INDIAN RUBBER INSTITUTE
DIRI EXAMINATION – 2018

Paper – IV

Date : 15ᵗʰ July, 2018
Duration : 3 Hours

Time : 14.00 – 17.00 hrs.
Full Marks : 100

RUBBER PRODUCT MANUFACTURING AND THEIR EVALUATION

Answers should be illustrated with sketches wherever helpful
Total FIVE questions are to be answered. Question number 1 is compulsory. Answer <u>four</u>
from the remaining questions taking <u>two</u> from each group

GROUP – A

1. Select the correct answer from the given alternatives:

(i)   The most widely used blowing agent for the production of Hawai sheets is
(a) DNPT (b) Ammonium carbonate (c) Sodium nitrite   (d) Ammonium chloride

(ii)   For acid resistant tank lining the most suitable rubber is
(a) Natural rubber   (b) SBR   (c) Nitrile rubber   (d) Hypalon

(iii)   The term "LOI" is related to
(a) Ozone resistance   (b) Fire Resistance
(c) Abrasion resistance   (d) Chemical Resistance

(iv)   For latex product the preferred accelerator is
(a) DPG   (b) TBBS   (c) ZDC   (d) MBTS

(v)   Tan delta value is a measure of
(a) Heat resistance   (b) Oil resistance   (c) Rolling resistance (d) Tear resistance

(vi)   Silica and silane coupling agent are most important for
(a) Green tyre technology   (b) Footwear technology
(c) Latex products   (d) V-belt technology

(vii)   Heat treatment is necessary for
(a) Rayon   (b) Glass   (c) Carbon fibre   (d) Nylon

(viii) Insulator is a component of
(a) V-belt   (b) Radial tyre   (c) Cable   d) Hose

(ix)   For tubeless tyre, air is carried by
(a) Tread base   (b) Side wall   (c) Breaker   (d) Inner liner

(x)   Rotocuring is related to
(a) Cable   (b) V-belt   (c) Tyre   (d) Footwear

(xi) Specific operation related to auto tube manufacturing is
(a) Splicing   (b) Braiding   (c) Frictioning   (d) Dipping

(xii) Heat build up of a tyre compound is measured by
(a) De Mattia flexing machine   (b) Goodrich flexometer
(c) Ross flexing machine   (d) Fatigue to failure

(xiii) Jacketless V-belt is superior to Jacketed V-belt in respect of
(a) Strength   (b) Better dimensional stability
(c) Wedging action   (d) Lower diameter of pulley

(xiv) Resilience of a rubber compound
(a) Increases with filler loading   (b) Increases with rise in temperature
(c) Increases with lowering of temperature   (d) Increases with increase of hysteresis.

(xv) In crescent tear test the result is expressed as
(a) Tearing load/thickness of sample
(b) Tearing load/original cross-sectional area of sample
(c) Tearing load/width of sample
(d) Tearing load only

(xvi) In expanded micro-cellular sheet production, decomposition of blowing agent should take place
(a) At any time during curing   (b) Simultaneously with on-set of curing
(c) Before on-set of curing   (d) After on-set of curing.

(xvii) 'H-pull' test associated with
(a) Moulded rubber   (b) Hose   (c) Farbric abrasion   (d) Bonding of textile cord to rubber

(xviii) Endurance test is the test associate with
(a) Footwear   (b) V-belts   (c) Tyre   (d) Cable

(xix) In Mooney Viscometer, rotor speed is
(a) 2 Revolution / Min.   (b) 100 Revolution / Min.
(c) 4 Revolution / Min.   (d) 5 degree Oscillation / Min.

(xx) Most important property of oil seal is
(a) Tensile strength   (b) Tear strength   (c) Compression set resistance   (d) Resilience

(20 x 1 = 20)

2. (a) What are the different components of a classical V-belt? Showing a proper diagram, explain their individual function.
(b) Write briefly the curing process of V-belts.
(c) What do you mean by life testing of V-belts?

(10+6+4) = 20

3. (a) Discuss the 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

4. (a) Define KOH number in NR latex. State its significance.
   (b) Indicate the basic principles for preparation of latex compound.
   (c) Mention at least four latex products.
   (d) Briefly describe the manufacturing process for **any one** of the latex products you mentioned along with the formulation.
   (e) Mention **any two** tests for the latex product you have discussed.

   (4+6+2+6+2) = 20

GROUP – B

5. (a) What are the carcass construction used in radial and bias tyre? Illustrate with sketches.
   (b) Write a compound formulation for a truck tyre tread explaining the significance of each ingredients.
   (c) Name the different components of bead of a tyre. Illustrate with sketches.
   (d) Briefly explain the function of bead in a tyre.

   (8+6+4+2) = 20

6. (a) Name the processes and the product for which following equipments/instrument are required
   (i) Bag-o-Matic press   (ii) Braider   (iii) Rotocure (iv) Ball mill   (v) Kneader
   (vi) Cross head extruder
   (b) State briefly, in a line or two, the significance of the following tests.
   (i) Iodine adsorption   (ii) Ash content   (iii) DBP   (iv) Aniline point.

   (6x2+4x2) = 20

7. (a) The tensile strength of a given rubber specimen was found to be 20 MN per sq. m and the dumbbell specimen that was cut to give a sectional width of 6.0 mm. If the load at break was 250N, calculate the thickness of the specimen.
   (b) What is meant by accelerated ageing?
   (c) Describe accelerated ageing test in relation to tensile strength and elongation at break.

   (8+4+8) = 20

8. Write short notes on (**any four**)
   (a) Fabric to rubber adhesion tests
   (b) Plunger testing of tyres
   (c) Electrical properties of cable
   (d) Drum friction test of conveyor belt
   (e) Oil seal & gasket
   (f) Rebound Resilience.

   (4 x 5) = 20