

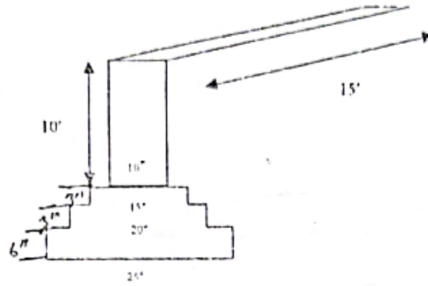
Full marks: 72

Time: 3 Hours

- N.B:- (i) Answer any SIX questions, taking THREE from each section.
 (ii) Figures in the margin indicate full marks.
 (iii) Use separate answer script for each section.
 (iv) Assume reasonable value for any data missing.

SECTION-A

- Q.1(a) Differentiate between malleability and brittleness. 2.00
 (b) Explain the rate of silica in brick clay to produce brick. 3.00
 (c) Discuss the short comings of natural drying of brick over artificial drying of brick. 3.00
 (d) The section of a brick foundation with wall is shown in figure below. Compute the number of bricks required. 4.00



- Q.2 (a) Critically evaluate why trench Kiln is popular than Hoffman's Kiln in Bangladesh. 4.00
 (b) Write down properties of 1st class brick. Mention field test of brick. 3.00
 (c) Write short note on "Grout Mortar" 2.00
 (d) "Sea water should not be used in making Mortar"-give reasons. 3.00
- Q.3 (a) Differentiate between plastering and pointing. 3.00
 (b) What is FRP? Explain its application in Civil Engineering field. 3.00
 (c) Mention the uses/applications of (i) veneers (ii) plywood (iii) Fibre boards. 3.00
 (d) Explain the role of vulcanization in producing rubber. 3.00
- Q.4 (a) Distinguish between upvc and pvc. Why upvc is so popular now -a days? 4.00
 (b) Enumerate the ingredients of an oil bone paints with examples and major roles. 4.00
 (c) Discuss the advantages of ferrocement over RCC. 2.00
 (d) Write explanatory note on "Synthetic Rubber Paints". 2.00

SECTION-B

- Q.5(a) "Sea sand is not suitable for construction" why is it so? State importance of F.M. 4.00
 (b) State principle of gradation. Explain importance of grading curve. 3.00
 (c) Define bulking of sand. Classify ASTM classification of fine aggregate. 3.00
 (d) What are "real" and "field" mix ratio. 2.00
- Q.6(a) State function of lime cement. Where do you recommend high alumina cement? 3.00
 (b) What are the raw materials used in manufacturing cement? What are the factors to be considered in site selection for cement factory? 4.00
 (c) Write down the reactions take place in hydration of cement. 3.00
 (d) Differentiate between initial and final setting time. 2.00
- Q.7(a) "Carbonation is advantageous to non-reinforcement," why? 3.00
 (b) What is Plasticizer? Discuss its role in concreting. 3.00
 (c) How bleeding affects concrete? State remedial measures against bleeding. 4.00
 (d) Find strength of concrete after 20 days in psi where strength of fully matured concrete is 450 kg/cm² [A = 32 B = 51]. 2.00

Time (days)	5	5	10
Temperature	20°C	15°C	10°C

- Q.8(a) Define workability. Explain procedure of slump test. 3.00
 (b) Write down uses of type II and Type III cement. 3.00
 (c) Design a 100 litre of concrete. Density of CA is 100 lb/ft³, G_{max} = 19 mm, sp.gr. of CA = 2.72, sp. gr. of FA = 2.68, FM of FA = 2.80, slump = 150mm, bulk volume of CA = 0.72, surface moisture of FA = 3%, w/c ratio for strength and durability respect are 0.55 and 0.48, required water is 200 kg/m³. Entrapped air = 2.5%. 6.00

Full marks: 72

Time: 3 Hours

- N.B:-**
- (i) Answer any **SIX** questions, taking **THREE** from each section.
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 - (iv) Assume reasonable value for any data missing.

SECTION-A

- Div. 20*
- | | |
|---|------|
| Q1(a) Differentiate between physical and mechanical properties of a material. | 3.00 |
| (b) Define and explain the terms (i) Stiffness (ii) Malleability (iii) Brittleness | 3.00 |
| (c) State the function of (i) Silica and (ii) Iron oxide in brick clay. | 3.00 |
| (d) Describe the harmful effect of lime and alkalis in brick earth. | 3.00 |
| Q2(a) Write down the causes, damages and removal techniques of efflorescence. | 4.00 |
| (b) Describe briefly the steps involved in preparation of brick clay. | 3.00 |
| (c) Compare the advantages and disadvantages of artificial drying over natural drying | 3.00 |
| (d) Write short note on Hoffman's Kiln. | 2.00 |
| Q3(a) What is grout mortar? Explain its application in civil engineering. | 3.00 |
| (b) Write short note on "Air Entraining Admixtures". | 3.00 |
| (c) "Sea water should not be used in making mortar" give reasons. | 3.00 |
| (d) Differentiate between plastering and pointing work. | 3.00 |
| Q4(a) Write short notes on (i) Log, (ii) Plank, (iii) Impreg timber. | 4.50 |
| (b) State the application of rubber in civil engineering works. | 1.50 |
| (c) Differentiate between thermo-plastic and thermo-setting plastic. | 3.00 |
| (d) Write down the advantages of ferro-cement over conventional building materials. | 3.00 |
- energy efficient*

