Time Allowed: 3 Hours **Full Marks: 100**

The figures in the margin on the right side indicate full marks.
Where considered necessary, suitable assumptions may be made and clearly indicated in the answer.
Question No. 1 and 8 are compulsory; Answer any four from Question No. 2, 3, 4, 5, 6 & 7.

SECTION - A

1. (a)

Sl. No.	Answer	Justification
(i)	(b)	When share price reaches to ₹ 20 per share, the profit will be = (20 – 15) × 100 – 150 = ₹ 350 So, the correct option is (b)
(ii)	(d)	The bear market phenomenon is thought to get its name from the way in which a bear attacks its prey—swiping its paws downward. This is why markets with declining stock prices are called bear markets. So, the correct option is (d)
(iii)	(c)	The Co-efficient of Variation is the ratio of standard deviation to mean. Alternative | Expected Return (%) | Standard Deviation of Return (%) | Co-efficient of Variation I | 23 | 8 | 0.35 II | 20 | 9.5 | 0.48 III | 18 | 5 | 0.28 Alternative III is the best as its co-efficient of variation is the lowest. So, the correct option is (c)
(iv)	(a)	Theoretical minimum price = [Present Value of Strike Price – Current Stock Price] = [1,000 × e^{-rt}) – 925 = [1,000 / $e^{0.05 \times 0.5}$] – 925 = [1,000 / $e^{0.025}$] – 925 = [1000/1.02532] - 925 = 975.3053 - 925 =50.3053 So, the correct option is (a)

(v)	(b)	ROE = ROA x Leverage factor = 0.20 x 1.5 = 0.30 So, the correct option is (b)
(vi)	(b)	Financial history is replete with boom-bust cycles and repetition of these cycles makes one believe that history repeats itself. So, the correct option is (b)
(vii)	(c)	Securitization is an act of conversion of loans into debt instruments The process of taking an illiquid group of assets or an individual asset through financial engineering and changing it into a security is called securitization. So, the correct option is (c)
(viii)	(a)	The club loan is a private arrangement between lending banks and a borrower. Conventionally, the entry into Euromarkets for a funding deal is well-publicized. When the loan amounts are small and parties familiar with each other, lending banks form a club and advance a loan. So, the correct option is (a)
(ix)	(d)	A perfect capital market assumes information availability to all market participants, absence of transaction cost and taxes. So, the correct option is (d)
(x)	(d)	A very simple way of eliminating the transaction exposure is to invoice all receivables and payables in the domestic currency. However, only one of the parties involved can hedge itself in this manner. It will still leave the other party exposed as it will be dealing in a foreign currency. So, the correct option is (d)

SECTION - B

2. (a) (i) If the projects are divisible

Projects are ranked according to PI and arranged in descending order.

Proposal	Investment (₹)	NPV (₹)	PV of Inflows (₹)	PI	Rank
I	85,00,000	50,00,000	1,35,00,000	1.59	4
II	35,00,000	26,00,000	61,00,000	1.74	2
III	60,00,000	20,00,000	80,00,000	1.33	5
IV	40,00,000	25,00,000	65,00,000	1.63	3
V	60,00,000	50,00,000	1,10,00,000	1.83	1

Projects are selected based on their ranking up to the availability of fund.

Proposal	Investment (₹)	Cumulative Investment (₹)
V	60,00,000	60,00,000
II	35,00,000	95,00,000
IV	40,00,000	1,35,00,000
I	85,00,000	2,20,00,000
III	60,00,000	2,80,00,000

Only ₹ 65,00,000 can be invested in project I.

NPV of the project = 65/85×50,00,000 = ₹ 38,23,529

So, the selected projects are V, II, IV and part of I.

(ii) If the projects are indivisible (by trial-and-error method)

Feasible Sets	Investments (₹)	NPV (₹)
V, II, I	1,80,00,000	1,26,00,000
V, IV, I	1,85,00,000	1,25,00,000
V, II, IV, III	1,95,00,000	1,21,00,000
I, II, IV	1,60,00,000	1,01,00,000
V, IV, III	1,60,00,000	95,00,000

The combination of projects V, II and I provides the maximum NPV and hence may be undertaken.

