



Name :

Roll No. :

Invigilator's Signature :

CS / B.TECH (CT) / SEM-6 / CT-602 / 2011

2011

GLASS-II

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Objective Type Questions)

1. A. Fill in the blanks / Write Yes or No : $5 \times 1 = 5$
- i) is basically scrap glass.
 - ii) In glass the colour developed by colloidal gold is
 - iii) The crown of regenerator is made up of
 - iv) In glass batch mixing mixing is advantageous.
 - v) Furnace exit and IS machine entry viscosity of Gob is different. (Write Yes or No)
- B. Choose the correct answers : $5 \times 1 = 5$
- i) In oxidising furnace atmosphere the preferred nucleating agent is
 - a) TiO_2
 - b) B_2O_3
 - c) P_2O_5
 - d) MoO_3 .



- ii) The major crystalline phase in machinable glass ceramics is
- a) Fluorophlogopite b) Margarite
c) Phlogopite d) Paragonite.
- iii) Refractive indices (RI) of a glass is dependent on
- a) melting temperature of glass
b) annealing temperature
c) electron density / polarizability of the ions
d) none of these.
- iv) Griffith's equation for failure stress of glass is
- a) $\delta_f = \sqrt{\frac{2E \gamma}{\pi c^*}}$
b) $\delta_f = \sqrt{\frac{2 \gamma}{\pi c^*}}$
c) $\delta_f = \sqrt{\frac{2E \gamma}{c^*}}$
- v) Abbe number ν is
- a) $\frac{\eta_D - 1}{\eta_F - \eta_C}$
b) $\frac{1 - \eta_D}{\eta_F - \eta_C}$
c) $\frac{\eta_D - 1}{\eta_C - \eta_F}$



GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. Name six principal glass making raw materials. What problem is associated with using PbO in glass batch and how is it overcome ?
2 + 3
3. Explain the effect of CoO as colourant on glass batch.
Solve the following problem :
Glass composition 65 CaO – 35 SiO₂
Calculate the batch composition.
2 + 3
4. Give the expression of molar refractivity with R.I. How is molar refractivity of a compound A_xB_y related to ionic refractivity ? Why do chalcogenide glasses show high R.I. ?
1 + 2 + 2
5. Define glass-ceramic. Briefly explain the technological significance of glass ceramics with example.
1 + 4

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following.

3 × 15 = 45

6. Explain the working principle of glass tank furnace (bridge wall type). What are the chemical reactions take place during melting of glass batch ? What factors are to be considered during batch transportation ?
6 + 6 + 3
7. Briefly narrate the thermodynamic basis for phase separation. How phase separation by nucleation & growth process differs from that by Spinodal decomposition ? Describe how the melting / shaping and crystallization characteristics of glasses control the processing of glass ceramics.
5 + 5 + (2 × 2½)



8. Glasses based on BeF_2 have low R.I. ($n \approx 1.27$) whereas vitreous silica and vitreous boron oxide have high R.I. ($n \approx 1.458$). Why ? Draw and explain the effect of different alkali oxides on the R.I. of glass. What are optical dispersion and mean dispersion ? Briefly describe the mechanism of boron colour in amber glass. What is solarization ? Give the mechanism of solarization. $3 + 3 + 3 + 2\frac{1}{2} + 1 + 2\frac{1}{2}$
9. Write short notes on any *three* of the following : 3×5
- a) Mechurable glass ceramics
 - b) Photosensitive and photochromic glasses
 - c) Annealing of glass
 - d) Optical glass fibre
 - e) Batch house and batch mixing.

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