

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI**

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI DISEMBER 2016

CC206: INDUSTRIALISED BUILDING SYSTEM

TARIKH : 01 APRIL 2017

TEMPOH : 2.30 PM – 4.30 PM (2 JAM)

Kertas ini mengandungi **DUA BELAS (12)**halaman bercetak.

Bahagian A: Soalan Pendek (10soalan)

Bahagian B: Struktur (4soalan)

Dokumen sokongan yang disertakan : Borang *IBS Score* & Jadual *IBS Score*

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A: 40 MARKS**BAHAGIAN A: 40 MARKAH****INSTRUCTION:**

This section consists of **TEN (10)** short questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **SEPULUH (10)** soalan pendek. Jawab **SEMUA** soalan.*

QUESTION 1**SOALAN 1**CLO1
C1

Industrialised Building System is a construction method which involves prefabricated components and on-site installation. List **FOUR (4)** main advantages of IBS systems that are popularly used in Malaysia.

*Sistem Binaan Berindustri adalah satu kaedah pembinaan yang melibatkan komponen pasang siap dan pemasangan di tapak. Senaraikan **EMPAT (4)** kebaikan sistem utama IBS yang popular digunakan di Malaysia.*

[4 marks]

[4 markah]

QUESTION 2**SOALAN 2**CLO1
C2

The government's policy on housing in Malaysia is that the conventional building practices must be replaced by Industrialised Building System (IBS). Nevertheless, the large numbers of building contractors are reluctant to apply IBS in their construction projects. Identify **TWO (2)** factors to support the statement above

*Di Malaysia, telah menjadi dasar kerajaan mengenai perumahan dimana pembinaan bangunan secara konvensional mestilah diganti dengan Sistem Binaan Industri (IBS). Walau bagaimanapun, kebanyakan kontraktor pembinaan enggan memohon untuk menggunakan sistem ini di dalam projek-projek pembinaan mereka. Kenalpasti **DUA (2)** faktor yang menyokong kenyataan di atas*

[4 marks]

[4 markah]

QUESTION 3

SOALAN 3

CLO1
C1

State **FOUR (4)** types of creativity precast panel of IBS.

Nyatakan EMPAT (4) jenis kreativiti panel pratuang dalam IBS.

[4 marks]

[4 markah]

QUESTION 4

SOALAN 4

CLO1
C2

Precast staircase is suitable to all types of buildings including residential, commercial and industrial applications. Describe the statement above.

Tangga Pratuang sesuai untuk semua jenis bangunan termasuk kediaman, komersil dan industri. Gambarkan keterangan di atas.

[4 marks]

[4 markah]

QUESTION 5

SOALAN 5

CLO2
C1

Discuss **TWO (2)** benefits of Modular Coordination

Bincangkan DUA (2) kebaikan Koordinasi Modular.

[4 marks]

[4 markah]

QUESTION 6

SOALAN 6

CLO2
C2

Describe **FOUR (4)** basis of Modular Coordination.

Huraikan EMPAT (4) asas Koordinasi Modular.

[4 marks]

[4 markah]

QUESTION 7

SOALAN 7

CLO2
C1

List **FOUR (4)** principles of IBS Score.

Senaraikan EMPAT (4) prinsip Skor IBS.

[4 marks]

[4 markah]

QUESTION 8

SOALAN 8

CLO2
C1

IBS Content Scoring System (IBS Score) is a systematic and structured assessment system. Explain the following terms:

Sistem Pemarkahan Kandungan IBS (Skor IBS) adalah penilaian yang sistematik dan system berstruktur. Jelaskan istilah-istilah berikut:

- a) IBS Scoring System /Sistem Pemarkahan IBS
- b) MS 1064

[4 marks]

[4 markah]

QUESTION 9

SOALAN 9

CLO2
C1

The problems existed in construction Industry such as comparative isolation of many designers practical construction process required the implementation of buildability.

Define the term "Buildability" in the context of the construction industry.