(b) Schedule of Debt Payment

Year end	Loan Instalment	Loan at the beginning of the year	Interest on loan (Col. 3 x 0.16)	Principal Repayment (Col.2 - Col.4)	Principal Outstanding at the end of the year (Col.3 - Col.5)
	₹	₹	₹	₹	₹
1	**2**	**3**	**4**	**5**	**6**
0	7,13,394	40,00,000	0	7,13,394	32,86,606
1	7,13,394	32,86,606	5,25,857	1,87,537	30,99,069
2	7,13,394	30,99,069	4,95,851	2,17,543	28,81,526
10	7,13,394	6,14,994 (7,13,394/1.16)	98,400	6,14,994	0

Annual instalment of Loan = ₹40,00,000 / 5.607 (PV factor making payment in 0 year =Factor for cash flow at time 0 + Annuity factor for 9 years at 16% = 1 + 4.607) = ₹ 7,13,394

PV of Cash Outflows under Buying Alternative

Depreciation = 40,00,000 / 10 = 4,00,000

Year End	Loan Instalment	Tax Advantage		Net Cash Outflows	PV factor at after tax cost	Total PV
		On Interest (0.5)	On Depreciation (0.5)			
	₹	₹	₹	₹	₹	₹
1	**2**	**3**	**4**	**5**	**6**	**7**
0	7,13,394	0	-	7,13,394	1.000	7,13,394
1	7,13,394	2,62,928	2,00,000	2,50,465	0.926	2,31,931
2	7,13,394	2,47,926	2,00,000	2,65,468	0.857	2,27,506
10	0	0	2,00,000	(2,00,000)	0.463	(92,600)

Let x be the equal annual lease rental (L.R).

P.V. of L.R. = PV for year 0 + PV for yrs 1-9 - PV for year 10

= (x)×1 + (x-0.5x) × 6.247- (0.5x) × 0.463

= 1x + 3.1235x-0.2315x

= 3.892x

Lease will be preferred if 3.892x < 26,57,029, i.e., x < ₹ 6,82,690

So, the maximum lease rental should be ₹6,82,689.

3. (a) Determination of NPV

Project-A

Year	Cash inflow (₹)	Certainty equivalent	Adjusted cash in flow (₹)	P.V. Factor @ 5%	Total P.V. (₹)
1	92,000	0.8	73,600	0.9524	70,097
2	1,02,000	0.7	71,400	0.9070	64,760
3	1,12,000	0.5	56,000	0.8638	48,373
					1,83,230

NPV= ₹ (1,83,230-1,80,000) = ₹ 3,230

Project B

Year	Cash inflow (₹)	Certainty equivalent	Adjusted cash in flow (₹)	P.V. Factor @ 5%	Total P.V. (₹)
1	92,000	0.9	82,800	0.9524	78,859
2	92,000	0.8	73,600	0.9070	66,755
3	1,02,000	0.6	61,200	0.8638	52,865
					1,98,479

NPV = ₹ (1,98,479 – 1,60,000) = ₹38,479

(i) Project B should be preferred as its NPV is greater.

(ii) Project A is riskier because its certainty equivalent is lower.

(iii) Project A being riskier would be discounted with higher rate.

(b) The components of digital finance ecosystem include the following.

1. **Digital Infrastructure:** Digital infrastructure refers to the digital technologies that bring together and interconnect physical and virtual technologies such as computer, storage, network, applications etc. to provide the foundation for an organisation's digital operations. The components of digital infrastructure are as follows-
   - (i) Internet
   - (ii) Mobile telecom and digital communication suites, including applications
   - (iii) Data centers and networks
   - (iv) Enterprise portals, platforms, systems, and software
   - (v) Cloud services:
   - (vi) Operational security, user identity and data encryption
   - (vii) APIs and integrations
2. **Digital Money:** digital money is largely interpreted as digital currency issued by the central bank of a country and is essentially a digital version of cash that can be stored and transferred using an internet or mobile application. It is also known as Central Bank Digital Currency (CBDC)

3. **Digital Assets:** A digital asset is anything that is stored digitally and is uniquely identifiable that the owner can use to realize value. In other words, a digital asset is anything that exists only in digital form and comes with a distinct usage right. Data that do not possess that right are not considered. Types of digital assets include, but are not exclusive to: photography, logos, illustrations, animations, audio-visual media, presentations, spreadsheets, digital paintings, word documents, electronic mails, websites, and a multitude of other digital formats and their respective metadata. In addition to above, digital assets may also include Non-Fungible Tokens, Private Cryptocurrency, Stablecoins which are immensely popular in today's digital age.

4. **Digital Financial Services:** Digital Financial Services (DFS) are financial services (e.g., payments, remittances, and credit) accessed and delivered through digital channels, including via mobile devices. These encompass established instruments (e.g., debit and credit cards) offered primarily by banks, as well as new solutions built on cloud computing, digital platforms, and distributed ledger technologies (DLT), spanning mobile payments, and peer-to-peer (P2P) applications.

4. (a) (i) The P/E ratio can be derived from the dividend discount model which is the foundation of valuation for common stocks.

