SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology
Civil Engineering

B.Tech. IV Semester VII

Subject Name : Flood Mitigation and Management **Subject Code:** BTCL14709
Type of course : PEC - V
Prerequisite : Hydrology and Water Resource Management (BTCL13504)
Rationale : Students will be able to perform hydraulic design of structures for flood control. They will also be able to understand clearly flood routing and its effect in flood management and control.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	100
3	0	0	3	60	25	15	-	-	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course.

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	**Flood Estimation:** Floods- causes of occurrence, flood classification- probable maximum flood, standard project flood, design flood, flood estimation-methods of estimation ; estimation of flood peak rational method, empirical methods, unit hydrograph method. Statistics in hydrology, flood frequency methods-log normal, Gumbel's extreme value, Log –Pearson type-III distribution, depth-area-duration analysis.	11	25%
2	**Flood Mitigation:** Flood forecasting. Flood routing-channel routing, Muskingum method, reservoir routing and Modified Pul's method. Flood control-history of flood control, structural and non-structural measures of flood control, storage and detention reservoirs, levees, channel improvement, Flood routing using numerical methods, HEC-RAS applications, Reservoir operations, Real-time flood warning system and flood forecasting, Flood management as changing risks, frequency approaches vs. time series, risk vs. uncertainty, flood and ecosystem, Vulnerability to floods, impact of floods, assessing the risk, flood damage analysis and flood control measures.	8	15%
3	**Gully Control Structure and Ravine reclamation:** temporary check dams, Permanent structures for gully control, Design of chute spillway, Gully erosion and its control structures-design and implementation, design of drop inlets, Ravine control measures, Control & training of rivers, objectives, classification, methods of river training, marginal embankments, planning of flood control projects and their economics.	13	30%

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4	**Earthen Dam:** Earthen embankments – functions, classification-hydraulic and rolled fill dams homogeneous, zoned and diaphragm type, foundation requirements, grouting, seepage through dams, flow net and its properties, seepage pressure, seepage line in composite earth embankments, drainage filters, piping and its causes, Design and construction of earthen dam, stability of earthen embankments against failure by tension, overturning, sliding etc., stability of slopes- analysis of failure by different methods. Subsurface dams-site selection and constructional features.	13	30%

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	15	15	25	25	10

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Advances in Urban Flood Management	Richard Ashley, Stephen Garvin, Erik Pasche, Andreas Vassilopoulos, Chris Zevenbergen	CRC Press, ISBN-13 : 978-0415436625	2007	1st
2.	Flood risk management : hazards, vulnerability and mitigation measures	Jochen Schanze; Evzen Zeman; Jiri Marsalek	Springer publication, ISBN-13 : 978-1402045967	2006	1st
3.	Soil and Water Conservation Engineering Paperback	R Suresh	Delhi : Standard Publishers, ISBN-13 : 978-8180141867	2017	5th
4.	Land and water management engineering	V V N Murty; Madan K Jha	New Delhi : Kalyani Publishers, ISBN-13 : 978-9327287356	2019	7th
5.	Engineering Hydrology	Subramanya K	Tata McGraw-Hill Publishing Co, Delhi, ISBN : 978-0-07-064855-5	2008	3rd

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Develop comprehensive strategies for flood risk management. (*R, U, A... - Cognitive Level)*	10
CO-2	Estimate the extent of flood risk and vulnerability and assess the capacity to response. *(U, N, E... - Cognitive Level)*	20
CO-3	Simulate structural and non-structural measures for flood risk mitigation. (*A, N, E ...- Cognitive Level)*	25
CO-4	Prepare preparedness and response plans for efficient flood risk reduction. (*N, E, C ...- Cognitive Level)*	25
CO-5	Integrate recovery and rehabilitation plans and programs with flood risk management strategies. (*N, E... - Cognitive Level)*	20

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	2	3	2	1	1	3	3	3	2	2	2	2	1	2	3
CO-2	1	2	2	2	1	3	3	2	2	1	1	2	2	2	1
CO-3	2	1	2	1	1	1	1	1	1	2	2	1	1	2	1
CO-4	2	3	3	2	1	2	1	2	1	2	1	2	2	2	1
CO-5	2	2	3	3	2	3	2	2	1	1	2	2	2	3	3
Rationale *	**9**	**11**	**12**	**9**	**6**	**12**	**10**	**10**	**7**	**8**	**8**	**9**	**8**	**11**	**9**

Rationale*:
All the COs are satisfying the well-defined POs & PSOs up to the certain extent. Student's approaches to flood management, mitigation, recover and rehabilitation also need to give a re-look to have an integrated strategy for policy and management related to floods.

List of Open Source/learning website:

- https://www.fema.gov/
  - An official website of the United States government for flood mitigation
- https://www.edx.org/course/flood-risk-management
  - Detail of coverage as flood risk management
- https://nptel.ac.in/courses/105/101/105101010/
  - Detail of coverage as introduction to watershed management
- https://nidm.gov.in/PDF/pubs/NDMA/3.pdf
  - Detail of coverage as national disaster management guidelines-management of flood

List of Open Source Software:

- QGIS
- River modeling (HEC-RAS)
- Hydrologic modeling (HEC-HMS, MODFLOW)
- SWAT

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