Masalah yang wujud dalam industri pembinaan seperti perbezaan pandangan dalam kalangan perekabentuk proses pembinaan yang memerlukan pelaksanaan konsep "kebolehbinaan". Apakah maksud "kebolehbinaan " dalam konteks industri pembinaan

[4 marks]

[4 markah]

QUESTION 10

SOALAN 10

CLO2
C2

The Government has to lead the construction industry in 2008, by ensuring that all public sector projects must achieve not less than 70% content of IBS under SPP Treasury circular 07/2008. Explain the relationship of higher IBS score obtained from the score calculation

Kerajaan telah menerajui industri pembinaan pada tahun 2008, dengan memastikan bahawa semua projek-projek sektor awam mesti mencapai tidak kurang daripada 70% kandungan IBS di bawah SPP Pekeliling Perbendaharaan 07/2008. Jelaskan hubungkait nilai skor IBS yang tinggi yang diperolehi dari pengiraan skor IBS.

[4 marks]

[4 markah]

SECTION B: 60 MARKS

BAHAGIAN B: 60 MARKAH

INSTRUCTION:

This section consists of **FOUR (4)** essay questions. Answer **THREE (3)** questions only.

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan esei. Jawab TIGA (3) soalan sahaja.

QUESTION 1

SOALAN 1

CLO1
C3

a) Demonstrate how IBS can contribute to sustainable and green construction in the future based on the following aspects:

Jelaskan bagaimana IBS boleh menyumbang kepada pembinaan yang mampan dan hijau pada masa depan berdasarkan aspek-aspek berikut:

CLO1
C3

i. Sustainability from controlled production environment.

Kelestarian dari persekitaran pengeluaran dikawal.

CLO1
C3

ii. IBS and waste

IBS dan sisa

CLO1
C3

iii. IBS and logistic

IBS dan logistik

CLO1
C3

iv. IBS and economic sustainability

IBS dan kemampuan ekonomi

[20marks]

[20 markah]

QUESTION 2

SOALAN 2

CLO1
C2

- a) Explain **TWO (2)** functions of facade

Terangkan DUA (2) fungsi fasad

[4 marks]

[4 markah]

CLO1
C2

- b) Precast Flooring has been used widely in commercial, industrial Stairs provide immediate access to working levels as construction proceeds. Discuss **FOUR (4)** advantages of precast staircase in the IBS building construction.

Tangga menyediakan akses mudah ke setiap aras ruang kerja mengikut tahap pembinaan. Bincangkan EMPAT (4) kelebihan tangga pratuang dalam pembinaan bangunan IBS.

[8 marks]

[8 markah]

CLO1
C3

- c) Precast half slab is a precast floor panel that is a direct equivalent of an in-situ slab which combines pre-cast and in-situ concrete. Illustrate **FOUR (4)** advantages of precast half slab used in a building construction.

Papak separa pratuang adalah satu panel lantai pratuang yang bersamaan langsung dengan papak in-situ yang menggabungkan konkrit pratuang dan konkrit in-situ. Terangkan EMPAT (4) kebaikan papak separa pratuang yang digunakan dalam pembinaan sesebuah bangunan.

[8 marks]

[8 markah]

QUESTION 3

SOALAN 3

Modular Coordination is concept to coordinate dimension and space for buildings and components which are dimensionalised and positioned in the basic units or modules. *Koordinasi Modular adalah satu konsep untuk menyelaraskan dimensi dan ruang untuk bangunan dan komponen yang berdimensi serta diletakkan di unit asas dan modul.*

CLO2
C2

- a) List **FOUR (4)** basis of Modular Coordination.

Terangkan EMPAT (4) asas koordinasi modular

[4 marks]

[4 markah]

CLO2
C2

- b) Many construction methods have been introduced in Malaysia because of innovation and technological improvements such as modular coordination. Explain clearly the **THREE (3)** importance of using Modular Coordination.