As per the constant growth version of dividend discount model. The value of a stock or

$$P = D_1 / (k - g)$$

Dividing both sides of the equation by expected earnings E_1, we get,

$$P / E_1 = \frac{D_1/E_1}{k-g}$$

If the growth rate is assumed to depend on the return on equity (ROE), then $g = ROE\ (1 - D_1/E_1)$

Then, $P / E_1 = \frac{D_1/E_1}{k-ROE(1-\frac{D_1}{E_1})}$

Thus, P/E ratio depends on the dividend payout, discount rate and return on equity.

The following relationship should hold, other things being equal:

- The higher the expected payout ratio, the higher the P/E ratio.
- The higher the expected growth rate (g), the higher the P/E ratio.
- The higher the required rate of return (k), the lower the P/E ratio.

(ii) EPS current year = ₹4.00; expected growth rate = 2%; required rate of return = 14%

We know that, $P_0 = \frac{D_0\,(1+g)}{k-g} = \frac{4\,(1+0.02)}{0.14-0.02} = ₹34$

P/E ratio = Price/ EPS = 34/10 = 3.4

Again, $P_0 = \frac{D_0\,(1+g)}{k-g}$

$P_0/E = \frac{D_0\,/E \times (1+g)}{k-g}$

or, $7 = \frac{4/10\,(1+g)}{0.14-g}$

Solving for 'g' we get, g = 0.078378 = 7.84%

So, implied growth rate is 7.84%.

(b) Return for the year (all changes on a per unit basis)

Change in price (13.40 - 12.50)	₹ 0.90
Dividend received	₹ 1.55
Total Return	₹ 2.45

Holding Period Return = 2.45 / 12.50 × 100 = 19.6%

(ii) When all distributions are reinvested into additional units of the fund (at NAV of ₹12.80).

Dividend per unit = ₹ 1.55

Total receipt from 240 units = 1.55 × 240 = ₹ 372

Additional unit acquired ₹ 372 / ₹ 12.80 = 29.06 Units

Value of (240 + 29.06) = 269.06 units held at end of year = 269.06×13.40 = ₹ 3,605.40

Price paid for 240 units at beginning of year = 240 units ×12.50= ₹ 3,000

Holding period return would be = (3605.40 - 3000) / 3000 = 20.18%

5. (a) Characteristics line

$y = \alpha + \beta x$

y= Mean return (stock PQ), x= mean return (market)

$10=\alpha+0.73\,(6.75)$

$\alpha = 5.0725$

$y=5.0725+0.73x$

So, the characteristic line is $y=5.0725+0.73x$

Now, If x=5

y=5.0725+3.65

y=8.7225

or, y=8.72%

Similarly, If x=(-) 8

y=5.0725+0.73(-8)

y=5.0725-5.84

y=(-)0.767% y=(-)0.77%

(b) Calculation for ranking based on Jensen's alpha

Particulars	Scheme A	Scheme B	Scheme C
Dividend Distributed	₹1.60	-	₹1.15
Add : Capital Appreciation	₹2.77	₹3.33	₹1.79
Total Return (A)	₹4.37	₹3.33	₹2.94
Opening NAV (B)	₹30	₹25.15	₹21.50
Actual Return (C)=(A)÷(B)×100	14.57%	13.24%	13.67%
Beta (D)	1.40	1.10	1.35
Expected Return under CAPM [E=(R_P)][E]=R_F + B_P × (R_M – R_F)]	14.14% [6.64+1.40×(12 - 6.64)]	12.54% [6.64+1.10×(12-6.64)]	13.88% [(6.64+1.35×(12 -6.64)]
Jensen's Alpha (C)-(E)	0.43% (14.57-14.14)	0.70% (13.24-12.54)	=(0.21%) (13.67-13.88)
Ranking	II	I	III

Schemes A and B have outperformed the market portfolio (Nifty) whereas scheme C has underperformed in comparison with the NIFTY.

6. (a) (i) Theoretical Future Price

Particulars	**Value**
6 months future price	₹200
Current Stock Price (S_x)	₹180
Borrowing Rate (r)	12% or 0.12
Time (in years)	6/12 = 0.5 year
Theoretical Future Price (F_x) =	$S_x \times e^{rt}$
	$180 \times e^{0.12 \times 0.5}$
	$180 \times e^{0.06}$
	180 x 1.06184 = ₹191.13

Since the Theoretical Future Price is less than the Expected Future Price, the recommended action would be to sell in the future market.

