Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B. ARCH. DEGREE EXAMINATION – JAN/FEB 2018

SUBJECT: ARC-14-409.3 - ADVANCED BUILDING SERVICES

(2014 SCHEME)

Thursday, February 01, 2018

Time: 10:00 – 13:00 Hrs. Max. Marks: 50

- **Answer any FIVE Questions fully.**
- **Give neat sketches wherever relevant.**

1A. Explain the points to consider while deciding on the size of underground water tank (UGT) and over head water tank (OHT) for a multi-storeyed residential apartment building.

1B. How do you decide on the specifications of pump for multi-storied residential apartment building?

1C. Describe the parameters considered while deciding on the sprinklers for fire-fighting in an office building.

(3+3+4 = 10 marks)

2. Explain in brief the basic components processes of a sewage treatment plant (STP).

(10 marks)

3A. Explain with an example how you would arrive at the area requirement of transformer and substation in the case of a multi-storied office building.

3B. What is the basic logic of deciding number of circuits and the size of conductor in building electrification?

(5+5 = 10 marks)

4. An office space 5 x 5 m in area and 2.5 m in height, is located on an intermediate floor of a large building. It has (only) one exposed wall facing south, all other walls adjoin rooms kept at the same temperature: T =Ti. The ventilation rate is three air changes per hour. Three 100W bulbs are in continuous use to light the rear part of the room, which is used by four clerical workers. The exposed 5 x2.5 m wall consists of:

(i) A single glazed window, 1.5m x5 m and

(ii) A brick masonry wall, 200 mm thick, rendered and plastered 1m x 5 m

Climatic information, for critical time: Out-door temperature = 27°C

- Desired internal temp 20°C
- Incident radiation (I) on southern wall= 580 W/m^2
- U value for glass = 4.48 W/m^2 degC
- U value for brick masonry (20 cm thick) wall = 0.5 W/m^2degC

- Coeff. of absorption of the wall surface (a) = 0.4
- Surface conductance (fo), = 10 W/m^{2}degC
- Solar gain factor for window (θ) = 0.75
- Volumetric specific heat of air = 1300 W/m^{3}degC

4A. Explain the procedure of arriving at duct-size if desired thermal condition is to be achieved by supply of cool-air?

4B. What all options the architect has in various stages of decision making?

(6+4 = 10 marks)

5. A govt. building is of rectangular plan with G+14 floors of single occupancy and all floors are of height of 3.2m with area/floor of 2000m^2. Use the following for decision making:
Occupancy: 15 m^2 /person; Estimated Round Trip Time for 20 capacity car = 152 sec.

5A. Determine the number of lifts required
(Handling capacity for single occupancy office buildings shall not be less than 15% as per NBC)

5B. What are the various options available at different stages of decision making and what are the implications of those options?

(6+4 = 10 marks)

6. **Explain the following:**

6A. Capacity estimation of stand-by electric power for a residential building

6B. Energy saving aspects of chilled water system of air-conditioning

6C. Parameters affecting Round-trip time and their implications in elevator planning

6D. Need for approximate estimation of building services before actual design of buildings

(2½ marks × 4 = 10 marks)