



WEST BENGAL STATE UNIVERSITY
B.Com. Programme 5th Semester Examination, 2020, held in 2021

FACGDSE02T-B.COM. (DSE1)

CORPORATE ACCOUNTING

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

GROUP-A

Answer any two questions from the following

10×2 = 20

1. (a) A limited company with a subscribed capital of Rs. 10,00,000 in Equity Shares of Rs. 10 each has resolved to issue fully paid bonus shares in the ratio of one equity share for every five equity shares held. The company has a balance of Rs. 1,60,000 in securities premium account and a balance of Rs. 2,00,000 in general reserve. Show journal entries in the books of the company for the issue of bonus shares. 4+6
- (b) Big Co. Ltd. issued 4,500, 15% Debenture of Rs. 100 each. Give the journal entries if the Debentures are
- (i) issued at a discount of 10% and
 - (ii) issued at a premium of 10%. The Debentures are to be redeemed at par in each case.
2. The following particulars are available regarding the liquidation matters of a company: 8+2
- | | |
|----------------------------|--------------|
| Sale proceeds of assets: | Rs. 7,50,000 |
| Liquidation expenses: | Rs. 10,000 |
| Amount due to be paid: | |
| To preferential creditors: | Rs. 25,000 |
| To unsecured creditors: | Rs. 8,25,000 |
- Liquidator's remuneration: 3% of the amount realized + 4% of amount distributed to unsecured creditors
- Calculate:
- (i) the amount of liquidator's remuneration, and
 - (ii) the amount paid to unsecured creditors.
3. Pass necessary journal entries for the following transactions in connection with a scheme of internal reconstruction of a company: 4+2+2+2
- (i) The company has 40,000 equity shares of Rs. 10 each, Rs. 8 per share paid-up. As per the scheme of reconstruction, uncalled capital is to be called up in full and then equity shares are to be reduced to Rs. 5 per share.

- (ii) Trade creditors of Rs. 60,000 have agreed to forgo 50% of their claim on a condition that the balance should be paid immediately.
- (iii) The company has 1,000, 11% Debentures of Rs. 100 each fully paid-up. The debenture holders agreed to surrender their existing debenture of Rs. 100 each and exchange the same for new 12.5% Debenture of Rs. 80 each.
- (iv) Fixed assets of Rs. 8,00,000 are to be written down by 40%.

4. From the following information, prepare statements showing: (a) Average Capital employed and (b) Goodwill on the basis of 5 years' purchase of the average super profit.

6+4

Liabilities	Rs.	Assets	Rs.
20,000, Equity Shares of Rs.10 each	2,00,000	Goodwill (Purchased)	30,000
1,000, 9% Preference Shares of Rs. 100 each	1,00,000	Fixed Assets	3,00,000
Reserves	1,75,000	Investments in 6% Govt. Securities	50,000
Provision for Taxation	20,000		
Creditors	65,000	Current Assets	1,80,000
	5,60,000		5,60,000

Other Information:

The current market value of the Plant is Rs. 3,20,000.

Current year's after-tax profit of the company is Rs. 90,000.

After-tax average profit of the company is computed as Rs. 68,000.

Expected rate of return is 10% and tax rate is 30%.

5. The Balance Sheet of Z Ltd. as on 31st March, 2020 was as follows:

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Liabilities	Rs.	Assets	Rs.
Share Capitals:		Bank	90,000
50,000, Equity Shares of Rs.10 each	5,00,000	Other Assets	8,10,000
1,000, 10% Redeemable Pref. Shares of Rs.100 each	1,00,000		
Reserves & Surplus:			
Securities Premium	30,000		
Profit & Loss A/c	60,000		
General Reserve	70,000		
Current Liabilities:			
Creditors	1,40,000		
	9,00,000		9,00,000

The redeemable preference shares were redeemed on the following basis:

- (i) Further 4,000 equity shares of Rs. 10 each were issued at 10% premium.
- (ii) Expenses for fresh issue of shares Rs. 5,000.

(iii) Preference shares were redeemed at a premium of 10% and the share premium account was utilized in full for this purpose.

Pass the journal entries for the above transactions in the books of Z Ltd.

6. (a) Mention any four Statutory Books to be maintained by a company.

4+3+3

কোম্পানিকে রাখতে হয় এমন যে কোনো চারটি বিধিবদ্ধ বই এর উল্লেখ কর।

(b) What do you mean by 'Consolidated Balance Sheet'?

'একীভূত উন্নত পত্র' বলতে তুমি কী বোঝ ?