Pelbagai kaedah pembinaan diperkenalkan di Malaysia kerana inovasi dan peningkatan teknologi pembinaan seperti Koordinasi Modular. Huraikan dengan jelas TIGA (3) kepentingan menggunakan Modular Koordinasi.

[6 marks]

[6 markah]

CLO2
C3

- c) The modular reference system is to define coordinating spaces and zones for building elements and assemblies. Sketch **FOUR (4)** types of references in locating building elements and assemblies.

Sistem rujukan modular untuk menentukan ruang dan zon penyelarasan bagi elemen bangunan dan pemasangan. Lakarkan EMPAT (4) jenis rujukan dalam mencari elemen bangunan dan pemasangan.

[10 marks]

[10 markah]

QUESTION 4

SOALAN 4

Figure B4 shows the typical layout of a floor plan for one unit of Single Storey Bungalow House.

Rajah B4 menunjukkan pelan lantai bagi Rumah Banglo Setingkat.

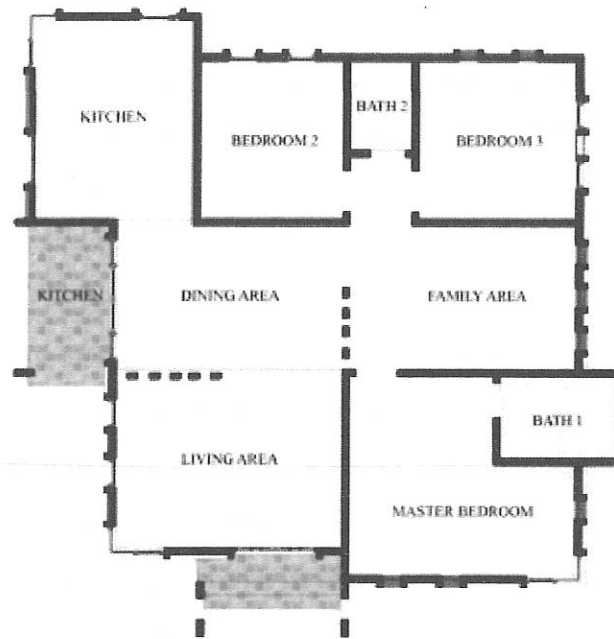


Figure B4/ Rajah B4

1) Construction Area / Luas Binaan

Construction area

Luas binaan

- | | | |
|-----|-------------------------|----------------------|
| i) | Construction floor area | : 140 m ² |
| | Luas binaan lantai | : 140 m ² |
| ii. | Construction roof area | : 140 m ² |
| | Luas binaan bumbung | : 140 m ² |

2) Structural Systems / Sistem Struktur

- | | | |
|------|----------------|--|
| i. | Beams | : Precast concrete beam |
| | Rasuk | : Rasuk konkrit pratuang |
| ii. | Columns | : In-situ concrete using steel formworks |
| | Tiang | : Konkrit in-situ menggunakan acuan keluli |
| iii. | Floor slab | : Precast concrete slabs |
| | Papak | : Papak lantai pratuang |
| iv. | Roof truss | : Prefabricated timber roof truss. |
| | Kekuda bumbung | : Kekuda bumbung prefabrikasi kayu |

3) Wall System / Sistem Dinding

- | | | |
|-----|---------------|---|
| i. | Internal wall | : Precast concrete panel = 160 m length |
| | Dinding dalam | : Panel Konkrit Pratuang = 160m panjang |
| ii. | External wall | : Precast blockwork = 220 m length |
| | Dinding luar | : Kerja Blok Pratuang = 220 m panjang |

4) Other simplified construction solutions / Lain-lain kaedah kebolehbinaan

- | | | |
|------|--------------------|-----------------------------------|
| i. | Beams : | 60% complies to MS 1064 |
| | Rasuk | 60% berpandukan MS 1064 |
| ii. | Columns : | 100% complies to MS 1064 |
| | Tiang | 100% berpandukan MS1064 |
| iii. | Walls and slabs : | Less than 50% complies to MS 1064 |
| | Dinding dan lantai | Kurang 50% berpandukan MS1064 |
| iv. | Doors : | 100% complies to MS 1064 |
| | Pintu | 100% berpandukan MS1064 |

