

the area after completion of the quarrying process. Awareness campaign should be conducted among people about the various impacts of soil quarrying and levelling of hillocks, present state of hill ecosystems, finite character of the resource, use of alternative materials and immediate need for control measures.

Module II

- 10 a) Can we stop the soil quarrying from hills? Justify your arguments. (3)
- b) What are the impacts of soil quarrying on the eco system? (3)
- c) Can such local environmental issue be an example also for resource degradation? Justify. (4)

Stories/Cases/Data set - 3

(Stories/Cases/Data set)

Water supply management systems are becoming increasingly complex and instrumented requiring a rich set of features to deal with the complexity efficiently. Automation and “smart” water management software centred on powerful dash boarding, background analytics, management through exception and codifying standard operating procedures can be a solution to this complexity. Such a system was proposed for Bangalore city supports customizable key performance indicators (KPIs), business rules for managing water flow, real time reporting on a rich geo-spatial visual. This provides pro-active alerts to commonly occurring disruptions and optimization such as pressure management to reduce energy bills or water loss from leakage. Real time data and continuously refinement of water flow equations provide higher levels of precision for water supply, audit and balance. The software could control actuators, pumps, valves to automate water operations with far greater precision.

Module III

- 11 a) Describe the given case as an Environment Management System. (3)
- b) Propose a modified system to your campus. (3)
- c) List steps to get an ISO certification to your proposal. (4)

Stories/Cases/Data set - 4

(Stories/Cases/Data set)

Infosys, a global Consulting and Technology leader, has been awarded the LEED (Leadership in Energy and Environmental Design) India ‘Platinum’ rating by Indian Green Building Council (IGBC) for its Software Development Block 1 (SDB 1) at its Pocharam campus in Hyderabad.

Key features of this building include:

- **Water Efficiency:** 48% reduction in overall water consumption through the use of efficient plumbing fixtures and by water recycling. 100% of waste water from the campus will be treated on site, helping in the reduction of potable water consumption.
- **Energy Efficiency:** The building is 40% more efficient than the globally accepted ASHRAE standard. This has been achieved through an efficient building envelope including high performance glazing and adequate shading, radiant cooling system, efficient chillers, pumps and fans, efficient lighting system and smart building automation.
- **Day lighting:** Over 90% of the office space has natural light, reducing the need for artificial lighting during daytime. The design includes light shelves along all windows to ensure that the natural light travels as deep into the building as possible.
- **Efficient Material Selection and Management:** Recycled materials account for 18% of the total value of materials in the building; these include aluminium, glass, steel, plywood and tiles among others. 38% of the total project material by cost was manufactured regionally thereby reducing pollution due to transportation.

Module IV

- 12 a) Energy efficiency has been given more weightage in the rating systems than all other aspects. Justify this. (3)
- b) What are the additional aspects (than given in the case) to take care for a green building. (3)
- c) How LEED Green Building Rating System can function as a benchmark for design, construction and operation of high performance green buildings. (4)

Stories/Cases/Data set - 5

(Stories/Cases/Data set)

According to the study conducted by the International Energy Agency (IEA), petrochemicals are becoming the largest drivers of global oil demand, outperforming cars, planes and trucks. The petrochemicals- components derived from oil and gas that are used in products such as plastics, fertilisers, packaging, clothing, digital devices, medical equipment, detergents and tyres and modern energy systems like solar panels, wind turbines, batteries, thermal insulation and electric vehicles – have become an integral part of human life. Petrochemicals are one of the key blind spots in the global energy debate, especially given the influence they will exert on future energy trends. They will have a greater influence on the future of oil demand than cars, trucks and aviation. They provide substantial benefits to society, including a growing number of applications in various cutting edge, clean technologies critical to sustainable energy systems. However the production, use and disposal of petrochemical- derived products present a variety of climate, air quality and water pollution challenges that need to be addressed. To address these challenges, a Clean Technology Scenario (CTS) which provides an alternative future in line with key UN Sustainable Development Goals such as climate action and responsible consumption. CTS recommends slashing air pollutants from primary chemicals production by almost 90% by 2050 and reducing direct CO₂ emissions by 60% . It also suggests reducing water demand by 30%.

Module V

- 13 a) How petrochemical derived products influence pollution? (5)
- b) Suggest ways to reduce the emission of Greenhouse gases. How each option benefits the environment? (5)

Stories/Cases/Data set - 6

(Stories/Cases/Data set)

Sponge City is the concept popular in China, a city that can hold clean, drain water in a natural way, using an ecological approach. It retains water for its own use. Permeable materials shall be replaced by grass and gardens to allow sustainable drainage. Cities should have separate rainwater from the sewer system, which enables the waste water treatment plants to function properly without being overburdened. Flood plains has to be restored, as they are absolutely necessary for flood protection; preventing all sorts of development activities. Illegal sand mining, rapid urbanisation leading to encroachment of water bodies, unplanned tourism and lack of proper administrative discipline facilitates the worries of generations on flooding.

Module VI

- 14 a) What benefits are expected from the concept “sponge city”? (5)
- b) How this concept can be applied in Indian context. (5)
