORMANCE CRITERIA	MAXIMUM MARK
(A)	
Plan of **layout** on outside wall shown	5
Bath and associated **pipework** shown in well-proportioned sketch (3 marks for bath + 7 marks for pipework)	5
WC and associated **pipework** shown in well-proportioned sketch (3 marks for WC + 2 marks for pipework)	5
WHB and associated **pipework** shown in well-proportioned sketch (3 marks for WHB + 2 marks for pipework)	5
(B)	
Window shown in suitable location	5
Minimum of 2 valid **reasons** given for window positioning	5
Door shown in suitable location	5
Minimum of 2 valid **reasons** given for door positioning	5
(C)	
Bath branch shown and annotated (3 marks for sketch + 2 for note)	5
WHB branch shown and annotated (3 marks for sketch + 2 for note)	5
WC branch shown and annotated (3 marks for sketch + 2 for note)	5
SVP sketched and height noted (3 marks max if window not referred to)	5
TOTAL	60

CEIST 3

Aggregates

- Gravels crushed stone and sand
- Fine Aggregates - will pass through a 5mm sieve - mostly the larger particles being used
- Coarse Aggregates - will not Pass through a 5mm sieve - seldom greater than 20mm.
- Strength
- Durability
- Cleanliness - free from organic impurities
- Other similarly relevant points

Batching

- Process of measuring the quantities of various sizes of aggregates to achieve the required concrete strength
- Generally done by weight
- Large concrete misers have the facilities to weigh aggregates before putting them in the drum for mixing.
- Other similarly relevant points

Water/Cement Ratio

- Usually from 0.4 to 0.6
- Too little water may not wet all of the cement and aggregates sufficiently.
- Too much water may result in liquid run off and air cavities when hydration occurs.
- Allowances have to be made for surface wetness of the aggregates.
- A slump test is used to test the water/cement ratio.
- Other similarly relevant points

Placing

- Concrete should not be dropped more than 1 metre
- Avoid segregation of the large aggregates from the mis
- Mix must be homogeneous
- Avoid air pockets and uneven distribution.
- Formwork used to contain wet mix
- Formwork should he clean before placing.
- Other similarly relevant points

Compacting

- Dense mass to gain maximum finished strength
- Assure structural quality
- Assure visual quality
- Vibrate to eliminate air voids using mechanical vibrators
- Poker Vibrator for columns, beams and trenches
- Beam vibrators attached to a large wooden or steel screed for floors, slabs. roads etc.
- Vibrators attached to formwork for precast work and some in-situ jobs
- Other similarly relevant points

Curing

- Allow to dry/cure slowly.
- Cover exposed concrete.
- Keep damp for some days.
- Protrcl from extremes of temperature.
- Formwork kept in position as long as possible
- When formwork is removed protect fresh concrete from drying out too fast.
- Other similarly relevant points

CEIST 3

PERFORMANCE CRITERIA	MAXIMUM MARK
Maximum of 2 **relevant points** under each of 6 headings (5 marks each for each of the 12 points)	10 10 10 10 10 10
TOTAL	60

CEIST 4

CEIST 4(A)

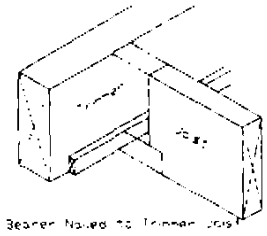
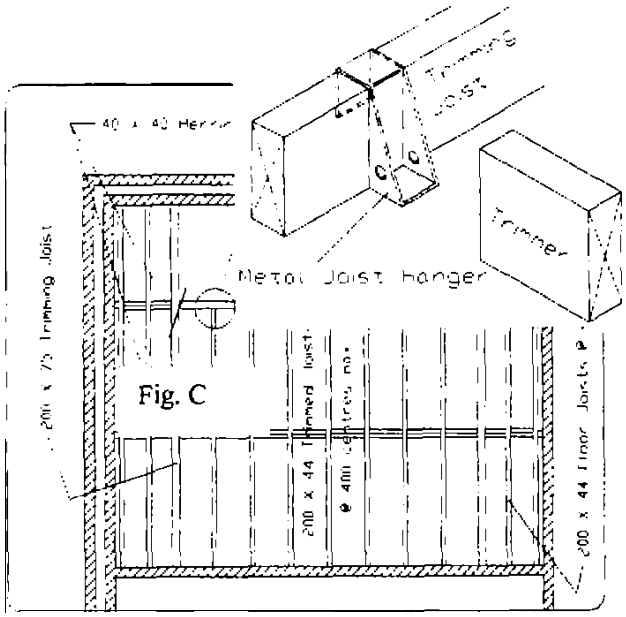


