Digital Finance — Extended Exam Bank

96 Practice Questions Across All 8 Modules

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Digital Finance — BSc Course

How to Use This Exam Bank

- **96 questions:** 12 per module (4 Basic, 4 Applied, 4 Advanced)
- **Three tiers of difficulty:**
  - **Basic (QB):** Definitions, concepts, recall — test whether you understand the fundamentals
  - **Applied (QP):** Calculations, comparisons, case analysis — test whether you can use concepts
  - **Advanced (QA):** Critical evaluation, system design, policy arguments — test whether you can think independently
- **Numbering:** QB1.1 = Basic, Module 1, Question 1; QP3.2 = Applied, Module 3, Question 2; QA8.4 = Advanced, Module 8, Question 4
- **Study strategy:** Master all Basic questions first, then Applied, then Advanced. The exam will draw from all three tiers.

These are practice questions only. The actual exam may differ in format, difficulty, and coverage.

QB1.1 [Basic] Define "payment intermediary" and list 3 examples in the traditional financial system.

QB1.2 [Basic] Explain why a domestic bank transfer in the US takes 1–3 business days while a Bitcoin transfer takes approximately 10 minutes.

QB1.3 [Basic] What is an "interchange fee" and how does it affect merchants?

QB1.4 [Basic] Describe the difference between a payment processor (e.g., Stripe) and a payment network (e.g., Visa).

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1 covers payment costs, interchange economics, neobank revenue models, and platform pricing.

QP1.1 [Applied] A European tourist pays EUR 100 with a credit card in Japan. The FX markup is 2.5% and the interchange fee is 1.5%. Calculate the total cost of this transaction to the merchant.

QP1.2 [Applied] Compare the revenue models of a traditional bank and a neobank (e.g., Revolut). How do they differ in their approach to generating income from payments?

QP1.3 [Applied] Using the concept of platform economics from Lesson 1.4, explain why PayPal charges 2.9% + \$0.30 per transaction while bank ACH transfers are nearly free.

QP1.4 [Applied] Real-time payment systems like FedNow and SEPA Instant are reducing settlement times. Analyze who benefits most and who loses from instant payments.

Appli

questions test your ability to calculate costs and compare business models critically.

Module 1: Cost — Advanced Questions

QA1.1 [Advanced] "Financial intermediaries will be completely replaced by blockchain-based payment systems within 10 years." Critically evaluate this claim using evidence from Modules 1 and 3.

QA1.2 [Advanced] Design a payment system for cross-border remittances that costs less than 3% (the UN SDG target). Specify: technology, regulatory approach, and business model.

QA1.3 [Advanced] Assess whether "buy now, pay later" (BNPL) services like Klarna reduce or increase the total cost of financial services for consumers.

QA1.4 [Advanced] Compare the total cost of processing a $100 payment via (a) credit card, (b) ACH, (c) stablecoin transfer. Which is cheapest and why?

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questions require you to construct arguments, weigh evidence, and design solutions.

QB2.1 [Basic] Define "financial exclusion" and list 3 forms it can take.

QB2.2 [Basic] Explain how credit scoring works and why it can perpetuate existing inequalities.

QB2.3 [Basic] What is "algorithmic bias" in the context of financial services?

QB2.4 [Basic] Describe how M-Pesa (Kenya) solved the financial access problem without requiring traditional bank accounts.

Modu

2 covers financial inclusion, credit scoring fairness, investment democratization, and algorithmic bias.

Module 2: Access — Applied Questions

QP2.1 [Applied] A credit scoring model rejects loan applications from ZIP code 60637 at 3x the national average rate. Using the concept of proxy discrimination from Lesson 2.4, analyze whether this is fair.

QP2.2 [Applied] Compare traditional credit scoring (FICO) with alternative data scoring (social media, phone usage). Analyze the tradeoffs between accuracy and fairness.

QP2.3 [Applied] Using Lesson 2.3 (Democratizing Investment), explain how fractional share platforms changed the minimum viable investment from approximately $1,000 to $1.

QP2.4 [Applied] A robo-advisor charges 0.25% annually while a human advisor charges 1%. Does the cost difference alone explain the democratization of investment advice? What else matters?

