Q1. What are the limitations of the unit-specific event-based model of Ierapetritou and Floudas (1998) for batch scheduling? [3 M]

Q2. What is the purpose of 'idle task' used in the slot-based model of Sundaramoorthy & Karimi (2005)? [2 M]

Q3. Explain the meaning of following sequencing constraints used in the general-precedence based model of Mendez & Cerda (2002). [4 M]

$$T^s(i') \geq T^f(i) + CL_{ii'} + Su_j - M(1 - X_{ii'}) - M(2 - W(i,j) - W(i',j)) \quad \forall i, i' \in J_{ii'}, i < i'$$

$$T^s(i) \geq T^f(i') + CL_{i'i} + Su_j - MX_{ii'} - M(2 - W(i,j) - W(i',j)) \quad \forall i, i' \in J_{ii'}, i < i'$$

Q4. Explain the differences between cyclic scheduling and short-term scheduling. [3 M]

Q5. Explain the basis behind formulation of following inventory breakpoints in cyclic scheduling model of Pinto & Grossmann (1994). [5 M]

$$I1_{im} = I0_{im} + \alpha_{im} R_{im} \min\left\{ \sum_k T^s_{ik(m+1)} - \sum_k T^s_{ikm}, \sum_k T^P_{ikm} \right\}$$

$$I2_{im} = I1_{im} + \left(\alpha_{im} R_{im} - R_{i(m+1)} \right) \max\left\{ 0, \sum_k T^e_{ikm} - \sum_k T^s_{ik(m+1)} \right\}$$

$$I3_{im} = I2_{im} - R_{i(m+1)} \min\left\{ \sum_k T^P_{ik(m+1)}, \sum_k T^e_{ik(m+1)} - \sum_k T^e_{ikm} \right\}$$

$$I3_{im} = I0_{im}$$

Q6. Explain the differences between no-intermediate storage (NIS) and zero-wait (ZW) policies for batch vs continuous plants. [3 M]