Name.....ID.....

Prince of Songkla University

Faculty of Engineering

Midterm Examination : Semester II **Academic Year : 2005**

Date : 13 December 2005 **Time : 09.00-12.00**

Subject :226-318 Industrial ceramics **Room : A400**

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ทุจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้นและพักการเรียน 1 ภาคการศึกษา

Instruction:

1. Do all 21.
2. The score appears at the end of question.
3. Total score is 100.
4. Your choices for problem no.1-18 are shown on page 5-10. For the answers you have to put 4 letters which is corresponding to the choice into | | | | | .
5. The answers must be done on page 2 and 3.
6. Book, notes and calculator are allowed.

Asst. Prof. Sane Thanthadalugsana

1. There are 4 plates. A is made of iron. C,D and E are made of copper alloy, Al-alloy and granite. Which is the lowest toughness? (4)
2. How do you find toughness of problem number one? (4)
3. What should you say about SiC and steel in term of hardness, toughness and thermal conductivity? (4)
4. From what is the plaster made ? (4)
5. How is plaster of paris useful for ceramic industry? (4)
6. On what factors do the fired clay color of the same firing temperature depend? (4)
7. What does it occur over the glazes at 1250^{o}C or higher? (4)
8. How are the low fired bricks shaped in mass production? (4)
9. Why is ball clay more plastic than white clay? (4)
10. What are the fluxes for low fired glazes? (4)
11. How do you decrease the moisture of stoneware body before bisque firing? (4)
12. How many stages of water elimination are there during clay body firing? What are they? (4)
13. There are 3 ceramic materials. They are silicon carbide, gypsum and feldspar. What are the hardest and the harder ones? (4)
14. What is the difference between HIP and hot pressing? (4)
15. How is a firebrick shaped? (4)
16. What is slip? For what is it used? (4)
17. How do you find true density of a firebrick? (4)
18. Why have the high clay mixture to be deaired before shaping? (4)
19. Given true density of a firebrick = 3.50 g/cc., apparent porosity =30% and bulk density = 2.10 g/cc. Find the sealed porosity. (12)
20. Given wt. of a dried brick = 2100 g., b = 2800 g. and wt. of brick after 5 hours immersion in boiling water = 2820 g. Find the absorption by weight after 24 hours cold immersion. (8)
21. Given wt. of a brick = 2.4 kgs, cold crushing strength = 150 kgs/cm^{2} , the thickness = 10 cm. The height of wall is 2 m. Find the percentage of work load ? (8)

A	B	C	D	Impact test.
B	A	C	D	Permeability test.
C	A	B	D	Crushing strength test.
D	A	B	C	Hardness test.

C	D	E	F	Model making.
D	C	E	F	Model and mold making.
C	D	F	E	Model and mold for pressing, jiggering and slip casting.
D	E	C	F	Mold for pressing and slip casting.

A	F	G	X	Firing atmosphere, chemical composition and time.
F	A	G	X	Firing temperature and time.
A	G	X	F	Chemical composition and firing time.
G	F	A	X	Firing atmosphere and temperature.

D	G	H	Y

Dry pressing.

G	D	H	Y

Extruder.

H	D	G	Y

Casting.

Y	H	D	G

Throwing.

C	F	G	K

HIP is hot pressing with isostatic pressure but hot pressing is not isostatic pressure.

F	C	G	K

HIP is the shaping for high value product but hot pressing is not.

G	F	C	K

HIP is good for shaping fire brick but hot pressing is not.

F	K	G	C

HIP is special shaping but hot pressing is not.

A	D	G	X

Incomplete reaction.

D	A	X	G

Complete reaction.

X	D	A	G

Reversible reaction.

G	X	D	A

Irreversible reaction.

F	G	H	K	Ball clay is more sticky.

G	F	K	H	White clay is softer.

K	G	F	H	There are more organic material and others in ball clay.

F	K	H	G	Ball clay is mixed with binder but white clay is not.

G	H	J	K	Boron and lead compounds.

H	J	K	G	Lead compound and feldspar.

H	G	K	J	Quartz and feldspar.

G	H	K	J	Boron compound and feldspar.

A	B	Q	R	The body is put into dryer.

B	A	R	Q	Leave the body in the open shelter for hrs or days.

Q	B	A	R	Leave the body under the sun.

A	Q	B	R	To fire the body at 200 $^{\circ}$C for hrs.

C	Q	X	R

Iron plate.

Q	C	R	X

Copper alloy plate.

C	R	Q	X

Al-alloy plate.

R	C	X	Q

Granite plate.

D	Q	Z	X

Hardness of SiC is heigher but toughness and thermal conductivity are lower.

Q	D	Z	X

Hardness of steel is heigher but toughness and thermal conductivity are lower.

Z	Q	X	D

Toughness of SiC is lower but hardness and thermal conductivity are heigher.

X	Q	Z	D

Thermal conductivity of SiC is lower but the others are heigher.

J	K	L	M

Felspar.

K	J	L	M

Clay.

L	K	J	M

The mineral gypsum.

J	K	M	L

Quartz.

K	D	F	J

Liquid of ceramics. Glazing.

S	T	U	V	3 stages. Mechanical, hygroscopic and chemical water elemination.

T	S	V	U	2 stages. Mechanical and chemical water elemination.

V	T	S	U	1 stage. Hygroscopic water elemination.

U	S	T	V	2 stages. Mechanical and hygroscopic water elemination.

C	R	Q	S	Gypsum is the hardest and the harder is silicon carbide.

R	C	Q	S	The hardest is silicon carbide and gypsum is the harder.

Q	R	C	S	The hardest is feldspar and gypsum is the harder.

S	Q	R	C	The hardest is silicon carbide and feldspar is the harder.

D	F	J	K	Liquid of suspended ceramics. Casting.

F	D	K	J	Solution of ceramic material. Casting.

D	K	J	F	Solution of ceramic material. Glazing.

K	D	F	J	Liquid of ceramics. Glazing.

A	D	K	L	To weigh the firebrick and calculate the volume.

D	A	K	L	To weigh the firebrick and find the true volume.

K	A	D	L	To make the powder from the brick and calculate the volume of brick.

A	L	K	D	To find the weight and the volume of the brick powder.

X	Y	R	S	To get the good quality of ceramic product.

Y	X	S	R	To get the good quality of glaze.

S	Y	R	X	To reduce the defects from buble.

R	S	X	Y	To reduce the cracks from buble.