Appli

questions require you to analyze real-world scenarios using course concepts.

QA2.1 [Advanced] "Financial inclusion through technology inevitably leads to financial over-inclusion (predatory lending, gambling-like trading)." Evaluate this argument.

QA2.2 [Advanced] Design a credit scoring system for first-generation immigrants who have no local credit history. What data sources would you use? How would you ensure fairness?

QA2.3 [Advanced] Assess whether gamification of investing (confetti animations, fractional shares, social trading) is democratizing or exploiting retail investors.

QA2.4 [Advanced] The EU's PSD2 mandates open banking. Does this increase or decrease financial access? Consider both intended and unintended effects.

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questions demand critical evaluation, system design, and balanced policy analysis.

QB3.1 [Basic] Explain the double-spend problem and how Bitcoin solves it.

QB3.2 [Basic] Describe the difference between Proof of Work and Proof of Stake consensus mechanisms.

QB3.3 [Basic] What is a smart contract? Give a real-world example.

QB3.4 [Basic] Explain why DeFi protocols use over-collateralization (e.g., 150% for lending protocols).

QP3.1 [Applied] A DeFi lending protocol requires 150% collateralization. A user deposits 10 ETH at $3,000/ETH and borrows $20,000 DAI. At what ETH price will the position be liquidated?

QP3.2 [Applied] Compare centralized exchanges (Coinbase) with decentralized exchanges (Uniswap) on 5 dimensions: custody, KYC, speed, liquidity, regulatory status.

QP3.3 [Applied] The Bitcoin blockchain processes approximately 7 transactions per second. Visa processes approximately 65,000. Using the blockchain trilemma (Lesson 3.2), explain why this tradeoff exists.

QP3.4 [Applied] Analyze the Terra-LUNA collapse using the concepts of algorithmic stability and reflexive feedback loops from Lesson 3.4.

Appli

questions test calculation skills and the ability to compare systems using structured criteria.

QA3.1 [Advanced] "Smart contracts make lawyers obsolete." Critically evaluate this claim. Under what circumstances does code NOT equal law?

QA3.2 [Advanced] Design a DAO governance structure for a student investment fund. Specify voting rights, proposal process, quorum requirements, and dispute resolution.

QA3.3 [Advanced] Assess whether stablecoins (USDT, USDC) represent genuine innovation or merely replicate the risks of traditional banking with fewer safeguards.

QA3.4 [Advanced] The Ethereum community hard-forked after the DAO hack (2016) to reverse the theft. Was this the right decision? What precedent does it set?

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questions require critical thinking about governance, immutability, and systemic design.

QB4.1 [Basic] Define Value at Risk (VaR) and explain what "95% VaR of $1M over 1 day" means.

QB4.2 [Basic] Explain the difference between a call option and a put option using a real-world example.

QB4.3 [Basic] What is "counterparty risk" and why does it matter in derivatives trading?

QB4.4 [Basic] Describe 3 types of risk that a traditional bank manages (market, credit, operational).

Modu

4 covers VaR, options, derivatives, counterparty risk, and DeFi-specific risk categories.

QP4.1 [Applied] A portfolio has daily returns with mean 0.05% and standard deviation 1.2%. Calculate the 1-day 95% VaR for a \$10M portfolio (assume normal distribution, $z = 1.645$).

QP4.2 [Applied] Explain how total return swaps allowed Archegos Capital to build \$20B in positions without disclosing them. Why is this a systemic risk?

QP4.3 [Applied] A European call option on stock XYZ has strike \$50, premium \$3, and expires in 30 days. If the stock is at \$56 at expiration, calculate the profit/loss.

QP4.4 [Applied] Compare the risk profiles of a traditional savings account, a DeFi yield farm, and a stablecoin holding. Which has the highest tail risk?

Appli

questions combine quantitative calculations with qualitative risk analysis.

QA4.1 [Advanced] "VaR is a dangerous metric because it tells you nothing about losses beyond the confidence level." Evaluate this critique and propose an alternative.

