

School: SOE	Level: BE	Invigilator's Sign:
Program: BCE	Year/Part: IV/I	Superintendent's Sign:
Subject: Hydropower Engineering (EG703CE)		Code No.

- i. Answers should be given by filling the Multiple-Choice Questions' Answer Sheet.
ii. The main answer sheet can be used for rough work.

Code No.

GROUP A (Multiple-Choice Questions)	[10x1=10]	Time: 20 Minutes
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- The function of a cut off in an earthen dam is to
 - support the dam
 - prevent undermining of foundation
 - reduce uplift pressure of dam
 - increase loss of stored water
- In order to reduce uplift on a gravity dam the type of grouting done is
 - consolidation grouting near toe
 - curtain grouting near toe
 - consolidation grouting near heel
 - curtain grouting near heel
- The upstream face of an earth dam is
 - A flowline
 - an equipotential line
 - a phreatic line
 - a stream line
- V shaped narrow valley is suitable for
 - earthen dam
 - arch dam
 - rockfill dam
 - overflow concrete dam
- Reaction turbine worked in the principle of
 - Converting potential energy in to pressure energy
 - Converting potential energy in to kinetic energy
 - Converting Pressure energy in to Potential energy
 - Converting Kinetic energy in to Potential energy
- When the tail water depth is greater than the hydraulic jump sequent depth y_2 then use energy dissipator below the spillway
 - Flip Bucket energy dissipater
 - Ski jump type energy dissipater
 - Roller bucket energy dissipater
 - USBR type energy dissipater
- The factors considered while alignment of the penstock in Hydropower Project are
 - Location of Surgetank
 - Topographical condition along the penstock
 - Location of Powerhouse
 - all of the above
- The increased pressure in the rigid penstock pipe during the closure of valve in the Powerhouse is
 - $\rho L t / (V)$
 - $\rho V t / (L)$
 - $\rho L V / (t)$
 - $L V / (t \rho)$
- The methods used for the check of strength of rock while constructing the tunnels are
 - Q value
 - RMR system
 - by visual check in the site
 - all of the above
- The major pressure force need to be considered while designing the dam is
 - the uplift pressure force
 - the water pressure force in U/S and D/S side of the dam
 - the earthquake pressure force
 - the wind pressure force

Multiple Choice Questions' Answer Sheet

Marks Secured: _____

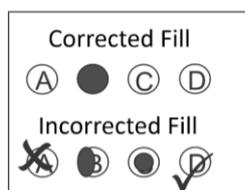
In Words: _____

Examiner's Sign: _____ Date: _____

Scrutinizer's Marks: _____

In Words: _____

Scrutinizer's Sign: _____ Date: _____



1. (A) (B) (C) (D)	6. (A) (B) (C) (D)
2. (A) (B) (C) (D)	7. (A) (B) (C) (D)
3. (A) (B) (C) (D)	8. (A) (B) (C) (D)
4. (A) (B) (C) (D)	9. (A) (B) (C) (D)
5. (A) (B) (C) (D)	10. (A) (B) (C) (D)

Manmohan Technical University
Office of the Controller of Examinations
Exam Year: 2082, Mangsir(Model Question)

School: SOE	Level: BE	Time: 3 Hours
Program: BCE	Year/Part: IV/I	Full Marks: 50
Subject: Hydropower Engineering (EG703CE)		

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

GROUP A (Multiple-Choice Questions in separate paper)

[10×1=10]

GROUP B (Short Answer Questions - *Attempt Any Eight*)

[8×2=16]

- 1) What are the major provision in hydropower development policy in 2001? List out the major institution involved in hydropower development sector?
- 2) If you are developing 300 MW hydropower project in a river basin of Nepal. Briefly mention what step would you follow from planning to commissioning of the project?
- 3) Explain the working principle of ROR , PROR and storage plant with the help of figures? Briefly describe the factors affecting hydropower development cycle
- 4) Design a hydraulic jump stilling basin for a maximum discharge of 40 cumec flowing from an overflow spillway with the spillway crest 50m above the downstream gravel river bed with a slope of 0.00515 and $n=0.025$
- 5) What is mass curve of inflow and mass curve of demand ? How is it constructed ? Explain its uses
- 6) Explain the term a) load factor b) plant factor c) utilization factor and d) powergrid
- 7) Differentiate between Centrifugal and Reciprocating pump with a sketch ?
- 9) Explain the term governor and generator ie used in powerhouse design?

Group C (Long Answer Questions -Attempt all questions)

[3*8=24]

1) A hydropower plant is to be planned in a Nepalese river where the mean monthly flows for the typical year as follows

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Q(m ³ /sec)	85	80	91	107	150	260	675	910	620
Month	Oct	Nov	Dec						
Q (m ³ /sec)	266	140	104						

a) Draw a flow duration curve find out the design flow of the power plant corresponding to a probability of exceedence as 0.35

if the net head of the project is 230m and overall efficiency of the project is 95%

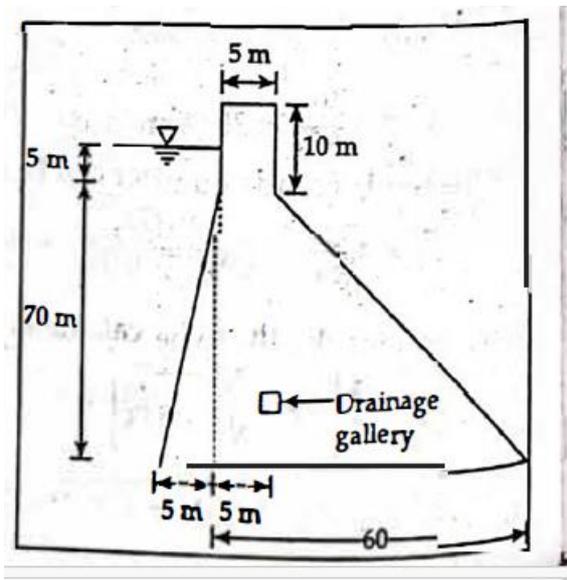
also find the firm energy and secondary energy of the project

2) Concrete gravity dam has the dimension as shown in the figure. Neglect all other forces except self weight, hydrostatic pressure and uplift pressure. Take coefficient of friction μ between the base of the dam and foundation as 0.75 and specific weight of dam material as 2400kgf/m³ .Check that

a) no tension exists any where along the base of the dam

b) dam is safe against sliding with out consideration of shear strength of joint between concrete and underneath foundation

c) Dam material is safe against crushing failure. Allowable crushing strength is 11kgf/cm²



3) Draw a plan and section of Powerhouse having two units of vertical axis francis turbine showing from Penstock to tailrace outlet

4) A Kaplan turbine developing 3200 kw under a head and 8m has a draft tube with inlet diameter 2.8m and is placed 1.5m above tail water. If vacuum gauge connected to the draft tube indicates the reading of 5m of water determine the efficiency of turbine if draft tube efficiency is 80%

5) Differentiate between forebay and surge tank. Design a forebay which accumulates water for 3minutes for operation of a hydropower project having data as given below. Also check the length of forebay and limiting velocity

6 Explain the methods of construction of tunneling ? Also explain the types of intakes used in hydropower projects ?

7) Explain the process of designing of settling basin in hydropower projects?

***** All the Best ***