

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-V Examination-Nov/Dec.-2011

Subject code: 152601

Subject Name: Vulcanization

Date: 22/11/2011

Time: 2.30 pm -5.00 pm

Total marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Answer the following
i Write about the following forms of sulphur **06**
(1) Insoluble Sulphur (2) α Sulphur (3) β Sulphur

Q.1 (b) Answer the following
i Write a short note on Monsanto Rheometer. **05**
ii What are the advantages of Moving Die Rheometer over Oscillating Disc Rheometer? **03**

Q.2 (a) What is a basic principle to calculate the degree of shrinkage? How is it calculated? **06**

Q.2 (b) Answer the following
i How an assessment of state of cure of vulcanizate is done by physical method? **04**
ii Which are the desirable features of an accelerator from the processing point of view for vulcanization? **04**

OR

Q.2 (b) Answer the following
i Write about the characteristic properties of unvulcanized compound. **04**
ii Which accelerators are generally used as secondary accelerators? How they are useful in vulcanization and for vulcanizate? **04**

Q.3 (a) Answer the following
i Give the generally accepted reaction scheme for accelerated sulphur vulcanization. **05**
ii Write about the solubility of sulphur in rubber. **03**

Q.3 (b) Explain the basis on which peroxide vulcanization is superior than sulphur vulcanization? **06**

OR

Q.3 (a) How is sulphur vulcanization of rubber without accelerator carried out? Also mention the reaction chemistry associated with it. **06**

Q.3 (b) Answer the following
i Explain the peroxide vulcanization of unsaturated elastomer with suitable examples. **05**
ii Give the general classification of peroxides. Which type of peroxide radicals are suitable for crosslinking? **03**

- Q.4 (a)** Describe the effect of crosslink density and crosslink type on the following properties of vulcanizate. **07**
 (1) Resilience (2) Hardness (3) Fatigue
- Q.4 (b)** Answer the following
- i** What is an influence of temperature on the rate of vulcanization? **03**
 - ii** Write a short note on autoclave used as vulcanizing equipment. **04**
- OR**
- Q.4 (a)** Answer the following
- i** Which rubbers are cured by metal oxides? Why? **02**
 - ii** Define the following terms: (1) Crosslinking Efficiency (2) Optimum Cure **02**
 - iii** What do you mean by free sulphur? How is it determined? **02**
- Q.4 (b)** Discuss in detail about the Liquid Curing Method. **08**
- Q.5 (a)** Answer the following
- i** Describe the difference between hot air vulcanization and steam vulcanization. **06**
 - ii** How is sulphur dichloride vulcanization of rubber carried out? **04**
- Q.5 (b)** Explain the working principle of ultrasonic vulcanization technique. **04**
- OR**
- Q.5 (a)** Answer the following
- i** Explain about the prime compounding requirements of rubber to be cured by microwave. **04**
 - ii** What are the different ways to do vulcanization in water? Also give the advantages of water vulcanization. **04**
- Q.5 (b)** Give the name of the product for which the continuous vulcanization in high pressure steam is done. Also write about this method. **06**