Fig Fig. B



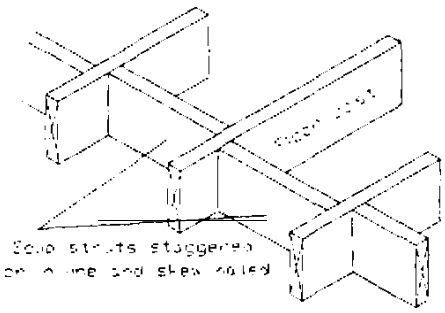
Formula to determine depth ofjoists, D = (span in mm/24) + 50
= (3600/24) + *50*
= 150 + 50 = ***200***

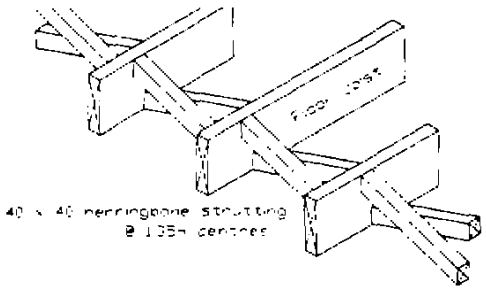
- The size of the joist should be 200 X 44 @ 400 centre to centre
- Structural grade Sitka spruce, 200 X 44 @ 400 c/c would permit a span of 3.87m

A method ofjoining the trimmer to the trimming joist is shown at Fig. B.
A method ofjoining the trimmed joists to the trimmer is shown at Fig. C.

CEIST 4(B)

- Solid or herringbone bridging/strutting is placed not more than 1.35m apart
- Solid strutting is normally the same thickness as the joist and not less than ¾ the depth.
- Herringbone strutting is usually 40 X 40 but is not less than 30 X 30.





Bridging

- Essential in floors with a span greater than 2.7m.
- Overcomes the possibility of lateral deflection of the joists by stiffening and making them rigid.
- Does not allow the joists TO move or twist and binds the structure together.

CEIST 4(c)

(i) By building them into the walls as shown in Fig. D ensuring that they have at least 90mm bearing on the wall. do not project into the cavity and that the ends of the joists are treated with preservative.

(ii) Galvanised steel joist hangers, Fig. E, are now widely used to support the ends of joists where they abut the wall. When the blockwork reaches the required level the joist hangers and joists are placed in position ensuring that all are level. The hangers are nailed to the joists using galvanised twist nails.

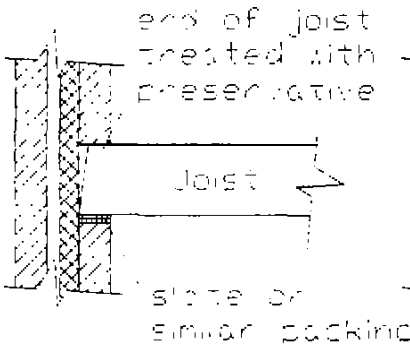


Fig. D

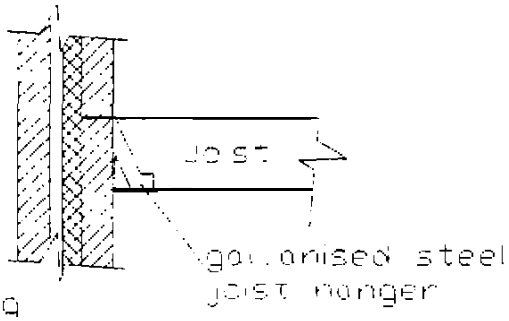


Fig. E

CEIST 4

PERFORMANCE CRITERIA	MAXIMUM MARK
(A)	
Well proponioned sketched **plan of layout** of joists	10
Joists correctly **named** and sizes correctly given (5 marks + 5 marks)	10
Jointing shown in well proportioned sketches (5 marks + 5 marks)	10
(B)	
Well proportioned sketch of 1 method **ofbridging**	5
Note stating **reasons** for bridging	
(C)	
Sketches and notes describing **of 2 methods of support** (5 marks each for sketches + 5 marks each for notes)	5 5 5 5
TOTAL	60

