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නව/පැරණි නිර්දේශය - புதிய/பழைய பாடத்திட்டம் - New/Old Syllabus

NEW/OLD

අධ්‍යයන පොදු ජනකික පනු (උසස් පෙළ) විභාගය, 2020
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2020
General Certificate of Education (Adv. Level) Examination, 2020

සිවිල් තාක්ෂණවේදය II
குடிசாரத் தொழினுட்பவியல் II
Civil Technology II

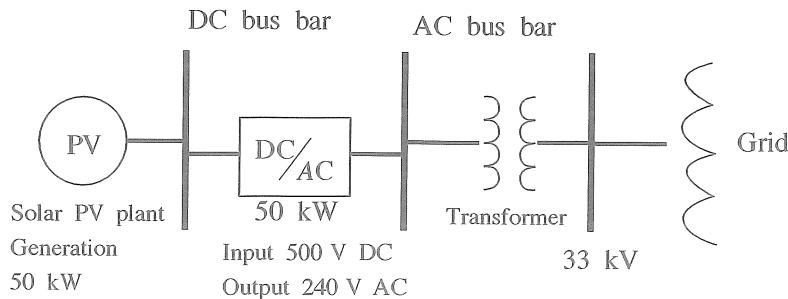
14 E II

Essay

* Select two questions from each of the Parts B and C and answer four questions only.
(Each question carries 15 marks.)

Part B

5. The Covid-19 is a recent pandemic situation that affected the whole world. During this pandemic certain technical and non technical measures have been taken in order to prevent the spread of the viral infection.
- Briefly explain how 'social distancing' was used to prevent spread of Covid-19.
 - Briefly explain two other non technical measures that were used to prevent the spreading of the virus.
 - Describe three modern technology applications can be used to control the spreading of the virus.
6. Solar PV plants are developed in Sri Lanka to enhance the renewable energy component of the power supply mix. A large number of small capacity solar PV panel units are interconnected in a solar plant. Output voltage from a solar PV module will vary depending upon the availability of sunlight. A module has a nominal power and maximum voltage output. These units can be connected in series and or in parallel to obtain the required voltage and current outputs. Output of a collection of solar modules will be connected to a DC to AC converter and then a transformer is used to convert AC voltage to the relevant grid voltage. (refer the detailed diagram given below)



PV Solar module data (for one unit)

- Power : 200 W
- Voltage V_{max} : 50 V








- Compute the number of PV modules to be used in a Solar PV plant of 50 kW.
- Assume that the width and length of a solar PV unit is 34" and 52" respectively. Compute the total area required for this plant.
- A DC bus voltage of 500 V is required at the DC to AC converter. Suggest a methodology to generate the required DC voltage from the given PV modules.
- Suggest a method to supply electricity from the solar PV plant during the night when electricity from the main grid is not available.

(e) Describe two benefits for Sri Lanka in using solar PV plants.

7. Generation and unsafe disposal of plastic waste is an ongoing issue in Sri Lanka. Even though we use 'safe' plastics to wrap food, being poly-carbonate compounds, they tend to bond with harmful chemicals in unregulated disposal sites. The leachate (i.e. liquid waste) and micro-plastics produced tend to contaminate surface and groundwater bodies, and the marine environment. These pollutants enter the food chains of human beings and animals.

Figure shows the classification system developed by the Society of Plastic Industry, in 1988.

WHAT DO RECYCLING SYMBOLS ON PLASTICS MEAN?