QA4.2 [Advanced] Design a risk management framework for a crypto hedge fund that trades both spot and derivatives. What risk limits would you set?

QA4.3 [Advanced] Silicon Valley Bank failed because of interest rate risk — a textbook risk. Why did the bank's risk management, auditors, and regulators all miss it?

QA4.4 [Advanced] Assess whether DeFi eliminates counterparty risk (as proponents claim) or merely transforms it into smart contract risk and oracle risk.

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questions require integrating multiple risk concepts and evaluating real-world failures.

Module 5: Automation — Basic Questions

QB5.1 [Basic] Define overfitting in machine learning and explain why it is problematic for financial models.

QB5.2 [Basic] Explain the difference between supervised and unsupervised learning with a financial example of each.

QB5.3 [Basic] What is a "transformer" architecture and why was it revolutionary for NLP in finance?

QB5.4 [Basic] Describe 3 risks of using GenAI/LLMs in financial decision-making.

Modu

5 covers ML fundamentals, NLP, GenAI applications, and automation risks in finance.

QP5.1 [Applied] A fraud detection model has precision 95% and recall 80%. Out of 10,000 transactions with 100 actual frauds, how many frauds will it catch and how many false alarms will it generate?

QP5.2 [Applied] Compare a rule-based trading system with an ML-based trading system. Under what market conditions might each outperform the other?

QP5.3 [Applied] Using the concept of model explainability from Module 5, explain why a bank cannot simply deploy a "black box" neural network for credit decisions under EU regulations.

QP5.4 [Applied] An LLM-powered research agent generates a summary claiming Company X's revenue grew 15% when the actual growth was 8%. Analyze this "hallucination" using concepts from Lesson 5.2.

Appli

questions test precision/recall calculations and regulatory reasoning about AI deployment.

QA5.1 [Advanced] "AI will replace 50% of financial analyst jobs within 5 years." Critically evaluate this prediction. Which tasks are most/least automatable?

QA5.2 [Advanced] Design an MLOps pipeline for a credit scoring model. Include: data pipeline, model training, validation, deployment, monitoring, and retraining triggers.

QA5.3 [Advanced] Assess the risks of deploying an autonomous AI trading agent without human oversight. Use the Knight Capital case as evidence.

QA5.4 [Advanced] The EU AI Act classifies AI in financial services as "high-risk." Is this classification appropriate? What compliance burden does it create?

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questions require system design, policy analysis, and critical evaluation of AI claims.

Module 6: Infrastructure — Basic Questions

QB6.1 [Basic] Describe the role of SWIFT in international payments and why it was created.

QB6.2 [Basic] Explain the difference between a real-time gross settlement (RTGS) system and a net settlement system.

QB6.3 [Basic] What is "open banking" and how does PSD2 enable it?

QB6.4 [Basic] Describe 3 components of a modern core banking system.

Module 6 covers payment rails, settlement systems, open banking APIs, and cloud infrastructure.

QP6.1 [Applied] A bank processes 1M transactions/day. Its core banking system has 99.99% uptime. Calculate the expected downtime per year and the number of failed transactions.

QP6.2 [Applied] Compare SWIFT (messaging network) with blockchain-based cross-border payments (e.g., Ripple). Analyze speed, cost, finality, and regulatory acceptance.

QP6.3 [Applied] Using the API economy concepts from Lesson 6.3, explain how a neobank like Revolut can offer banking services without owning a core banking system.

QP6.4 [Applied] The CrowdStrike outage (2024) disrupted financial services globally. Analyze this as a supply chain concentration risk using Module 6 concepts.

Appli

questions test uptime calculations and comparative infrastructure analysis.

QA6.1 [Advanced] "Cloud computing makes banks more resilient because it eliminates single points of failure." Evaluate this claim. What new risks does cloud introduce?

QA6.2 [Advanced] Design the infrastructure stack for a digital-only bank serving 1M customers. Specify: core banking, payments, identity, compliance, and customer-facing layers.

QA6.3 [Advanced] Assess whether instant payment systems (FedNow, SEPA Instant) make CBDCs unnecessary. What can CBDCs do that instant payments cannot?