CEIST 5

CEIST 5(A)

- Location – Its distance from towns, cities, amenities, schools.
- Planning – Will planning permission be granted'?
- Services – The availability of water, sewerage, electricity.
- Site – The size. shape. low-lying or elevated. sheltered.
- Surroundings – Is it in a housing estate, beside factories. farms etc.'!
- Access -The road access. width. condition, dangers.
- Cost -The price relative to similar sites, development costs.
- Future Development – What are the plans for the area. nearby'?
- Other *important* and relevant considerations

CEIST 5(B)

- Location

Being close to schools, shops. recreation centres is important to families. where as others may like privacy and isolation.

- Planning Permission

Will planning permission be granted? Need to enquire from the local authority, ask neighbours. look fur live year development plan.

- Services

Water availability. council supply, group water scheme or do you have to bore a well'? Is there a public sewerage system or will you have to install a septic tank? Electricity and cost of connection, telephone, transportation. refuse collection. gas supply are other important considerations.

- Site

The size. shape. topography. contours. altitude: being overlooked. views: exposed, sheltered: liable to flooding; rights of ways, title deeds, past history; geographical features: microclimate.

. Surroundings

Cognisance has to be taken of adjacent and nearby buildings, sites. industry, activities such as factories, farms - pig or poultry farms. mushrooms houses - pollution smells; busy processing units with hazardous traffic – near to airports or motorway.

- Access

The condition and width of roads; its upkeep if shared and not owned by the local authority; entry to site. visibility and safety, bus); roadway.

. cost

Is it value for money at current prices or would it be devalued in the future? Availability of workers skilled contractors, building material.

- Future Development

What future development could take place in the area over the next years to affect your planned development. Major road development: factories. new or expanding, new housing development

- Other Considerations

These must be of importance, be relevant and be discussed by the candidate.

CEIST 5(C)

- Siting
- ♦♦▣●ℳ
- Choice of materials
- Colour
- Planting

Siting

- sited a distance from the road
- hill or mountain as a background
- not obtrusive
- not upsetting the skyline
- Located as though buildings are comfortable or naturally sited in landscape
- grouped together having coherence, pattern form and harmony
- not in isolation or individuality
- single storey dwelling in low lying countryside
- two-storey house in mountainous landscape

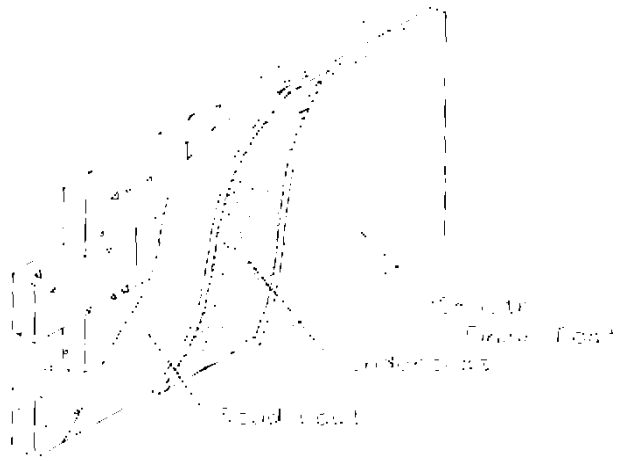
Style

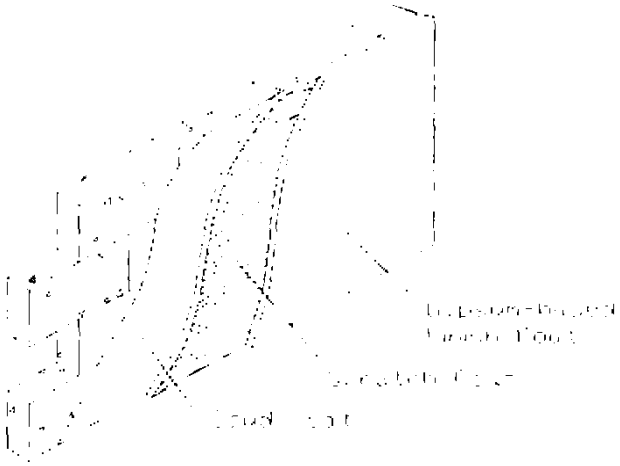
- harmonise with other nearby buildings
- traditional to the area or landscape
- complement the landscape
- External finishes and colours blend in with the surroundings
- native materials

