

1) Admin (System Administrator)

Purpose

Technical authority (non-academic).

Permissions

- Register/enroll identities (Fabric CA)
- Assign roles
- Deploy/update smart contracts
- Audit records
- View all documents

Cannot generate documents

Cannot approve

Cannot issue certificates

2) Faculty

Purpose

Course-level academic contributor.

Permissions

- Upload internal marks
- Propose grades
- Modify before submission
- View assigned students

Cannot approve documents

Cannot generate certificates

Cannot issue degree

Course-level write access only.

3) HOD (Head of Department)

Purpose

Department-level academic validator (intermediate authority).

Permissions

- Review faculty-submitted marks
- Validate grade distribution
- Approve semester results at department level
- Send back for correction
- View all department student records

Cannot generate documents

Cannot finalize documents

Cannot modify marks

Acts as first approval checkpoint after faculty.

4) Examination Section

Purpose

Official exam & document generation authority.

Permissions

- Upload external exam marks
- Lock semester results
- Generate academic documents
- Verify eligibility rules
- Maintain document numbering
- View all academic records

Cannot finalize without Dean & DAC

Cannot override DAC

Cannot approve alone

5) Dean

Purpose

Department academic approver.

Permissions

- Approve/reject documents
- Validate departmental compliance
- Send back for correction

Cannot generate documents

Cannot finalize alone

Cannot modify marks

6) DAC (Department Academic Committee)

Purpose

Final verification and digital signing authority.

Permissions

- Verify CGPA and credit rules
- Validate academic compliance
- Digitally sign final documents
- Move document to FINALIZED

Cannot create marks

Cannot modify marks

Final checkpoint before immutability.

7) Student

Permissions

- View personal records
- Request documents
- Raise correction request

Read-only access.

8) Verifier (Employer / External Authority)

Permissions

- Verify document hash

- Check signature authenticity
- View verification status

Read-only verification access.

UPDATED DOCUMENT WORKFLOWS (With HOD)

1) Semester-wise Marksheets

Trigger

After semester results completed.

Workflow

Faculty → HOD → Exam Section → Dean → DAC → FINALIZED

Responsibilities

Action	Role
Upload internal marks	Faculty
Approve internal marks	HOD
Upload external marks	Exam Section
Generate marksheets	Exam Section
Approve	Dean
Final sign & finalize	DAC

2) Consolidated Marksheets

Trigger

After all semester marksheets are finalized.

Workflow

Student Request → Exam Section → Dean → DAC → FINALIZED

(HOD not required here because semester approvals already validated.)

Action	Role
Request	Student
Eligibility check	Smart Contract
Generate	Exam Section
Approve	Dean
Final sign	DAC

3) Degree Certificate

Trigger

After consolidated marksheets finalized + credits satisfied.

Workflow

Student Request → Eligibility Check → Exam Section → Dean → DAC → ISSUED

Action	Role
Request	Student
Verify credits	Smart Contract
Generate	Exam Section
Approve	Dean
Final issue	DAC

4) Transfer Certificate (TC)

Student → Exam Section → Dean → DAC → ISSUED

5) Migration Certificate

Student → Exam Section → Dean → DAC → ISSUED

6) Bonafide Certificate

Student → Exam Section → Dean → ISSUED

(Optional DAC if strict model required.)

AGGREGATED DIGITAL SIGNATURE MODEL

This is your strongest security feature.

What is Aggregated Signature?

The finalized document must include signatures from:

- Faculty
- HOD
- Examination Section
- Dean
- DAC

Final blockchain record example:

```
{  
  "docType": "semester_marksheet",  
  "studentId": "STU101",  
  "status": "FINALIZED",  
  "approvals": {  
    "faculty": "sig_hash_1",  
    "hod": "sig_hash_2",  
    "examSection": "sig_hash_3",  
    "dean": "sig_hash_4",  
    "dac": "sig_hash_5"  
  },  
  "aggregatedSignature": "combined_multisig_hash"  
}
```

The aggregatedSignature can be:

- Multi-signature scheme
- OR
- Hash of concatenated individual signatures

Final state is accepted only when:

All required signatures exist

Updated Governance Table

Document	Request	Generate	Approve Chain	Finalize
Semester Marksheets	Student/System Exam Section Faculty → HOD → Dean DAC			
Consolidated Marksheets	Student	Exam Section	Dean	DAC
Degree	Student	Exam Section	Dean	DAC
Transfer Certificate	Student	Exam Section	Dean	DAC
Migration Certificate	Student	Exam Section	Dean	DAC
Bonafide Certificate	Student	Exam Section	Dean	Dean

Updated State Transition Model

DRAFT

→ FACULTY_APPROVED

→ HOD_APPROVED

→ EXAM_LOCKED

→ DEAN_APPROVED

→ DAC_VERIFIED

→ FINALIZED

Only DAC can move to FINALIZED.

Final Academic Hierarchy

Course Results

↓

Semester Marksheets

↓

Consolidated Marksheets

↓

Degree

Parallel Certificates:

- Transfer Certificate
- Migration Certificate
- Bonafide Certificate