MINIMUM CORE SUBJECT AREAS: BUILDING SERVICES ENGINEERING

AREA	SUBJECTS / DESCRIPTION	RECOMMENDED CONTACT HOURS
A recommendation of 30 hours from each area in Group 1 and 30 hours each from 2 out of 5 areas in Group 2.		
Group 1: 30 hours from each area below:		
1. Heating, Ventilation and Air-Conditioning (HVAC)	- selected topics such as psychometry; thermal comfort; thermal load calculations; ventilation design; HVAC systems and equipment; air duct design and space air diffusion; refrigeration systems; measurement and verification; chemical treatment for water system; etc.	30
2. Electrical Services	- selected topics such as power supply and distribution; load estimation; electrical safety and protective devices; overcurrent protection; protection against electric shock; earthing and bonding systems; emergency and standby power; testing and commissioning, regulations and code; lightning protection system; etc.	30
3. Fire Services	- selected topics such as fire characteristics and hazards; fire safety and code requirements; water-based systems; gas-based systems; fire detection and alarm systems; smoke control and fire engineering approach	30
4. Utility Services	- selected topics such as plumbing engineering; water supply systems; sanitation and drainage systems; steam systems; fuel gas supply; telecommunication services; extra low voltage systems; vertical transportation; heat recovery; etc.	30
Group 2: 30 hours each from at least 2 out of 5 areas below:		
1. Lighting Engineering	- selected topics such as light and colour; principles of vision; human eye; light sources and luminaires; lighting design and calculations; daylighting design; lighting energy management; light pollution, etc.	30
2. Project and Engineering Management	- selected topics such as building contract administration and procurement; project planning and control; tendering processes; site organization and safety management; dispute resolution; decision making; engineering management	30
3. Smart Cities and Sustainable Built Environment	- selected topics such as retro-commissioning (RCx); Internet of Things (IoT), carbon reduction, carbon neutrality, artificial intelligence; renewable energy; solar photovoltaic systems, new energy vehicle charging systems; climate change resilience and adaption; noise and acoustic control in building etc.	30
4. Asset Management and Best Practices for Operation and Maintenance	- selected topics such as asset management; chiller plant optimization; data analysis and data mining; best practices for operation and maintenance; basic financial techniques for building services engineers; etc.	30
5. Building Information Modelling and Integrated Building Services Engineering Design	- selected topics such as Building Information Modelling (BIM) for building services engineering system modelling; sizing and calculation; cost estimating; clash detection; integrated building services engineering design, and building performance modelling, integrated building project design and development from its preliminary design phase to construction planning through teamwork on BIM platform; MiC, MiMEP and DfMA; etc.	30