- v. Windows: 0% complies to MS 1064
Tingkap 0% berpandukan MS1064
- vi. Horizontal repetition of structure = 90%
Pengulangan struktur secara mengufuk = 90%

[20 marks]
 [20 markah]

SOALAN TAMAT

NO SIRI :

ELEMENTS	AREA (m ²)/ Length (m)	IBS FACTOR	COVERA GE	IBS SCORE
Part 1: Structural Elements				
Total Part 1				
Part 2: Wall Elements				
Total Part 2				
Part 3: Other Simplified Construction Solutions				
Total Part 3				
IBS CONTENTS SCORE OF PROJECT (PART1 + PART2 + PART3)				

STANDARD INDUSTRI PEMBINAAN

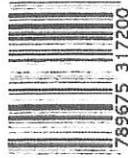
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Table 1. IBS Score For Structural Systems

SYSTEM	FLOOR	Precast concrete slab ⁽¹⁾	In-situ concrete on permanent metal formwork	In-situ concrete using reusable ⁽³⁾ system formwork	In-situ concrete using timber ⁽⁴⁾ formwork	Steel flooring system	Timber frame flooring system	No Floor ⁽⁶⁾
	COLUMN / BEAM ⁽⁵⁾							
CONCRETE	Precast column and beam	1.0	0.8	0.7	0.6	1.0	1.0	1.0
	Precast column and in-situ beams using reusable ⁽³⁾ system formwork	0.9	0.8	0.6	0.5	0.9	0.9	0.8
	Precast column and in-situ beams using timber ⁽⁴⁾ formwork	0.8	0.7	0.5	0.4	0.8	0.8	0.7
	Precast beams and in-situ columns with reusable ⁽³⁾ system formwork	0.9	0.8	0.6	0.5	0.9	0.9	0.8
	Precast beams and in-situ columns using timber ⁽⁴⁾ formwork	0.8	0.7	0.5	0.4	0.8	0.8	0.7
	In-situ column and beams using reusable ⁽³⁾ system formwork	0.7	0.6	0.5	0.3	0.7	0.7	0.6
	In-situ column and beams using timber ⁽⁴⁾ formwork	0.6	0.5	0.3	0.0	0.6	0.6	0.0
LOAD BEARING BLOCKWORK ⁽⁷⁾	Vertical and horizontal member systems / structure	0.8	0.7	0.6	0.5	0.8	0.8	0.7
STEEL	Steel columns and beams	1.0	0.9	0.7	0.6	1.0	1.0	1.0

Notes :

1. Precast concrete slab include half slab, hollow core slab, and precast prestressed planks.
2. Precast concrete include products of factory precasting, site precasting or the use of tilt-up systems.
3. Reusable formworks include plastic, fibreglass, steel, aluminium and other metal formworks that can be used not less than 20 cycles.
4. Timber formwork means the timber components are sized, cut and fabricated in-situ to form the formworks and the required temporary works.
5. For structural system using Load Bearing Wall, whether precast or in-situ, the factor can be determined from the table by treating the wall as a wide column.
6. The IBS factor for tunnel formwork system is 0.6.
7. Load-bearing blockwork include interlocking block, concrete masonry unit, hollow block and lightweight block.
8. This is for structures without floor. Refer examples in Section 6
9. For other structural systems not mentioned in the table please refer to IBS Centre, CIDB for the IBS Factor.

Table 1A provides the IBS factor, F_s for various types of roof system.