CEIST 5

PERFORMANCE CRITERIA	MAXIMUM MARK
(A)	
Outline 5 important relevant **considerations** (4 marks each)	4 4 4 4 4
(B)	
Discuss each of **the** five **considerations** outlined at (a) (4 marks each)	4 4 4 4 4
(C)	
Detailed discussion of 2 ways (10 **marks each)**	10 10
TOTAL	60

CEIST 6





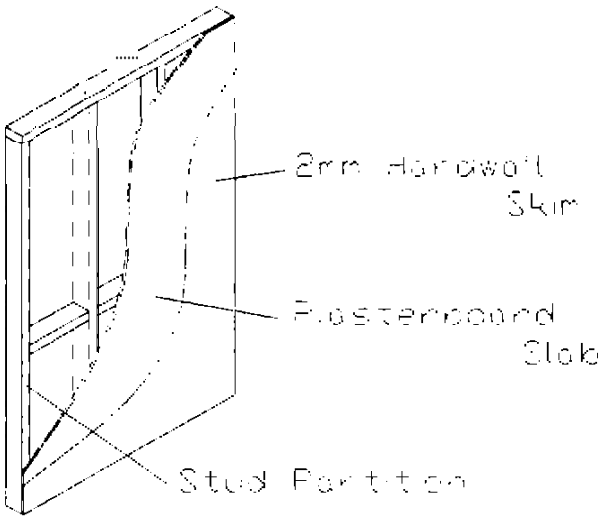
CEIST 6(I)

(SCUD COAT APPLIED AND ALLOWED TO SET.)

- Undercoat applied -- pushed well into the background, levelled and straightened. Undercoat scratched to form key.
- Finish coat applied, levelled and brought to a smooth or fine nap finish,
- Scud Mix -- 1 cement:2 sand; (or 1: 1 j
- Undercoat -- 1 cement:¼ lime : 3 sand -- 12 - 15mm thick
- Finish coat -- 1: ¼ : 4 -- 8 - 10mm thick

CEIST 6(II)

- Scud coat applied
- Undercoat applied, straightened. levelled and smoothed with wooden float
- Undercoat scratched to form a key
- Finish coat of gypsum wall finish (gypweld) mixed in bucket with clean water and applied to wall with steel float
- Finish coat levelled with straight edge and wooden float and finished smooth with steel float
- Hardwall sets in 2 - 3 hours.
- Scud treatment -- 1 : 2, cement, sand
- Scratch/Undercoat -- 1 : 3 + Plasticiser -- IO - 12mm thick
- Hardwall (Gypweld) Plaster -- 2/3mm thick



CEIST 6(m)

- Plaster slabs nailed to studs
- Joints, junctions at corners and between wall and ceiling jointed with **hardwall and** scrim
- Nail holes filled
- Board finish **hardwall (gyplath)** applied to slabs using steel float
- **Hardwall levelled** with wooden float **and** straight edge and finished to smooth **finish** with steel float.
- Plaster slabs **1** O/l **2mm** thick
- Joint filler **&** scrim
- **Hardwall/Gyplath** Plaster **&** water **2/3mm**

CEIST 6

PERFORMANCE CRITERIA	MAXIMUM MARK
(A) External block wall	
, Well proportioned **sketch**	4
Materials correctly described	4
Process correctly described and sequenced	4
Thicknesses of materials correctly stated	4
Proportions of mixes correctly stated	4
(B) Internal Block Wall	
Well proportioned **sketch**	4
Materials correctly described	4
Process correctly described and sequenced	4
Thicknesses of materials correctly stated	4
Proportions of mixes correctly stated	4
(C) Internal stud partition wall	
Well proportioned **sketch**	4
Materials correctly described	4
Process correctly described and sequenced	4
Thicknesses of materials correctly stated	4
Content of mis correctly stated	4
TOTAL	60

CEIST 7

CEIST 7(A)

