

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013****Subject code: 1724007****Date: 07-06-2013****Subject Name: Weathering of Rubbers****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

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

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|------------|------------|--|-----------|
| Q.1 | (a) | Discuss in detail about the thermo-oxidative degradation with its reaction mechanism. | 07 |
| | (b) | i Explain the basic phenomenon of mechanical degradation. Also give the parameters which affect the rate of mechanical degradation. | 04 |
| | | ii Why chain end degradation is termed as depolymerization? | 03 |
| Q.2 | (a) | List the different types of degradation agents. Explain their effects on rubber products. | 07 |
| | (b) | i Write a short note on photo stabilizers. | 05 |
| | | ii Which methods are available to prepare the test specimen for testing? | 02 |
| | | OR | |
| | (b) | i Which principle reactions are observed during photo degradation of rubber? | 04 |
| | | ii Which approaches can be made to improve ozone resistance of rubber? | 03 |
| Q.3 | (a) | Discuss the tensile stress strain properties measurement of rubber products. | 07 |
| | (b) | i Which indirect methods are available to monitor the ageing resistance? | 04 |
| | | ii Which considerations are made in durability test? | 03 |
| | | OR | |
| Q.3 | (a) | Discuss the compression set test to monitor the degradation. | 07 |
| | (b) | i Write down the factors which affect the choice of test parameters. | 04 |
| | | ii Hardness measurement is very attractive for monitoring degradation-Why? | 03 |
| Q.4 | (a) | Discuss the accelerated test by taking an example of suitable degradation agent. | 07 |
| | (b) | i How an evaluation of crack is done after ozone ageing? Also show the relationship between crack size, crack density and stain. | 05 |
| | | ii Define the following terms: (i) Weathering (ii) Artificial Weathering | 02 |
| | | OR | |
| Q.4 | (a) | Give the name of the test which is to be conducted to measure volume change of rubber. Discuss that test in detail. | 07 |
| Q.4 | (b) | Distinguish the types of fatigue tests. Discuss any one test in detail. | 07 |
| Q.5 | (a) | Discuss the Arrhenius relationship to access the permanent effects of temperature as a degradation agent. | 07 |
| | (b) | i Explain the construction and working of DIN abrader. | 05 |
| | | ii Define the following terms: (i) Storage Modulus (ii) Loss Modulus | 02 |
| | | OR | |
| Q.5 | (a) | What do you mean by oxidative induction time? Describe the methods to determine the oxidative induction time with suitable example. | 06 |
| | (b) | i Describe the ways to express abrasion test results. | 05 |
| | | ii Write a brief note on dynamic modulus. | 03 |
