

INDIAN RUBBER INSTITUTE

DIRI EXAMINATION – 2016

Paper - IV

Date: 23.07.2016

Time: 14.00-17.00 hrs.

Duration: 3 Hours

Full Marks : 100

Rubber Product Manufacturing and Their Evaluation

Answers should be illustrated with sketches wherever helpful

Total FIVE questions are to be answered. From Question No. 1 is compulsory. Answer FOUR from the remaining questions taking TWO from each group.

GROUP – A

1. (a) Select the right answers from the given alternatives.

- (i) Surgical gloves are made from latex by process.
(a) Dipping (b) Casting (c) Moulding (d) Extrusion
- (ii) The most widely used blowing agent for the production of Hawaii sheets is.....
(a) DNPT (b) Ammonium carbonate (c) Sodium nitrite (d) Ammonium chloride
- (iii) Tensile strength measurement of rubber is classified as a Test
(a) Mechanical (b) Thermal (c) Electrical (d) Chemical
- (iv) The maximum dirt content of ISNR - 5 grade of natural rubber is %
(a) 0.15 (b) 0.05 (c) 0.50 (d) 5.00
- (v) Shore durometer is used to measure of vulcanized rubber.
(a) Modulus (b) Hardness (c) Compression set (d) Resilience
- (vi) Mooney scorch time is the time required for the torque to rise units above the minimum
(a) 2 (b) 5 (c) 15 (d) 35
- (vii) Which is very specific operation in automotive tube manufacturing?
(a) Frictioning (b) Dipping (c) Splicing (d) Braiding
- (viii) The most suitable cord for V-belt reinforcement is
(a) Nylon (b) Rayon (c) Polyester (d) Cotton
- (ix) Endurance test is the test associated with
(a) Footwear (b) V-belts (c) Tyre (d) Cable
- (x) LPG (domestic gas) tubing should be made with
(a) SBR (b) Butyl rubber (c) EPDM (d) Polychloroprene

[Turn Over]

- (xi) Reclaim rubber may be used for
 (a) Aero tyre (b) Truck tyre (c) Cycle tyre (d) Passenger tyre tread
- (xii) 'Peel' test is associated with
 (a) Bond testing of fabric to rubber (b) Hose (c) Moulded rubber (d) Fabric abrasion
- (xiii) For acid resistant tank lining the most suitable rubber is
 (a) Natural rubber (b) SBR (c) Nitrile rubber (d) Hypalon
- (xiv) The term "toughability" is relevant for
 (a) Cable (b) V-belt (c) Tyre (d) Conveyor belt
- (xv) For tubeless tyre, air is carried by
 (a) Tread base (b) Side wall (c) Breaker (d) Inner liner
- (xvi) Rotocuring is related to
 (a) Cable (b) V-belt (c) Tyre (d) Footwear
- (xvii) "Tangent delta" is the ratio of
 (a) Storage modulus/ Loss modulus (b) Loss modulus/Storage modulus
 (c) Complex modulus/Loss modulus (d) Loss modulus/Complex modulus
- (xviii) Denier for a yarn is weight in gms for
 (a) 9000 mt of yarn (b) 900 mt of yarn (c) 90 mt of yarn (d) 1000 mt of yarn.
- (xix) The term LOI is related to
 (a) Ozone resistance (b) Fire resistance
 (c) Abrasion resistance (d) Chemical resistance
- (xx) Most important property of oil seal is
 (a) Tensile strength (b) Tear strength (c) Compression set (d) Resilience

1 x 20 = 20

2. (a) Explain with diagram the constructional patterns of Bias tyre, Bias-Belted tyre and Radial tyre.
- (b) Write a compound formulation for a truck tyre tread compound explaining the significance of each ingredient.
- (c) Name the different parts of bead region of tyre with appropriate figure.
- 3.(a) What are the different components of a V-belt and their specific functions?
 (b) Describe one method for V-belt curing?
 (c) Describe briefly the manufacturing steps for braided hose.

8 + 6 + 6 = 20

3 + 4 + 8 = 20

4. (a) How is latex compounding different from solid rubber compounding?
- (b) Give one example in each case for latex products made by dipping, extrusion and moulding.
- (c) Briefly describe the manufacturing process for any one of the latex products you mentioned along with the formulation.
- (d) Mention any two tests for the latex product you have discussed.

(5+3+10+2) = 20

GROUP - B

- 5.(a) Discuss the salient features and functions of the primary components of a hose.
- (b) Describe briefly the manufacturing steps for a braided hose.
- (c) What is neutral angle? How braiding angle is related to neutral angle and performance of the hose?
- (d) Give a typical formulation of a cover compound for oil resistant hose.

(4+10+3+3) = 20

6. (a) What do you mean by Shore A & Shore D ?
- (b) Explain $ML_{1+4}@100^{\circ}C = 90$
- (c) Using tensile testing machine, what are the properties you can measure?
- (d) Draw standard curves you get from Mooney viscometer and Rheometer.

5 +5 + 5 + 5 = 20

7. Name the processes and the product for which following equipments/instrument are required

- (i) Braider
- (ii) Ball mill
- (iii) Bag-o-matic press
- (iv) Triple head extruder
- (v) Autoclave
- (vi) 4 Roll calendar
- (vii) Rotocure
- (viii) Former
- (ix) b -scanner
- (x) Kneader

10 x 2 = 20

8. Write short notes on (Any Four)

- (i) Metal rubber bonding.
- (ii) Plunger testing of tyres.
- (iii) Goodrich Flexometer
- (iv) Preparation of any microcellular product.
- (v) Oil seal & gasket
- (vi) Shoe sole & heel.

4 x 5 = 20