Formulae: E = EB = EA x N x F x (FE / FB)
Room Area = 4.8m long x 3.6m wide = 17.28 m^2
Standard Overcast Sky = 5000 lux

. Average Daylight Illumination = (vertical illumination at window) x (efficient co. efficient)
= WA / RA
= 150(5000 / **2)** x (40%) x (WA: 17.28)
= 150 x 17.28 x 2500 x 0.4 x (WA)

• Window Area Required = (150 x 17.28) / (2500 x 0.4)
= 2592 / 1000
= **2.592** m^2

CEIST 7(B)

Softwood
Advantages:
. Timber traditionally used for window construction
. Best for traditional type windows such as cased window
. Environmentally friendly -- from renewable sources
. Traditional skills and processes arc used in the manufacturing process
. Good thermal insulation properties
. Other acknowledged advantages
Disadvantages:
. Needs regular maintenance
. Affected by seasonal climatic variation
. Other acknowledged disadvantages

UPVC
Advantages:
• Maintenance free
• Good thermal insulation properties
• Employed for most types of window design
. Not affected by dampness
. Does not rot
. Other acknowledged advantages
Disadvantages
. Environmentally damaging in manufacturing process
• Untested for extended exposure to sunlight
. Not in harmony with traditional buildings
. Other acknowledged disadvantages

CEIST 7

PERFORMANCE CRITERIA	MAXIMUM MARK
(A)	
Correct **calculation** (5 marks for each correct line to a maximum of 6 lines)	5 5 5 5 5 5
(B)	
Discuss in detail **2 advantages** and **1 disadvantage** OR **1 advantage** and **2 disadvantages** of 2 selected materials (5 marks for each of 6) (No mark greater than 5)	5 5 5 5 5 5
TOTAL	60

CEIST 8

CEIST 8A

(i) Conductivity

- Transfer of heat energy through a material without the molecules of the material changing their basic position.
- Materials have different rates of conductivity
- Non-metals tend to be poor thermal conductors
- Metals have free electrons which make them good thermal conductors
- Thermal conductivity (k) is measured in W/m°C

(ii) Transmittance

- Heat is transferred through an element of a building by a combination of conduction. convection and radiation
- The ease with which heat passes through an element is measured as the thermal Transmittance Coefficient or U-value
- Measure of heat loss per second through one square metre for one degree Kelvin difference in temperature
- U-value is measured in $W/m^{2o}C$

(iii) Heat Flow Rate

- Rate at which heat is transferred through a building element; W/m^2
- Conduction
- Convection
- Radiation

CEIST 8(B)

(i)

COMPONENT	THICKNESS (D)	CONDUCTIVITY (K)	RESISTANCE (Ω)
Internal Surface	standard		0.12
External Surface	standard		0.08
Glass	0.005 x 2	1.02	0.01 I1.02 = 0.0095
Air Space	0.01		0.15
		Total Resistance	0.359s

U-value = 1 / 0.3598
= 2.779 $W/m^{2o}C$

(ii)

Area of window = 1.5 x 4 = $6m^2$
Rate of heat loss for 1°C difference = 6 x 2.779

= 16.674 W

Rate of heat loss for 20°C difference = 16.674 x 20

= 333.4s W

CEIST 8

PERFORMANCE CRITERIA	MAXIMUM MARK
(A)	
Correct **explanation** and **symbol** for each of3 terms (5 marks for explanation + 2 marks for symbol)	7 7 7
(B)	
(i) Correct **calculation** **(5 marks** each for each of6 lines)	5 5 5 5 5 5
(ii) Correct **calculation** (3 marks each for each of 3 lines)	3 3 3
TOTAL	60

CEIST 9

CEIST 9(A)

Sources of Finance

- Building Societies
- Banks
- Local authorities
- County Councils
- Assurance companies
- Credit Unions
- Other recognised institutions

Deposit

- Necessary before seeking a mortgage or loan
- None of the institutions give out the full cost of purchasing or building

Criteria for Qualification for a loan or mortgage

- Ability to repay capital and interest over the period
- Secure employment
- Regular savers and investors
- House to be surveyed

Types of insurances required

- Mortgage Protection
- Life Assurance
- Property against flood, subsidence. storm damage etc
- Property against fire. explosion. lightning. leakage of water etc.
- Loss of or damage to contents of house. valuables
- Public liability
- Other applicable insurance

