



**B.E DEGREE EXAMINATIONS: MAY 2017**

(Regulation 2014)

Sixth Semester

**AUTOMOBILE ENGINEERING**

U14AUTE15: Tyre Technology

**COURSE OUTCOMES**

- CO1:** Understand the Basics of tyres and its Components  
**CO2:** Understand the Fabric preparation & Calendaring process  
**CO3:** Understand the Tread Extrusion & Bead Construction  
**CO4:** Understand the building & curing of tyres

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. Match the following:

CO2 [K<sub>2</sub>]

A	Dynamic Stiffness	i	Nylon > Advanced Polyester > Rayon
B	Modulus	ii	Rayon > Advanced Polyester > Nylon
C	High Speed/ Runflat Tyres	iii	Rayon > Advanced Polyester
D	Fatigue Resistance	iv	Aramid > Steel > Rayon > Polyester > Nylon

- |    | A   | B  | C   | D   |
|----|-----|----|-----|-----|
| a) | i   | iv | iii | ii  |
| b) | ii  | iv | iii | i   |
| c) | iv  | ii | i   | iii |
| d) | iii | i  | iv  | ii  |

2. Calculate the Tyre Diameter P 210/60 R 15

CO1 [K<sub>3</sub>]

- |           |           |
|-----------|-----------|
| a) 633 mm | b) 668 mm |
| c) 642 mm | d) 588 mm |

3. .... protects the wire bead components from the rim

CO3 [K<sub>2</sub>]

- |            |                |
|------------|----------------|
| a) Chipper | b) Flipper     |
| c) Chafer  | d) Bead filler |

4. Chemicals that decrease or delay vulcanization process is CO4 [K<sub>2</sub>]
- a) Retarder b) Accelerator  
 c) Filler d) Sulphur
5. Which of these statements are correct CO2 [K<sub>2</sub>]  
 Requirements for cord-to-rubber adhesives
- A. No brittleness or flaking in processing  
 B. Intermediate modulus between cord and rubber Rapid rate of bond formation  
 C. Low fatigue resistance in the cured adhesive  
 D. Good bonding to both cord and rubber
- a) B, C & D b) A, B & C  
 c) A, B & D d) A, C & D
6. In the case of radial tires, the cured ply angles are in the range CO2 [K<sub>2</sub>]
- a) 85 – 90° b) 30 – 45°  
 c) 70 – 80° d) 16 – 25°
7. Consider the following effects CO2 [K<sub>2</sub>]
- i. Improper Roll temperature  
 ii. Improper running speed  
 iii. Low compound viscosity  
 iv. Improper warming of the compound
- The above effects lead to which one of the tyre defect?
- a) Lumps b) Crushed Fabric  
 c) Loose coating d) Crow's Feet
8. .... enhances high speed suitability CO4 [K<sub>2</sub>]
- a) Textile cord b) Steel cord  
 c) Side wall d) Cap ply
9. A ..... is defined as one minute of curing time at a constant reference temperature, CO4 [K<sub>2</sub>]  
 usually 287°F.
- a) Curing time of a tire b) Cure equivalent  
 c) Blow point d) Tread mass
10. Direction of Strands in opposite to direction of Cord CO2 [K<sub>2</sub>]
- a) Open cord b) Compact cord  
 c) High elongation cord d) Regular cord

**PART B (10 x 2 = 20 Marks)**  
**(Answer not more than 40 words)**

- |   |                       |
|---|-----------------------|
| 11. Explain the Types of Tyres, mention its advantages and disadvantages.   | CO1 [K <sub>2</sub> ] |
| 12. What is Awling in Tyres?  | CO4 [K <sub>2</sub> ] |
| 13. What is Die Swell? How it can be avoided?                               | CO3 [K <sub>2</sub> ] |
| 14. Define Vulcanization in Tyres.  | CO4 [K <sub>2</sub> ] |
| 15. Write a short note on Lang's lay cord?                                  | CO2 [K <sub>2</sub> ] |
| 16. What is Strand and cord?  | CO2 [K <sub>2</sub> ] |
| 17. Mention the defects that occur in Tyre Fabrics.                         | CO2 [K <sub>2</sub> ] |
| 18. State the Functions of Tyre Bead.                                       | CO3 [K <sub>2</sub> ] |
| 19. How does Hysteresis affect the tyres?                                   | CO1 [K <sub>2</sub> ] |
| 20. What is Bias angle, and how does it contribute to the tyre performance? | CO2 [K <sub>2</sub> ] |

**Answer any FIVE Questions:-**

**PART C (5 x 14 = 70 Marks)**  
**(Answer not more than 300 words)**

**Q.No. 21 is Compulsory**

- |   |                       |
|---|-----------------------|
| 21. Explain with a neat sketch the manufacturing of   | CO2 [K <sub>2</sub> ] |
| i) Nylon  | (8)                   |
| ii) Rayon   | (6)                   |
| 22. Explain with a neat sketch,   | CO1 [K <sub>2</sub> ] |
| i) Different tread patterns available, state their application, advantages and disadvantages? | (7)                   |
| ii) Internal mixer, its advantages and disadvantages, application.                            | (7)                   |
| 23. Explain   | CO4 [K <sub>2</sub> ] |
| i) Tyre Retreading process in detail.   | (8)                   |
| ii) Hot process retreading  | (3)                   |
| iii) Cold process retreading  | (3)                   |

24. i) Explain Four roll calendering? The different roll arrangements, advantages over two roll and three roll calendering, (8) CO2 [K<sub>2</sub>]  
ii) What is Frictioning and Skim coating? (6)
25. Explain with appropriate sketches the production steps involved in steel cord manufacturing? (9) CO2 [K<sub>2</sub>]  
Write a short note on  
i) Regular cord (1)  
ii) Open cord (2)  
iii) Compact cord (2)
26. Explain (8) CO3 [K<sub>2</sub>]  
i) Tread Extrusion, (2)  
ii) Parts of the Extruder with a neat sketch and (7)  
iii) How temperature, screw speed and other parameters affect the extrusion process. (5)
27. Explain Tyre Building process of radial passenger car tyres in detail with a neat sketch? (8) CO4 [K<sub>2</sub>]

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