(ii) Cash flows to gain from Arbitrage opportunity:

Activity Flow: Enter into a future contract to sell shares at the rate of ₹ 200 on expiry date, sell the shares at the 6 months future rate of ₹ 200, pay the amount of borrowing together with interest. ₹ $180 \times e^{0.12 \times 0.5}$ = ₹ 191.13

Net gain = 200 – 191.13=₹8.87

(b) Net pay-off [call option]

Spot price on Expiry Date (SPE)	Exercise Price (EP)	Value of call [Maximum of (SPE-EP),0]	Action	Option premium	Net Pay off [call holder]
1	**2**	**3**	**4**	**5**	**6=3-5**
200	220	200-220=-20--------0	Lapse	6	0-6=-6
210	220	210-220= -10-------0	Lapse	6	0-6=-6
220	220	220-220=0----------0	Lapse	6	0-6=-6
230	220	230-220=10-------10	Exercise	6	10-6=4
240	220	240-220=20-------20	Exercise	6	20-6=14

Net pay off [put option]

Spot price on Expiry Date(SPE)	Exercise price (EP)	Value of call [Maximum of (EP-SPE),0]	Action	Option premium	Net Pay off [call holder]
1	**2**	**3**	**4**	**5**	**6=3-5**
200	220	220-200=20	Exercise	5	15
210	220	220-210=10	Exercise	5	5
220	220	220-220=0	Lapse	5	-5
230	220	220-230= -10-----0	Lapse	5	-5
240	220	220-240= -20-----0	Lapse	5	-5

Option is gainfully exercised by (or in the money)

(i) For call option holder, share price is more than ₹ 226

(ii) For put option holder, share price is less than ₹ 215

7. (a) An American Depositary Receipt (ADR) is a certificate that represent shares of a foreign stock owned and issued by a U.S. bank. The foreign shares are usually held in custody overseas, but the certificates trade in the U.S. Through this system, a large number of foreign-based companies are actively traded on one of the three major U.S. equity markets (the NYSE, AMEX or Nasdaq).

Advantages of ADRs: ADRs provide the following advantages -

(i) Access to Large Capital.

(ii) Access to Foreign Exchange.

(iii) No Change in the Shareholding / voting pattern.

(iv) Increased recognition for the Company internationally by bankers, customers, etc.

(v) No Exchange Rate risk since the Company pays interest and dividends in Indian Rupees.

Limitations of ADRs:

(i) High cost of Issue.

(ii) Requirement as to large size of issue.

(iii) Stringent compliance requirements.

(b) (i) Payment to supplier in 60 days

If the payment is made to supplier in 60 Days, the applicable forward rate for 1 US$	₹ 65.10
Payment due	US$ 1,00,00,000
Outflow in rupees (US$ 1,00,00,000 × ₹ 65.10)	₹ 65,10,00,000
Add: Interest on Loan for 30 days @10% p.a.	₹ 54,25,000
Total Outflow	₹ 65,64,25,000

(ii) Payment to supplier in 90 days

Amount Payable	US$ 1,00,00,000
Add: Interest on Credit Period for 30 days @ 8% p.a.	US$ 66,667
Total Outflow in US$	US$ 1,00,66,667
Applicable forward for 1 US$	₹ 65.50
Total Outflow (US$ 1,00,66,667 × ₹ 65.50)	₹ 65,93,66,689

Comment: It is better to select alternative (i) as it entails lower cash flows.

SECTION - C

8.

Existing Machine	**(Amount in ₹)**
Cost	20,00,000
Depreciation 20%, year 1	4,00,000
	16,00,000
Depreciation 20%, year 2	3,20,000
WDV	12,80,000
Depreciation 20%, year 3	2,56,000
WDV at Y0 =	10,24,000

Base for incremental depreciation

Cost of New Machine	30,00,000
Less: WDV of existing machine	10,24,000
Difference	19,76,000

Depreciation at end of the Year

		PV	Disc. Values
Year 1	3,95,200	0.909	3,59,237
Year 2	3,16,160	0.826	2,61,148
Year 3	2,52,928	0.751	1,89,949
Year 4	2,02,342	0.683	1,38,200
Year 5	1,61,874	0.621	1,00,524
			10,49,058
Tax Shield 40%			4,19,623

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Expenses				(1,00,000)	(1,00,000)	(1,00,000)
Revenue		3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Net Revenue		3,00,000	3,00,000	2,00,000	2,00,000	2,00,000
Net Revenue after Tax		1,80,000	1,80,000	1,20,000	1,20,000	1,20,000
Cost of New Machine	(30,00,000)					
Resale – old Machine	12,00,000					
Resale – New Machine						18,00,000
Cash Flows other than Depreciation	(18,00,000)	1,80,000	1,80,000	1,20,000	1,20,000	19,20,000
PV Factor	1	0.909	0.826	0.751	0.683	0.621
Discount Annual C/F	(18,00,000)	1,63,620	1,48,680	90,120	81,960	11,92,320
						(1,23,300)

PV of Cash Flows (Other than Depreciation) (1,23,300)
Depreciation Impact + 4,19,623
Net Impact + 2,96,323
Hence it is beneficial to go in for the new machine.