Issue	Points to remember	Page
Slack and Float	**Slack:** Difference between L & E values as derived by the scheduling computations. **Float:** • **Total Float:** [LST – EST] or [LFT – EFT]. For all **CP** Activities, **Total Float = Zero.** • **Free Float:** Total Float **Less** Head Event Slack. If a negative value is obtained, then the Free Float is taken to be **Zero.** • **Independent Float:** Free Float **Less** Tail Event Slack. If negative value is obtained, the Independent Float is taken to be **Zero**.	19.5
PERT Features	1. **3 Time Estimates:** Optimistic (t_o), Pessimistic (t_p), and Most Likely (t_m) 2. **Expected Time** = $t_e = \frac{t_o + 4t_m + t_p}{6}$ 3. **Range** = $t_p - t_o$ 4. **Standard Deviation** = SD = $\frac{t_p - t_o}{6}$ 5. Variance = $\mathbf{SD^2} = \left[\frac{t_p - t_o}{6}\right]^2$ 6. Due to uncertainty in time estimates, the probability or chance that the project will be completed within the expected duration / critical path duration is only **50%.**	19.6
Probability Analysis in achieving completing date	1. Compute the Expected Time $t_e = \frac{t_o + 4t_m + t_p}{6}$ for each activity. 2. Draw the Network Diagram and update t_e for each activity. 3. Identify the Critical Path and compute T_{cp}, i.e. Duration of the Critical Path. 4. Compute Variance (as per Q.16 above), of all the activities on the **Critical Path**. 5. Compute Total Variances of all CP activities, (say V) and compute, Std Deviation (SD) = $\sqrt{V}$ 6. Find Standard Normal Variate (Z) = $\frac{T_r - T_{cp}}{SD}$, where T_r = Duration in which the project is required to be completed, T_{cp} = Duration of CP and SD = Std Deviation of the Critical Path 7. Obtain the value of Standard Normal Variate from the Normal Tables. Call this as NT (Z) 8. Compute Probability of completing the Project within the Required Duration = **0.5 ± NT(Z)**	19.7
PERT vs CPM	**CPM** / **PERT** 1. Activity Oriented. / Event Oriented. 2. Deterministic Model. / Probabilistic Model. 3. Dual Emphasis on Time and Cost. / Emphasis on Time. 4. Useful for projects of repetitive nature. / Useful for New Projects.	19.7
Project Crashing	Network Technique where the focus is on reducing the Project Duration to the Optimum Level, i.e. time that corresponds to the minimum costs.	19.8
Resource smoothing	Network Technique used for smoothening peak resource requirement during different periods / activities of the Project Network.	19.9
Resource Levelling	Network Technique used for determining the Project Duration, when there are restrictions on the availability of resources.	19.9
Network Table	**Columns Order for CPM:** 1. Activity, 2. Duration, 3. EST, 4. LST, 5. EFT, 6. LFT, 7. Total Float, 8. Free Float, 9. Independent Float. **Columns Order for PERT:** 1. Activity, 2. t_o, 3. t_m, 4. t_p, 5. t_e Duration, 6. EST, 7. LST, 8. EFT, 9. LFT, 10. Total Float, 11. Free Float, 12. Independent Float, 13. Variance.	

FTR 20 Learning Curve (Pages 20.1 to 20.3)

Issue	Points to remember	
Learning Effect	Phenomenon of improvement in the performance of a job because of the skill acquired by a person in doing that job repeatedly.	
Learning Curve	Geometrical progression, which reveals the steadily decreasing costs for the accomplishment of a given repetitive operation, as the identical operation is increasingly repeated.	
Application in Cost & Mgmt Accounting	1. CVP Analysis 2. Budgeting and Profit Planning 3. Pricing Decisions	4. Product Design 5. Contract negotiations 6. Setting Standards

Issue	Points to remember
Uses of Learning Curve	**1. Areas of Application:** (a) Aircraft Industry, (b) Manufacturing Industry with Labour–oriented Operations, (c) Jobs which are repetitive in nature particularly with same Machinery and Tools. **2. Impact on Costs:** Direct Labour Cost, Variable Overhead Cost, and sometimes Material Cost. **3. Management Accounting Areas:** (a) Analysis of Variable Overheads, (b) Standard Costing and Variance Analysis, (c) Pricing Decision for Incremental Orders, (d) Output Capacity and Impact on Costs, (e) Preparation of Direct Labour Budget.
Limitations	1. Non pervasive 2. Differential Rates of decrease 3. Non–Availability of data 4. Differential circumstances
Learning Ratio	$\frac{\text{Average Labour Time (or) Costs for first 2N units}}{\text{Average Labour Time (or) Costs for first N units}}$
Learning Curve Equation	1. $\mathbf{Y = AX^B}$ where – Y = Cumulative Average Time (or) Cost of 'X' Units or Lots X = Cumulative Number of Units or Lots produced A = Average Time (or) Cost of the first Unit or Lot B = Learning Co–efficient (or) Index of Learning = $\frac{\text{Logarithm of Learning Ratio}}{\text{Logarithm of 2}}$ When written as a Linear Equation in its logarithmic form, the Equation is **Log Y = Log A + B Log X.** 2. The above two equations define the Cumulative Average Cost. Either of them can be converted to a formula for the Total Labour Cost of all units produced upto a given point. Total Cost can be found out by the formula – **Total Cost = X** (units) × **Y** (Avg Cost pu) **= $AX^B \times X = AX^{B+1}$**

FTR 21 Simulation (Pages 21.1 – 21.3)

Issue	Points to remember	
Meaning	Quantitative procedure, which describes a process by developing a model of that process and then conducting a series of organised trial & error experiments to predict the behaviour of the process over time.	
Steps	1. Define the problem or system intended to be simulated. 2. Formulate the model intended to be used. 3. Test the model and compare its behaviour with the behaviour of the actual problem environment. 4. Identify and collect the data needed to test the model. 5. Run the simulation. 6. Analyse the results of the simulation and, if desired, change the solution that is being evaluated. 7. Return the simulation to test the new solution. 8. Validate the simulation, i.e. increase the chances that any inferences that may be drawn about the real situation from running the simulation will be valid.	
Appli–cations	1. Analysis of mathematical models of real–life systems 2. Making a **location analysis** 3. Planning military strategy, traffic control, management games & role playing, medical diagnosis, hospital emergency facilities, etc.	4. Learning about operating features of a new airplane, similar equipments, etc. 5. Study of electronic or hydraulic analog models of production processes or economic systems.
Merits and Demerits	**Advantages** 1. Easy understanding 2. Permits Model Experimentation 3. Allows Time Factor 4. Suitability 5. Cost Savings	**Disadvantages** 1. Lack of precision 2. Only Evaluation, Not generation of solutions 3. Time–consuming and long exercise. 4. Naïve approximations for major decisions. 5. Expensive, etc.
Models	1. Mathematical Models, 2. Physical Models.	
Monte Carlo Technique	**Use in Inventory Control:** Monte Carlo Simulation has the following applications in Inventory Control – (a) Determination of ROQ & ROL, (b) Computation of Stock–Out Costs and impact on profit, (c) Analysis of value of storage facilities for avoiding stock–outs and impact on profit, and (d) Analysis of demand distribution during lead time, etc.	