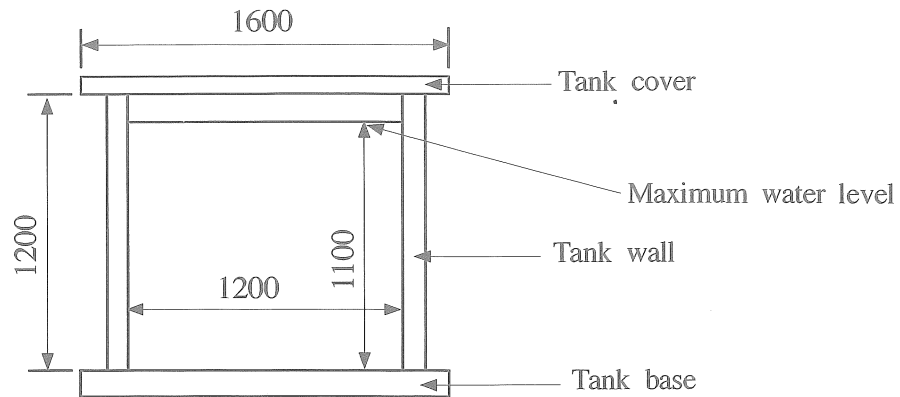
	<p>PET, PETE (Polyethylene Terephthalate)</p> <ul style="list-style-type: none"> ● Soft drink, water and salad dressing bottles, peanut butter and jam jars... ● Suitable to store cold or warm drinks. Bad idea for hot drinks. 		<p>PP (Polypropylene)</p> <ul style="list-style-type: none"> ● Reusable microwaveable ware kitchenware, yogurt containers, microwaveable disposable take-away containers, disposable cups, plates...
	<p>HDPE (High-density Polyethylene)</p> <ul style="list-style-type: none"> ● Water pipes, milk, juice and water bottles, grocery bags, some shampoo/toiletry bottles... 		<p>PS (Polystyrene)</p> <ul style="list-style-type: none"> ● Egg cartons, packing peanuts, disposable cups, plates, trays and cutlery, disposable take away containers... A void for food storage!
	<p>PVC (Polyvinyl Chloride)</p> <ul style="list-style-type: none"> ● Not used for food packaging ● Pipes, cables, furniture, cloths, toys... 		<p>Other (Often Polycarbonate or ABS)</p> <ul style="list-style-type: none"> ● Beverage bottles, baby milk bottles compact discs, "unbreakable" glazing, lenses including sunglasses, prescription glasses, automotive headlamps, riot shields, instrument panels...
	<p>LDPE (Low-density Polyethylene)</p> <ul style="list-style-type: none"> ● Frozen food bags, squeezable bottles, e.g. honey, mustard, cling films, flexible container lids... 	<p>http://nowsaveouplanet.blogspot.com/2015/07/what-types-of-plastics-can-be-recycled.html</p>	

The recycling rates of each type reduces with ascending numbers. This depends on the usage, the collection, the technology and the cost of processing of each type. The recycled products should also be used as a raw material for another finished product. The recycling percentage of each type in the developed world is around 20-40%. A small portion is burnt to produce energy, many end up in regulated and unregulated landfills, waste dumps, or in the sea.

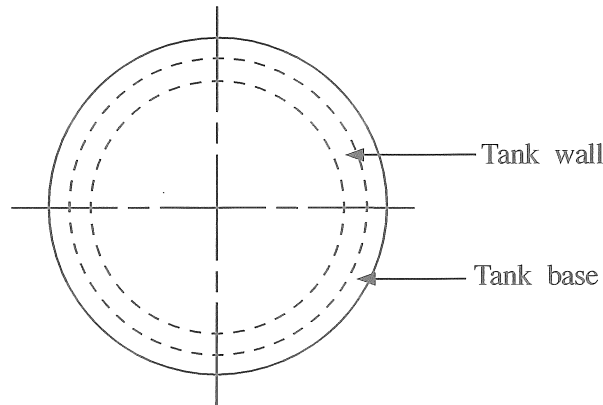
- (i) Classify the different types of waste produced in your local government (Pradesheeya Sabha, Urban council or Municipal Council) division, based on the above classification.
- (ii) Propose to your local government institution as to how they should handle the different types of wastes. Identify their respective cost implications to the community.
- (iii) Discuss three strategy to influence your community to use alternate non-plastic products or to reduce plastic usage significantly.

Part C

8. Figure shows the sectional view and the plan view of a cylindrical overhead water storage tank made of reinforced concrete with 100 mm thick wall. It has a concrete base and cover 100 mm and 75 mm thick, respectively. Water supply to the tank is from the mains of the National Water Supply & drainage Board, through a 25 mm PVC pipe. The tank supplies water to a domestic household for its washrooms, kitchen, garden etc.