CEIST 9(B)

- First time purchasers or building a new house qualify for a grant of £3000
- No stamp duty on new house if under 125 square metres.
- Stamp Duty on second hand-house
- Building guarantee on new house
- Surroundings sometimes unfinished in new development
- Better standards of insulation erc in new house
- Convenient location in many older houses
- Better facilities often close to settled areas
- Other relevant points

CEIST 9

PERFORMANCE CRITERIA	MAXIMUM MARK
(A)	
t **2points** discussed under each of 4 headings	5
(**5** marks each to a maximum of 40 marks) 1 mark for each point listed but not discussed	5 5 5 5 5 5 5
(B)	
2 **merits** discussed in detail for each choice	5
(5 marks each to a maximum of 20 marks) 1 mark for each merit listed but not discussed	5 5 5
TOTAL	60

CEIST 10

Styles

- Elements of limited number of styles
- Uncontrolled incorporation leads to developments of dubious value
- Adopted styles varied or adapted to suit tradition and local conditions
- Continuity within the of architecture in a region of great importance
- Maintenance of a coherent sense of place and community
- Elements of the vernacular architecture of various Irish regions have often been abandoned
- Outside styles have not always been adapted to suit local conditions
- "Spanish arches"
- Unthinking adopting of styles unsuited to local conditions a problem

Climate

- Take account of the local climate
- Vernacular tradition
- Climate must be taken into consideration when new styles of design are adapted
- Elements of design developed to deal with high seasonal temperatures, for example designs must be modified to suit Ireland.

Location

- Suitable in the city out of place in a small town or countryside
- Acceptable to build tall houses in a city street to maximise use of space
- Maintain streetscape and atmosphere of city
- Style unsuitable in traditional village

Materials

- Cheaper to use locally available materials
- Also ensures that new development tits into local landscape

Skills

- Builders and workers available in locality have skills in building industry
- Knowledge of trade practices and materials based on local style of architecture
- Best harnessed by designing architecture which calls on best of their abilities.

Economic Status

- Economic status of those to live in particular design of housing has impact
- Their ability to maintain and service property
- Large country house of earlier times depended on a staff of servants
- Fell into disrepair when owners fell on lean times
- Similar factors must be considered when designing domestic architecture today.

Lifestyle

- Lifestyle changes at an unprecedented rate
- Once normal pattern of work division rare
- Likely to work outside the home
- Changed organisation within the home reflected in design of house
- Modern houses to demand less work to function efficiently
- Impact on room divisions. choice of floor coverings. types of windows and choice of building materials.

Social Factors

- Changes within society at many levels
- Social exclusion
- Provision of suitable integrated housing
- restraints. financial as well as social affects the choice of style

Fashion

- Fashions in domestic architecture tend to he fickle
- Legacy sometimes unfortunate

CEIST 10

PERFORMANCE CRITERIA	MAXIMUM MARK
Any 6 of the above points or other relevant points stared clearly and supported hy discussion. (10 marks each for each point to a maximum of 60 marks)	10 10 10 10 10 10
TOTAL	60

CEIST 10 OR

CEIST 10 OR (A)

- Badly needed office space
- Provides employment – in building and later in offices
- Progress – centre of urban area
- Use of space church unwanted
- Urban renewal – Life into the centre of the town/city/urban area/activity
- Ideal location – accessible-central
- Church as an eyesore – unkempt – looks had
- Could incorporate car parking in new development
- Other relevant arguments in favour of office development

CEIST 10 OR(B)

- Desecration of place of worship
- Damage to streetscape/atmosphere
- Heritage -history – link to the past
- Can be retained – retention order, can he renovated and preserved
- There may he use for a church in the future
- Can he converted to a museum or a dwelling house
- Possibilities as an art gallery or community centre
- Might be of use in tourism, FÁS etc.
- Might be used by other religious groups, as a common house of worship
- Other relevant arguments in favour of retention of church building

CEIST10 OR

PERFORMANCE CRITERIA	MAXIMUM MARK
3 well discussed **points in favour of the office block** (maximum of 10 marks each based on the quality of the arguments presented)	10 10 10
3 well discussed **points in favour of retention of the church** (maximum of 10 marks each based on the quality of the arguments presented')	10 10 10
TOTAL	60