Kripaa - Comprehensive Exam Generation Report

Snapshot ID: 1baad9e6-9263-444a-8625-1d4f4045387f **Generated:** 2025-11-26 05:38

Executive Summary

- **Total Raw Questions Processed:** 78
- **Unique Concept Groups (Variants):** 41
- **Compression Ratio:** 1.90:1
- **Total Candidates Generated:** 81
- **Final Questions Selected:** 27
- **Final Paper Marks:** 120

Trend Analysis Results

Year Range: 2015-2024 **Emerging Topics:** 4 **Declining Topics:** 1

Topic Analysis (Enhanced with Section-Awareness & Cyclicity)

Aim of maintenance engineering

- **Module:** Module-II
- **Status:** stable
- **Gap Score:** 1.0

- **Last Asked:** 2023

- **Section Distribution:** A=0%, B=100%, C=0%

- **Section Preference:** B

- **Average Difficulty:** 3.0

- **Cyclicity Pattern:** insufficient_data

- Confidence: 0%

Common troubles of electric motor

- **Module:** Module-V
- **Status:** stable
- **Gap Score:** 0

- **Last Asked:** 2024

- **Section Distribution:** A=0%, B=100%, C=0%

- **Section Preference:** B

- **Average Difficulty:** 3.0

- **Cyclicity Pattern:** insufficient_data

- Confidence: 0%

Sequence of fault-finding activities

- **Module:** Module-IV
- **Status:** stable
- **Gap Score:** 1.0

- **Last Asked:** 2023

- **Section Distribution:** A=0%, B=100%, C=0%

- **Section Preference:** B

- **Average Difficulty:** 3.0

- **Cyclicity Pattern:** insufficient_data

- Confidence: 0%

Relation of maintenance cost with replacement economy

- **Module:** Module-II
- **Status:** stable
- **Gap Score:** 0

- **Last Asked:** 2024

- **Section Distribution:** A=0%, B=100%, C=0%

- **Section Preference:** B

- **Average Difficulty:** 3.0

- **Cyclicity Pattern:** regular

- Appears every 1 years
- Next expected: 2025
- Confidence: 70%

Service life of equipment

- **Module:** Module-II
- **Status:** declining
- **Gap Score:** 0

- **Last Asked:** 2024

- **Section Distribution:** A=0%, B=100%, C=0%

- **Section Preference:** B

- **Average Difficulty:** 3.0

- **Cyclicity Pattern:** regular

- Appears every 1 years
- Next expected: 2025
- Confidence: 70%

Decision tree concept

- **Module:** Module-IV
- **Status:** stable
- **Gap Score:** 2.0

- **Last Asked:** 2022

- **Section Distribution:** A=0%, B=100%, C=0%

- **Section Preference:** B

- **Average Difficulty:** 3.0

- **Cyclicity Pattern:** insufficient_data

- Confidence: 0%

Pressure vessels

- **Module:** Module-I
- **Status:** stable
- **Gap Score:** 2.0

- **Last Asked:** 2022

- **Section Distribution:** A=0%, B=100%, C=0%

- **Section Preference:** B

- **Average Difficulty:** 3.0

- **Cyclicity Pattern:** insufficient_data

- Confidence: 0%

Wear - causes

- **Module:** Module-III
- **Status:** stable
- **Gap Score:** 2.0

- **Last Asked:** 2022

- **Section Distribution:** A=0%, B=100%, C=0%

- **Section Preference:** B

- **Average Difficulty:** 3.0

• **Cyclicity Pattern:** insufficient_data

• Confidence: 0%

Steps of preventive maintenance

• **Module:** Module-V
• **Status:** stable
• **Gap Score:** 2.0

• **Last Asked:** 2022

• **Section Distribution:** A=0%, B=100%, C=0%

• **Section Preference:** B

• **Average Difficulty:** 3.0

• **Cyclicity Pattern:** insufficient_data

• Confidence: 0%

Steps/procedure for periodic and preventive maintenance of machine tools

• **Module:** Module-V
• **Status:** emerging
• **Gap Score:** 1.0

• **Last Asked:** 2023

• **Section Distribution:** A=0%, B=100%, C=0%

• **Section Preference:** B

• **Average Difficulty:** 3.0

• **Cyclicity Pattern:** regular

• Appears every 1 years
• Next expected: 2024
• Confidence: 70%

LLM Qualitative Insight (from Trend Analysis)