SECTIONAL VIEW

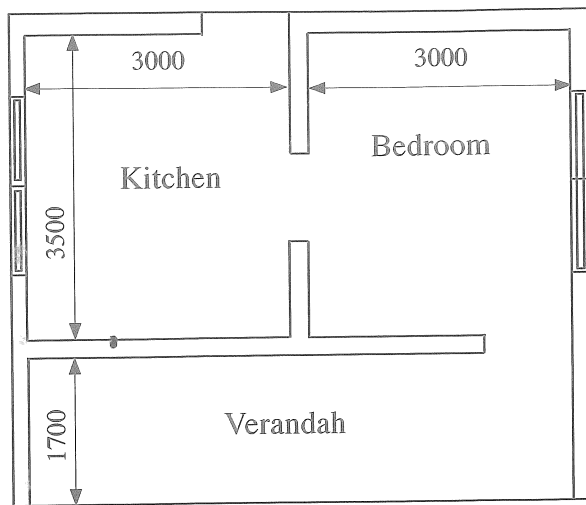


PLAN

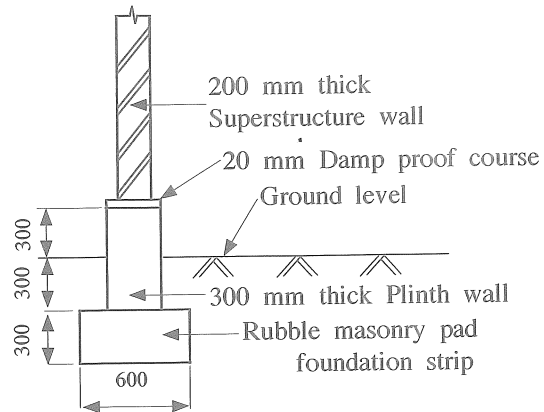
(All dimensions in millimetres)

- (a)
 - (i) Calculate the volume of water in litres that could be stored in the tank.
 - (ii) Calculate the total volume of concrete required for the tank wall, tank base and tank cover.
 - (iii) Show the connection locations, pipe sizes and names of all inlet and outlet pipes required for the tank.
 - (iv) State the locations, types and sizes of all valves required for flow control.
 - (v) Sketch the cross sectional view of any one of the valves you stated in (iv) above and explain how it functions.
- (b) Sketch the sectional view of a two chamber septic tank.
 - (i) Name its parts and state their purpose.
 - (ii) Describe how the septic tank functions.

9. Following figures show the plan and foundation detail of a small house. The pad foundation strip and plinth wall are made of random rubble masonry and the superstructure walls are made of cement blocks. Assume standard dimension for sizes when the dimension are not specified.



PLAN



(All dimensions are in millimetres)

- (a) (i) Calculate the centreline length of superstructure walls in the building.
 (ii) Take off quantities for the excavation in foundation trenches.
 (iii) Take off quantities for random rubble work in pad foundation strip.
 (iv) Take off quantities for random rubble work in plinth wall.
 (v) Take off quantities for 20 mm thick damp proof course on top of plinth wall.
- (b) (i) State the elements of a unit rate.
 (ii) Differentiate between net unit rate and gross unit rate.
 (iii) List the cost items under each cost element for calculating the net unit rate and gross unit rate for mixing and placing 1m^2 of damp proof course on plinth wall.
10. The centre line levels of a road were checked at 11 points identified from points A to K in 20 m intervals for a 200 m length and following staff readings have been recorded. The Benchmark (B.M.) was 20.350 m above Mean Sea level and all the measurements are in meters.

From instrument Position 1: 2.455 (B.M.), 1.360 (A), 1.250 (B), 0.590 (C) and 0.690 (D)

From instrument Position 2: 1.745 (D), 1.530 (E), 1.320 (F) and 1.215 (G)

From instrument Position 3: 1.445 (G), 1.250 (H), 1.245 (I), 1.090 (J) and 0.890 (K)

- (i) Book the above readings in the standard form.
 (ii) Calculate the reduced levels of each centre point using rise and fall method.
 (iii) Apply relevant checks to verify your calculations.

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