Table 1A. IBS Factor for Roof Structural Systems – F_s

NO	ROOF SYSTEM	IBS FACTOR
a.	Prefab timber roof truss	1.0
b.	Prefab metal roof truss	1.0
c.	Precut ⁽¹⁾ metal roof truss	0.5
d.	Timber roof trusses ⁽²⁾	0.0

Notes :

1. Precut means the metal section are cut and sized in factory but assembled in-situ.
2. Timber roof trusses means the timber components are cut, sized and fabricated in-situ to form the formworks and the required temporary works

Table 2. IBS Factor for Wall Systems

NO	WALL SYSTEM	IBS FACTOR
1	Precast concrete panel ⁽¹⁾	1.0
2	Wall cladding ⁽²⁾	1.0
3	Prefabricated timber panel	1.0
4	Full height glass panel ⁽³⁾	1.0
5	Dry wall system ⁽⁴⁾	1.0
6	In-situ concrete with reusable ⁽⁵⁾ system formwork	0.5
7	In-situ concrete with timber ⁽⁶⁾ formwork	0.0
8	Blockwork system ⁽⁷⁾	0.5
9	Pre-assemble brickwall / blockwall ⁽⁸⁾	1.0
10	Common brickwall	0.0

Notes :

1. Precast concrete panels include sandwich panel, solid panel and bay-window. Precast concrete includes products of factory precasting, site precasting or the use of tilt-up systems.
2. Wall cladding consists of panel acting as wall or facade and not as a skin to brickwall.
3. For full height windows, use the IBS Factor for panel glass. For wall with non-full height windows, take the highest or widest material e.g. brickwall, precast wall, glass, etc.
4. Precast dry wall include cementitious panels and composite gypsum boards.
5. Reusable formworks include plastic, breglass, steel, aluminium and other metal formworks that can be used repeatedly.
6. Timber formwork means the timber components are sized, cut and fabricated in-situ to form the formworks and the required temporary works. This is commonly referred to as stickbuilt formwork. Timber includes plywood.
7. Blockwork System either (loadbearing or non-loadbearing) includes hollow block, interlocking blocks, lightweight concrete blocks that can be laid on adhesive mortar.
8. Pre-assemble brickwall/blockwall means brick that being laid in form of a panel and transported to site.
9. Wall constructed using tunnel formworks, use Factor of 0.6.
10. For other wall system not mentioned in the table please refer to IBS Centre, CIDB for IBS Factor.

Table 3. IBS Score for Other Simplified Construction Solutions

No	DESCRIPTION	UNIT	IBS SCORE	
			PERCENTAGE OF USAGE	
			50% ≤ x <75%	75% ≤ x ≤100%
UTILISATION OF STANDARDISED COMPONENTS BASED ON MS 1064				
1	i) Beams ⁽¹⁾	Nos	2	4
	ii) Columns ⁽¹⁾	Nos	2	4
	iii) Walls ⁽¹⁾	m	2	4
	iv) Slabs ⁽¹⁾	m ²	2	4
	v) Doors ⁽²⁾	Nos	2	4
	vi) Windows ⁽³⁾	Nos	2	4
REPETITION OF STRUCTURAL LAYOUT				
a) For building more than 2 storeys				
2	i) Repetition of floor to floor height	Nos	1	2
	ii) Vertical repetition of structural floor layout	Nos	1	2
	iii) Horizontal repetition of structural floor layout	Nos	1	2
	b) For building 1 or 2 storeys			
	Horizontal repetition of structural floor layout	Nos	3	6

Notes :

1. Refer to MS 1064 : Pt 10 : 2001 Coordinating sizes and preferred sizes for reinforced concrete components. Values to use from the tables : beams and columns - width & depth, walls - width(thickness), slab-thickness.
2. Refer to MS 1064 : Pt 4 : 2001 Coordinating sizes and preferred sizes for door sets.
3. Refer to MS 1064 : Pt 5 : 2001 Coordinating sizes and preferred sizes for window sets.
4. Precast finished component/product means component that does not needs any finishes after installation on site such as plaster, skim coating and painting.
5. For structure using load bearing wall system, (without beams & columns) 8 marks is given automatically.
6. For non-concrete beams, columns, and slabs, 4 marks is given automatically for each component.
7. Other labour reducing products. Please provide details in the submission.