

Unit I — Foundations of Digital & Emerging Technologies

Emerging Technologies for Business | BMB IT 02

Unit I: Foundations of Digital and Emerging Technologies

Syllabus: Evolution of technology and the Fourth Industrial Revolution (Industry 4.0); introduction to digital transformation in business; overview of enabling technologies and business drivers; human-machine interaction; future trends in business technology adoption; introduction to programmable networks, devices and automation.

Exam Blueprint (2025-26 paper)

YE QUESTION BAAR-BAAR AAYA HAI

Section A ke **saat me se chaar questions** is unit se aaye — Fourth Industrial Revolution, digital transformation, human-machine interaction, aur programmable networks. Ye unit 2-markers ki khaan hai.

Topic	2025-26 paper	Marks
Fourth Industrial Revolution	Section A	2
Digital transformation	Section A	2
Human-machine interaction (example)	Section A	2
Programmable networks	Section A	2
Enabling technologies & business drivers	Syllabus	7
Future trends in technology adoption	Syllabus	7

1. Evolution of Technology — The Four Industrial Revolutions

1st (1784) MECHANISATION	2nd (1870) MASS PRODUCTION	3rd (1969) AUTOMATION	4th (2011-) CYBER-PHYSICAL SYSTEMS
Steam power Water power Mechanical looms	Electricity Assembly line Division of labour	Electronics Computers IT & PLCs	AI, IoT, Big Data Cloud, Robotics Blockchain, 3D printing
"Machines replace muscle"	"Factories produce at scale"	"Computers control the machines"	"Machines that think, sense and connect"

Revolution	Period	Core technology	Business impact
Industry 1.0	~1784	Steam and water power ; mechanical production	Factories replaced handicraft; the factory system was born
Industry 2.0	~1870	Electricity , assembly line, division of labour	Mass production ; economies of scale (Ford's Model T)
Industry 3.0	~1969	Electronics, computers, IT, PLCs	Automation of production; ERP; globalisation of supply chains
Industry 4.0	2011 onwards	Cyber-physical systems — AI, IoT, big data, cloud, robotics	Smart, connected, self-optimising factories and businesses; mass customisation

(Some writers now speak of **Industry 5.0** — putting the **human back at the centre**, with human-robot collaboration, sustainability and personalisation.)

1.1 The Fourth Industrial Revolution (Industry 4.0) — 2-mark question

DEFINITION - RATTA MAARO

The **Fourth Industrial Revolution (Industry 4.0)** is the ongoing transformation of industry and society through the fusion of **physical, digital and biological** systems — driven by cyber-physical systems, the Internet of Things, artificial intelligence, big data and cloud computing — where machines are **connected, intelligent and capable of autonomous decision making**. The term was popularised by **Klaus Schwab** of the World Economic Forum.

1.2 The Design Principles of Industry 4.0

Principle	Meaning
Interconnection	Machines, devices, sensors and people connect and communicate via IoT
Information transparency	Sensor data creates a digital twin — a virtual copy of the physical world
Technical assistance	Systems support humans in decision making and in physically difficult or unsafe tasks
Decentralised decisions	Cyber-physical systems make their own decisions locally and act autonomously

DEFINITION - RATTA MAARO

Cyber-Physical System (CPS) — a system in which physical machinery is monitored and controlled by computer algorithms, tightly integrated with the internet and with users. *Example:* a smart factory machine that senses its own wear and books its own maintenance.

DEFINITION - RATTA MAARO

Digital twin — a live virtual replica of a physical object, process or system, continuously updated by sensor data, used for simulation, monitoring and prediction.

1.3 Technologies of Industry 4.0 (the nine pillars)

1. **Big Data and Analytics**
2. **Autonomous Robots**
3. **Simulation and digital twins**