

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST -1 EXAMINATION- FEB 2020  
M.Tech Structures/B-Tech 8th Semester

COURSE CODE: 11M1WCE133

MAX. MARKS: 15

COURSE NAME: Bridge Engineering

COURSE CREDITS: 3

MAX. TIME: 1 Hr

*Note: All questions carry equal marks. Sharing of any material is not allowed. Assume necessary data but must be clearly mentioned. (One page one side hand written formula sheet is allowed)*

**Q1.** Answer/describe the following.

- (a) What is the need of a Bridge? Various characteristics of selecting a site for bridge.
- (b) Types of bridges on the basis of span length with neat sketch.
- (c) What is the difference in Kirpich and Hathaway Formula for discharge calculation for small catchment?

**Q2.** Calculate the peak discharge by the rational method for a 2- km<sup>2</sup> composite catchment with the following characteristics:

	Subarea A	Subarea B
Area (km <sup>2</sup> )	0.8	1.2
Runoff coefficient	0.6	0.3
Time of concentration (min)	30	70

Assume return period of 10 years and suitable IDF function.

**Q3.** The approximate cost of one superstructure and one pier for a multi-span bridge are given below. Estimate the economical span.

Span (m)	12	18	24
Superstructure cost (Rs.)	44,000	63,000	165,000
Substructure (Rs.)	52,000	57,000	65,000

**Q4.** Design a waterway for bridge over a trapezoidal channel having side slope of 1:1 with a discharge of 30 m<sup>3</sup>/sec, a bed fall of 1:1000 and a bed width to depth ratio of 5:1. The bed material is sand with a safe velocity of 2.4 m/s. The afflux should not be more than 10 cm. Take Manning coefficient, n = 0.025.

**Q5.** Calculate the maximum scour depth for a bridge of two spans of total linear waterway of 72 m. The stream flows between quasi-alluvial soil with hard banks and alluvial bed (f = 1.1). The flood discharge is 420 cumecs and width of flow is 75 m.