QA6.4 [Advanced] Financial infrastructure is increasingly concentrated in a few cloud providers (AWS, Azure, GCP). Is this a systemic risk? Should regulators intervene?

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questions require infrastructure design and systemic risk analysis.

Module 7: Compliance — Basic Questions

QB7.1 [Basic] What does KYC stand for and list the 3 pillars of KYC (Customer Identification, Customer Due Diligence, ongoing monitoring).

QB7.2 [Basic] Explain the difference between rule-based and risk-based AML transaction monitoring.

QB7.3 [Basic] What is a SAR (Suspicious Activity Report) and when must a financial institution file one?

QB7.4 [Basic] Describe how RegTech tools automate compliance processes.

QP7.1 [Applied] A bank's rule-based AML system flags 500 transactions/day; 495 are false positives. Calculate the false positive rate and explain why this is a problem.

QP7.2 [Applied] Compare the compliance burden of a traditional bank vs. a DeFi protocol. Which has more regulatory obligations? Which has more actual safeguards?

QP7.3 [Applied] Using Lesson 7.3, explain how the EU's MiCA regulation classifies different types of crypto-assets (e-money tokens, asset-referenced tokens, utility tokens).

QP7.4 [Applied] Danske Bank processed $230B in suspicious transactions through its Estonian branch. Using Module 7 concepts, identify at least 4 specific compliance failures.

Appli

questions test regulatory classification, false-positive calculations, and case analysis.

QA7.1 [Advanced] "Travel Rule requirements for crypto transfers undermine the privacy benefits of blockchain." Evaluate this tension.

QA7.2 [Advanced] Design a model risk governance framework for an AI-based credit scoring system. Include: validation, monitoring, documentation, and escalation procedures.

QA7.3 [Advanced] Assess whether "compliance by design" (embedding regulatory rules into smart contracts) is more effective than traditional compliance departments.

QA7.4 [Advanced] Compare the US SEC's "regulation by enforcement" approach to crypto with the EU's proactive MiCA approach. Which is better for innovation? Which for investor protection?

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questions require evaluating regulatory philosophy and designing governance frameworks.

Module 8: Future — Basic Questions

QB8.1 [Basic] Define "self-sovereign identity" (SSI) and explain how it differs from traditional identity verification.

QB8.2 [Basic] Explain why quantum computing poses a threat to current cryptographic systems used in finance.

QB8.3 [Basic] What is "climate finance" and list 3 financial instruments used to address climate change.

QB8.4 [Basic] Describe 3 ways digital technology could make green bonds more transparent and trustworthy.

Module 8 covers digital identity, quantum threats, climate finance, and the future of financial regulation.

QP8.1 [Applied] Using Lesson 8.2 concepts, explain which cryptographic algorithms are vulnerable to quantum attacks and what NIST post-quantum standards recommend.

QP8.2 [Applied] Compare two approaches to digital identity: government-issued IDs (e.g., Estonia e-Residency) vs. blockchain-based SSI. Analyze tradeoffs on privacy, portability, and trust.

QP8.3 [Applied] A carbon credit token represents 1 tonne of CO_2 offset at \$50. A company needs to offset 10,000 tonnes/year. Calculate the annual cost and explain how tokenization could reduce it.

QP8.4 [Applied] Analyze the FTX collapse as a case study for what happens when innovation outpaces regulation. Which specific regulatory gaps enabled the fraud?

Appli

questions test quantum literacy, identity system comparison, and carbon market calculations.

QA8.1 [Advanced] "Quantum computing will break Bitcoin within 10 years." Evaluate this claim using current estimates of quantum computing progress and post-quantum cryptography readiness.

QA8.2 [Advanced] Design a digital identity system for financial services that: (a) protects privacy, (b) enables KYC compliance, (c) works across borders. Specify architecture and tradeoffs.

QA8.3 [Advanced] Assess whether ESG ratings and climate disclosures actually change corporate behavior or are merely "greenwashing with data."

QA8.4 [Advanced] Write a 1-page brief to a central bank governor recommending whether their country should issue a retail CBDC.

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questions require forward-looking analysis, system design, and policy recommendation.