Answer all the questions.

1. (a) What do you understand by the term Intellectual Property Rights (IPRs)? Discuss the nature & scope of IPR as expanded by TRIPS Agreement, 1995. (CO-1) (8)
(b) Discuss the major International conventions, treaties and agreements relating to various types of IPRs. (CO-1, 2) (7)
(b’) Write short notes on any two of the following: (CO-1)
   (i) Traditional knowledge
   (ii) Protection of plant varieties and farmers rights
   (iii) Industrial designs (7)

2. (a) “Protection of Confidential Information/ Trade Secret is least known and least talked about, although it is perhaps the most important form of protection for industries, R&D institutions and other agencies dealing with IPRs”. Comment (CO-4) (5)
(b) Who can file an application for grant of patent? Outline the procedure for the grant of plant. (CO-2) (05)
(c) Define patent. What are the three important requirements of an invention to qualify for the grant of patent? Explain in brief. (CO-3) (05)
(c’) What are non patentable inventions as per The Patents Act, 1970? Illustrate your answer (CO-4) (5)

3. (a) Define copyright. Discuss the kinds of works protected under the copyright. Is registration of copyright compulsory? (CO-1, 3) (7.5)
(b) Define copyright infringement and plagiarism. Bring out the similarities and differences between copyright infringement and plagiarism. (CO-3) (7.5)

4. (a) Define trademark and discuss its essentials. What steps are involved in the registration of trademark under The Trademarks Act, 1999? (CO-3) (7)
(a’) Discuss the salient features of The Geographical Indication of Goods (Registration & Protection) Act, 1999. (7)
(b) Explain any two (02) of the following: (CO-1)
   (i) Infringement of Trade Mark
   (ii) Certification trademark & Collective marks
   (iii) Passing Off
   (iv) Rights of registered Trademark owners (04) (04) (04) (04)
2016-17
B.E. (WINTER SEMESTER) EXAMINATION
(Civil/Mechanical/Electrical Engineering)
WATER RESOURCES AND WATERSHED MANAGEMENT
Open Elective
(ECE-483)

Maximum Marks: 60  Credits: 04  Duration: Two Hours

Answer All Questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q. No.  Question  M.M.

1 (a)  What do you understand by the term ‘management of watersheds’? Explain the necessary steps involved in the watershed management programme. [3]

1 (b)  Briefly discuss the significance of watershed slope and soil type towards surface runoff generation from precipitation. [3]

1 (c)  Calculate the total length of all streams of all orders for a drainage basin of order 8, and having the stream length ratio as 4.2 and stream area ratio as 3.8. The total numbers of 4th, 5th, 6th, 7th and 8th order streams are 875, 310, 38, 11 and 1 respectively. Also calculate the drainage density of the basin if the average area of the first order channels is 2.8 km² and the average length of 1st order stream is 0.56 km. [9]

2 (a)  Explain the term rainfall excess (ER). Why is base flow separated from the flood hydrograph for calculating Φ index? [6]

2 (b)  Rainfall of magnitude 7.2 cm occurred for 6 hr duration over a catchment of area 85 km². Runoff produced at the outlet is given as

<table>
<thead>
<tr>
<th>Time (Hr)</th>
<th>0</th>
<th>6</th>
<th>12</th>
<th>18</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>54</th>
<th>60</th>
<th>66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runoff (m³/sec)</td>
<td>8</td>
<td>6</td>
<td>15</td>
<td>29</td>
<td>25</td>
<td>18</td>
<td>14</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Plot the hydrograph and estimate the rainfall excess and Φ index. Also calculate the lag time ‘Tl’ time of concentration Tc.

OR

...contd...
2' (a) Discuss briefly structural and non-structural methods of flood control. Estimate the peak flood flow for the catchment lying in the north Indian Gangetic plains having an area of 38.5 Km². Assume $C_D = 6$

2' (b) Explain the Rational method of computing the peak discharge from a small catchment. The slope of the catchment is 0.007 and the maximum length of travel of wafer is 750 m. The maximum depth of rainfall is as below:

<table>
<thead>
<tr>
<th>Duration (min)</th>
<th>7</th>
<th>14</th>
<th>21</th>
<th>28</th>
<th>35</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of rainfall (mm)</td>
<td>15</td>
<td>32</td>
<td>45</td>
<td>56</td>
<td>67</td>
<td>76</td>
</tr>
</tbody>
</table>

Estimate the required peak flow rate and equivalent runoff coefficient ‘$C$’. The land use of the area and corresponding runoff coefficient ‘$C$’ for the catchment are as follows:

<table>
<thead>
<tr>
<th>Land use</th>
<th>Roads</th>
<th>Lawn</th>
<th>Residential area</th>
<th>Industrial area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (Km²)</td>
<td>8</td>
<td>15</td>
<td>65</td>
<td>25</td>
</tr>
<tr>
<td>Runoff coefficient ($C$)</td>
<td>0.7</td>
<td>0.26</td>
<td>0.58</td>
<td>0.8</td>
</tr>
</tbody>
</table>

3 (a) Explain the term Environmental Impact Assessment ‘EIA’. Discuss the adverse effects of dams and reservoirs on environment.