SECTION-B

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|---|------|
| Q5(a) Define corrosion. Explain corrosion cell form in reinforcement embedded in concrete. | 3.00 |
| (b) Write short notes on uniform corrosion. Specify standards for half cell potential. | 3.00 |
| (c) Define fineness modulus. Why does gradation of aggregate necessary? | 3.00 |
| (d) Three different variety of sand A, B and C were mixed in the ratio 1:2:3 and there fineness modulus were 2.62, 2.32 and 2.80, respectively. Compute the combined fineness modulus. | 3.00 |
| Q6(a) Write down procedure and precaution in necessary setting time of cement in laboratory. | 4.00 |
| (b) Define normal consistency. Differentiate between <u>initial</u> and <u>final setting time</u> of cement. | 3.00 |
| (c) Write down function of lime in cement. | 2.00 |
| (d) Where does expansive cement be used? Explain the place of using rapid hardening cement. | 3.00 |
| Q7(a) How do you measure segregation? Do larger aggregate enhance strength of concrete? | 4.00 |
| (b) What is maturity of concrete? | 2.00 |
| (c) What are the factors affecting workability? | 2.00 |
| (d) Why does creep take place in concrete? Write down the effects of <u>size</u> and <u>shape</u> of aggregate on workability of concrete. | 4.00 |
| Q8(a) What are the effects of improper curing of concrete? Explain in details. | 3.00 |
| (b) Calculate gel/space ratio and theoretical strength of 200 cc cement with 0.6 w/c ratio for full and 70% hydration. Specific volume of cement is 0.319 ml/gm. Assume 1 ml of cement produces 2.06 ml of gel on hydration. | 3.00 |
| (c) Design a concrete mix for 200L of casting with the following data. Density of CA = 1450 kg/m ³ , G _{max} = 19.5 mm, specific gravity of CA = 2.70, specific gravity of FA = 2.64, FM of FA = 2.30, slump = 50 mm, K = 1, bulk volume of CA = 0.72, surface moisture of FA = 2.5%, w/c ratio are 0.60 and 0.45 for strength and durability, respectively. Required water is 150 kg/m ³ entrapped air is 3%. | 6.00 |

5.4
9.5

CE 203
 Engineering Materials

Full Marks: 70

Time: 3 Hours

- N.B.:-
- (i) Answer SIX questions, taking THREE from each section.
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 - (iii) Use separate answer script for each section.
 - (iv) Assume reasonable value for any data missing.

SECTION-A

- Q.1(a) What is the standard size of brick used in Bangladesh? Why does a frog mark place on the brick and why is it called frog mark? 3.00
- (b) Enumerate the adverse effects of alumina, Iron oxide, Lime and Alkalies on the quality of bricks if in excess in brick clay. 2.67
- (c) Differentiate between blending and temping operation of brick clay. 3.00
- (d) Calculate the number of bricks required to fill a block shaped brickwork having dimension of $5' \times 5' \times 5'$. 3.00
- Q.2(a) Describe the burning process of bricks in intermittent kilns. 3.00
- (b) Explain the tests to which bricks are generally subjected in the field. 3.00
- (c) Distinguish between Bullnose brick and perforated bricks. 3.00
- (d) "The tempering should be done exhaustively" - give reasons behind the statement. 2.67
- Q.3(a) Write a critical note on the Bangladeshi cement industry. 3.00
- (b) Write notes on: (i) Soundness Test (ii) Acid-resistant cement. 4.00
- (c) Distinguish between the quick setting cement and rapid hardening cement. 3.00
- (d) What are the harmful constituents of cement? 1.67
- Q.4(a) Describe the preparation of cement mortar. 2.67
- (b) Define the followings: (i) Grout, (ii) Gauged mortar, (iii) Lime plaster, (iv) Pointing. 6.00
- (c) Write down the causes of seasoning the timber. 3.00

