Ex/PRN/PC/B/T/424/2024

B.E. PRINTING ENGINEERING FOURTH YEAR SECOND SEMESTER EXAM 2024
QUALITY CONTROL IN PRINTING INDUSTRY

Time: 3hrs Full Marks: 100

(CO1, CO2, CO4) Answer any two of following questions

1. How can the use of quality control metrics help in continuous improvement in printing processes?. Discuss the importance of statistical process control (SPC) in maintaining quality standards during printing and packaging processes. How can control charts be used effectively in a printing setup? How do quality control tools such as, fishbone diagrams and histograms are utilized to optimize print quality in a flexographic printing setup? In what practical scenario within a printing and packaging environment would a scatter diagram be beneficial for analyzing the relationship between ink viscosity and print resolution to optimize print quality? [3+ 3+3 +6 + 5=20]
2. Describe the roles of key Six Sigma professionals, such as Black Belts and Green Belts. What are their responsibilities in leading and implementing Six Sigma projects? Explain the objectives of the Measure phase in Six Sigma as applied to the printing and packaging industry. How does this phase contribute to understanding and improving print quality and production efficiency? Discuss the role of data collection plans and sampling strategies in the Measure phase of Six Sigma. How do these plans ensure accurate and representative data for analysis? [8+4+4 +4=20]
3. Describe the DMAIC methodology and how it can be applied to improve print quality in a packaging manufacturing process. Describe two key benefits of implementing Six Sigma in a printing company. How can Six Sigma tools like Pareto analysis and Root Cause Analysis (RCA) contribute to quality improvement? Discuss the difference between defect detection and defect prevention. What is DPMO? [4+ (4+6) +6=20]

CO3, CO5 and CO6 (Answer any three of following questions)

1. Why is assessing substrate compatibility essential in the printing industry? Provide examples of substrates commonly tested for compatibility. Explain why proper dispersion is crucial for achieving consistent print quality? Draw the typical viscosity/time plots for a thixotropic system. How does ink viscosity impact ink transfer, color intensity, and drying characteristics during printing? Name instruments used to measure ink viscosity. How will you select specific equipment to measure the viscosity? Provide specific examples of how ink viscosity can be modified to optimize print quality on different substrates. [4+3+4+3+6=20]

2. What are the methods used to characterize and assess the quality of a solvent and how? What is refractive index? Odour is becoming of increasing concern to the inkmaker particularly in the field of food packaging- Justify your answer. Why is gloss measurement important in assessing print quality and appearance? How does ink flow affect print quality and consistency? Discuss potential issues related to insufficient or excessive ink tack during printing operations. [5+3+4+3+3+2=20]

3. What are the main international standards used in the printing industry to ensure quality control and standardization? Examine the role of international printing standards (e.g., ISO, ANSI/CGATS) in promoting interoperability and quality assurance in the printing supply chain. Provide examples of how these standards benefit printers, publishers, and consumers. Explain the principle of optical density measurement using a densitometer. Describe the relationship between ink density, light transmission, and densitometer readings . [4+8+4+4=20]

[Turn over

4. Describe the steps involved in a typical digital printing workflow from file submission to final output. How are digital proofs used to ensure accuracy and client approval? Explain the role of Raster Image Processing (RIP) in the digital printing workflow. How does RIP software convert digital artwork into printable raster images suitable for output on a printing device? What is job ticketing and tracking? [5 +5+6+4=20]

5. Explain the importance of following print performance test for paper, film and foil printing: i) Odor and taint, ii) Slip iii) Non-curl and vi) Cold-seal packaging . What is the drawback of PIRA automatic drying tester ? How do the pH variation control the quality of water based ink? Discuss the impact of paper or substrate characteristics on gloss levels in printing. How does substrate porosity, smoothness, and coating affect gloss uniformity and consistency? [8 +3 +3+6=20]