3 (b) Write short note on roof-top rainwater harvesting technique for sustainable management of watershed.

4 (a) A hydropower project is estimated to cost Rs. 120 crores. The useful life of the project is expected as 100 years. The interest on capital is 10% and the operation and maintenance cost is 5%. Salvage from the project will be nil after 100 years. Calculate the annual cost of the project. If the annual net benefits from the project are estimated to be Rs. 32.5 crores, determine whether the project is economically viable or not.

**OR**

4 (a') There are two alternatives for purchasing a hydropower turbine. Both the alternatives have different useful life. The cash flow details of alternatives are as follows;

**Alternative-1:**
- Initial purchase cost = Rs.30,00,000
- Annual operating and maintenance cost = Rs.2,00,000
- Expected salvage value = Rs.10,25,000
- Useful life = 50 years.

**Alternative-2:**
- Initial purchase cost = Rs.20,00,000
Annual operating and maintenance cost = Rs.3,50,000
Expected salvage value = Rs.7,00,000
Useful life = 70 years.

Using Present Worth (PW) method, find out which alternative should be selected, if the rate of interest is 10% per year.

4 (b) Write brief not on the following

(i) Cost-benefit ratio
(ii) Cash-flow diagram
2016-17  
B.E. (WINTER SEMESTER) EXAMINATION  
(CIVIL/ELECTRICAL/MECHANICAL)  
NON-CONVENTIONAL ENERGY (OPEN ELECTIVE)  
EME-462

Maximum Marks: 60  
Credits: 04  
Duration: Two Hours

Answer all the questions.  
Assume suitable data if missing.  
Notations used have their usual meaning.

<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Question</th>
<th>M.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>What are Primary and Secondary sources of energy?</td>
<td>[03]</td>
</tr>
<tr>
<td>1(b)</td>
<td>Define the terms (i) Energy Source Redundancy (ii) Levelized cost of energy and (iii) Energy Label</td>
<td>[03]</td>
</tr>
<tr>
<td>1(c)</td>
<td>Write note on current status and future trend of renewable energy in India.</td>
<td>[06]</td>
</tr>
</tbody>
</table>

OR

<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Question</th>
<th>M.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(c')</td>
<td>The replacement of a machine at the end of five years is likely to cost Rs. 20,000. What amount should the factory owner deposit every year to accumulate the desired amount if he earns 8.5% interest on his deposit?</td>
<td>[06]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Question</th>
<th>M.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2(a)</td>
<td>Derive the expression for transmissivity of cover system of a flat plate solar collector based on absorption. Discuss the factors for improving the efficiency of a flat plate solar collector.</td>
<td>[05]</td>
</tr>
</tbody>
</table>

OR

<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Question</th>
<th>M.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2(a')</td>
<td>Write the important characteristics of a good pyranometer. What do you mean by: (i) threshold intensity of solar radiation and (ii) collector heat removal factor?</td>
<td>[05]</td>
</tr>
<tr>
<td>2(b)</td>
<td>Explain geometric tilt factor for diffuse and direct solar radiations.</td>
<td>[07]</td>
</tr>
</tbody>
</table>

A flat plate solar collector, located at Delhi (28.60° N, 77.20° E), is tilted at 30° and facing south on 13th May at 1:30 P.M. (solar time). The solar radiation measured by a pyranometer on horizontal surface is 800 W/m². Assume 20% diffuse radiation and ground reflectance 0.2. Calculate the total solar radiation incident on the collector.

Given that $\delta = 23.45 \sin \left[360 \left(\frac{284+n}{365}\right)\right]$ and

$$
\cos \theta = \sin \delta \sin \varphi \cos \beta - \sin \delta \cos \varphi \sin \beta \cos \gamma + \cos \delta \cos \varphi \cos \beta \cos \omega + \cos \delta \sin \varphi \sin \beta \cos \gamma \cos \omega + \cos \delta \sin \beta \sin \gamma \sin \omega.
$$

*contd...*
3 With the help of schematic diagrams discuss any TWO (02) of the following:
   (i) Solar passive heating of buildings
   (ii) Natural circulation solar water heating system and
   (iii) Solar photovoltaic cell.

4(a) Define the terms: (i) Relative wind velocity (ii) Blade element and (iii) Solidity

4(b) (i) What are the driving factors for Global Winds?
   (ii) An HAWT is installed at a location having free wind velocity of 20 m/s. The 100 m
diameter rotor has two blades attached to the hub. Find the rotational speed of the
turbine for maximum power output.

    OR

4(b') Using linear momentum theory, derive the relation for power extraction from wind.

5 Answer any TWO (02) of the following:
   (i) Explain the process of biomass pyrolysis.
   (ii) What are the hydrothermal resources of energy? How they are harvested for
        useful purposes?
   (iii) With the help of a neat sketch, explain the working of a single basin tidal energy
        conversion system.

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