SECTION-B

- Q.5(a) "Avoid the use of sea sand in construction works" - justify. 2.67
- (b) Define grading of aggregate. Why does gradation of aggregate important? 3.00
- (c) State bulking of sand. Explain counter-measure against Alkali Aggregate Reaction for new construction. 4.00
- (d) Calculate gel/space ratio and theoretical strength of 100 gm of cement with 0.6 w/c ratio for a hydration of 60%. [Assume specific volume of cement = 0.32 ml/gm and 1 ml of cement will produce 2.06 ml of gel on hydration]. $0.6:1$ 2.00
- Q.6(a) Differentiate between normal consistency and initial setting time of cement. Describe the procedure to measure slump value of concrete. 4.67
- (b) Calculate the proportion of materials required to cast 50 cft of concrete. Temperature of casting place is 15°C , dry rodded density of CA = 1550 kg/m^3 , $G_{\text{max}} = 20 \text{ mm}$, Specific gravity of CA = 2.69, Specific gravity of FA = 2.67, FM of FA = 2.78, slump = 20 mm, $K = 1.5$, bulk volume of CA = 0.77, w/c relates to strength and durability are 0.48, 0.51, respectively, surface moisture of FA = 2%, required water for non-air-entrained and air entrained concrete are 140 kg/m^3 and 135 kg/m^3 , respectively, entrapped air is 1%. $\frac{1}{4} = 0.25$ 7.00
- Q.7(a) Enumerate the effect of vulcanization on the properties of rubber. 2.67
- (b) What is FRP? How does fiber reinforcement improve the quality of FRP? Mention its uses. 4.00
- (c) Mention the advantages of uPVC over PVC. 2.00
- (d) Write a short note on "Plasticizer". 3.00
- Q.8(a) Define workability of concrete. State the types of curing. 3.00
- (b) How does bleeding affect permeability and bond loss in concrete? 3.00
- (c) Explain causes of segregation. 3.67
- (d) How can efflorescence be removed? 2.00

CE 2103

Engineering Materials

Time: 3 Hours

Full Marks: 72

- (i) Answer SIX questions, taking THREE from each section.
 (ii) Figure in the margin indicates full marks.
 (iii) Use separate answer script for each section.
 (iv) Assume reasonable value for any data missing.

SECTION-A

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|---|--------------|
| 1(a) What are the common properties of engineering materials? How do you select an engineering material? | 4.00
2.00 |
| 1(b) "Brick is an artificial stone" – explain. | 3.00 |
| 1(c) Enumerate the advantages of table moulding over ground moulding of brick. | 3.00 |
| 1(d) The soling work in a room of size 3m x 3.5m is to be carried out using 2nd class brick. Calculate the number of bricks required to carry out the soling. | 2.00
3.00 |
| 2(a) What are the tests carried out for sand? | 2.00 |
| 2(b) Define mortar and discuss its varieties on the basis of nature of application. | 3.00 |
| 2(c) State the procedure to carry out the tensile strength test of cement mortar. | 3.00 |
| 2(d) Explain the function of sand in mortar. | 2.00 |
| 2(e) Differentiate between uniform and gap grading of sand. | 2.00 |
| 3(a) Differentiate between wood and timber. | 2.00 |
| 3(b) Criticize natural seasoning with respect to artificial seasoning. | 3.00 |
| 3(c) Compare impreg timber with compreg timber. | 3.00 |
| 3(d) Write a critical note on plastic as an engineering material. | 3.00 |
| 3(e) State the uses of vulcanized rubber. | 1.00 |
| 4(a) Write short notes on: (i) Turpentine, and (ii) Cellulose paint. | 4.00
2.00 |
| 4(b) Differentiate between base and vehicle. | 2.00 |
| 4(c) Compare spirit varnishes with water varnishes. | 3.00 |
| 4(d) Discuss the scope of ferro-cement in Civil Engineering. | 3.00 |

SECTION-B

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|--|------|
| 5(a) Why does fine sand shows higher bulking than that of coarse sand? Write down some uses of low F.M. sand with higher F.M. | 4.00 |
| 5(b) Define principle of grading. "Sea sand is not suitable for construction of concrete member with reinforcement" – explain. | 2.00 |
| 5(c) Define specific gravity. How do you determine specific gravity of fine aggregate in the laboratory? | 3.00 |
| 5(d) Calculate gel/space ratio and theoretical strength of 200 cm ³ of cement with 0.55 w/c ratio for full and 60% hydration. [Specific volume of cement is 0.319 ml/gm, and 1 ml of cement produces 2.06 ml of gel] | 3.00 |
| 6(a) State functions of lime and gypsum in cement. | 3.00 |
| 6(b) Write down the characteristics of pozzolana cement. | 2.00 |
| 6(c) Differentiate the followings: (i) Initial & Final setting time, and (ii) False & Flash setting. | 4.00 |
| 6(d) What is the advantage of using rapid hardening cement? Calculate volume of hydrated product (if 500 gms. of cement is mixed with 100 gms. of water) after 60% hydration is completed. Relative density of hydrated gel is 1.75. | 3.00 |
| 7(a) How do you measure segregation of concrete? Explain the causes of segregation. | 4.00 |
| 7(b) What do you suggest if you find bleeding over concrete in the field? How does bleeding affect bond loss? | 2.00 |
| 7(c) Explain the effect of size, shape and texture of aggregate on workability of concrete. | 3.00 |
| 7(d) What is the internal cause of creep of concrete? How does maturity affect creep of concrete? | 3.00 |
| 8(a) How do you control sulphate attack to concrete? | 2.00 |
| 8(b) Define efflorescence. Explain its causes to take place. | 3.00 |
| 8(c) Design a concrete mix where the air temperature is -10 °C. Required compressive strength is 3500 psi (w/c ratios are 0.6 and 0.5, for the strength of 3200 and 4000 psi, respectively), water content is 190 kg/m ³ , air content is 2% and 2.5% for non air entrained and air entrained concrete, respectively. Absolute density of CA is 105 lb/ft ³ , bulk volume of CA per unit volume is 0.69, specific gravity of | 7.00 |