Here's an analysis of the exam pattern shifts and recommendations:

1. Executive Summary

Analysis of recent exam trends reveals a significant shift towards practical and analytical application in Computer Science, particularly within maintenance and equipment management. Emerging topics emphasize preventive and periodic maintenance procedures, decision-making for electrical equipment faults, and the strategic importance of the repair cycle. Conversely, purely descriptive topics like 'service life of equipment' are declining. Several foundational concepts, including 'wear causes,' 'primary functions of maintenance department,' and 'fault tracing,' are overdue for recurrence, indicating their continued relevance. This pattern suggests a move away from rote memorization towards a deeper understanding of operational processes and problem-solving.

2. Practical/Analytical vs. Theoretical

The exam is definitively becoming more **practical and analytical**. The rise of topics like "Draw decision tree for problems in electrical equipment," "Steps/procedure for periodic and preventive maintenance," and "Importance of repair cycle concept" clearly indicates a shift towards applying knowledge, problem-solving, and understanding operational processes rather than just theoretical recall.

3. Specific Modules or Topics Becoming Critical

Critical modules and topics include: * **Maintenance Management & Strategy:** Emphasizing preventive, periodic, and predictive maintenance, understanding the repair cycle, and the primary functions of a maintenance department. * **Fault Diagnosis & Troubleshooting:** Specifically, the application of decision trees for electrical equipment and the concepts/importance of fault tracing. * **Equipment-Specific Knowledge:** Such as pressure vessels and general electrical equipment maintenance.

4. Strategic Recommendation for Students

Students should shift their preparation focus from purely theoretical recall to **application and problem-solving**. 1. **Practice Application:** Concentrate on understanding *how* to implement maintenance procedures, *how* to draw decision trees for fault diagnosis, and *why* certain maintenance strategies are preferred. 2. **Deep Dive into Emerging & High Gap**

Topics: Prioritize studying preventive/periodic maintenance, repair cycle concepts, and thoroughly review high-gap topics like 'wear causes,' 'primary functions of maintenance department,' and 'fault tracing.' 3. **Develop Analytical Skills:** Be prepared to analyze scenarios, evaluate maintenance strategies, and propose solutions rather than just defining terms. 4. **Focus on Procedures and Diagrams:** Expect questions requiring step-by-step procedures or graphical representations like decision trees.

Question Generation Strategy

Candidate Pool Breakdown

Origin Type	Count	Description
Historical	34	Reused from past papers
Generated Variant	21	LLM-rewritten variations
Generated Novel	26	New LLM-created questions

Section Distribution

Section	Candidates	Target Selection
A (Short)	30	10 questions
B (Medium)	36	12 questions
C (Long)	15	5 questions

Temperature Distribution (Multi-Temperature Ensemble)

Temperature	Count	Purpose
0.2	26	Conservative
0.5	35	Balanced
0.9	20	Creative

Voting & Selection Results

Selected: 27 / 81 **Excluded:** 54 **Selection Rate:** 33.3%

Exclusion Breakdown

Category	Count	Percentage
Rank Cutoff	32	59.3%
Section Mismatch	17	31.5%
Low Relevance	4	7.4%
Topic Cap	1	1.9%

Final Sample Paper

Paper ID: e87a1e6c-b19f-426f-942b-c32d6efb5fb5 **Total Marks:** 120 **Total Questions:** 27

Paper Structure

Section	Questions	Marks Each	Total Marks
A (Short)	10	2	20
B (Medium)	14	5	70
C (Long)	3	10	30
Total	**27**	-	**120**

Summary

This report documents the complete pipeline from {len(raw_questions)} historical questions to a {paper.total_marks if paper else 0}-mark predicted exam paper using:

1. **Enhanced Trend Analysis** with section-awareness and cyclicity detection

2. **Multi-Temperature Ensemble Generation** using gemini-2.5-pro (temps: 0.2, 0.5, 0.9)

3. **Section-Aware Voting** with detailed exclusion tracking

4. **Quality-Controlled Selection** ensuring diversity and relevance

All data is stored in PostgreSQL for transparency and reproducibility.