(c) State how 'Preliminary Expenses' are shown in company accounts.

কোম্পানির হিসাবে 'প্রাথমিক ব্যয়সমূহ' কিভাবে দেখান হয় তা বিবৃত কর।

GROUP-B

Answer any two questions from the following

15×2 = 30

7. The following are the Balance Sheets of H Ltd. and its subsidiary S Ltd. as at 31st March, 2019:

15

Liabilities	H Ltd. Rs.	S Ltd. Rs.	Assets	H Ltd. Rs.	S Ltd. Rs.
Fully Paid Equity Shares of Rs. 10 each	6,00,000	2,00,000	Machinery	3,90,000	1,35,000
General Reserve	2,40,000	80,000	Furniture	80,000	40,000
Profit & Loss A/c	1,00,000	80,000	80% Shares in S Ltd. at cost	2,40,000	-
Creditors	70,000	35,000	Stock	1,80,000	1,30,000
			Debtors	50,000	40,000
			Cash at Bank	70,000	50,000
	10,10,000	3,95,000		10,10,000	3,95,000

The following additional information is provided to you:

- Profit and Loss Account of S Ltd. stood at Rs. 40,000 on 1st April, 2019, whereas General Reserve has remained unchanged since that date.
- H Ltd. acquired 60% shares in S Ltd. on 1st October, 2018 for Rs. 2,40,000 as mentioned above.
- Included in Debtors of S Ltd. is a sum of Rs. 10,000 due from H Ltd. for goods sold at a profit of 20% on cost price. All the goods were lying in the godowns of H Ltd. as on 31st March, 2019.

You are required to prepare the Consolidated Balance Sheet as at 31st March, 2019.

8. X Ltd. invited applications for 20,000 Equity shares of Rs. 100 each at a premium of 20% payable as on application Rs. 40 per share, on allotment (including premium) Rs. 50 per share and the balance on first and final call.

15

Applications were received on 18,000 shares and application money for 3,000 shares were refunded. Allotment was made in full on all other applications.

All money due was received except the first and final call on 1,000 shares which

were forfeited. Out of these forfeited shares, 500 shares were re-issued at Rs. 100 each as fully paid up.

Pass necessary Journal entries in the books of X Ltd.

9. J Ltd. and K Ltd. agreed to amalgamate by transferring their undertakings to a new company JK Ltd. formed for that purpose. On the date of transfer, Balance Sheet of the two companies were as under:

4+6+5

Liabilities	J Ltd. Rs.	K Ltd. Rs.	Assets	J Ltd. Rs.	K Ltd. Rs.
Authorised & Issued Capital: Equity Shares of Rs. 10 each Fully Paid	75,000	25,000	Freehold Property	9,000	—
5% Debentures	—	4,000	Sundry Assets	62,000	33,000
Reserve & Surplus	3,000	5,000	Debtors	15,000	8,000
Mortgage Loan (Secured on Freehold Property)	6,000	—	Investments	20,000	6,000
Sundry Creditors	4,000	8,000	Bank	8,000	4,000
Sundry Provisions	1,000	3,000			
Profit & Loss A/c	25,000	6,000			
	1,14,000	51,000		1,14,000	51,000

The purchase consideration will be calculated on the basis of following terms:

- Debentures in K Ltd. will be discharged by issue of Rs. 3,500 4% Debentures in JK Ltd.
- All the assets and liabilities of both the companies will be taken over by JK Ltd.
- JK Ltd. will issue fully paid equity shares of Rs. 10 each at a premium of Rs. 5 per share.
- For the purpose of transfer, the assets are to be revalued as under:

	J Ltd. (Rs.)	K Ltd. (Rs.)
Sundry Assets	66,000	35,000
Freehold Property	6,000	—
Debtors	13,100	4,500
Investments	15,900	5,000
Goodwill	10,000	3,000

- Show the details of the exchange of shares.
 - Write up the Realization Account in the books of J Ltd. and K Ltd. to give effect to the above transactions.
 - Show the Balance Sheet of the JK Ltd. immediately after the amalgamation.
10. The following balances appeared in the books of XYZ Ltd. as on 31st March 2020:

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	Debit (Rs.)	Credit (Rs.)
Equity Shares of Rs.10 each, fully paid up		6,00,000
General Reserve		2,40,000
Trade Payables		42,800
Purchases	4,95,000	

Furniture (at cost)	5,000	
Buildings (at cost)	1,50,000	
Long term Provisions		40,600
Sales		10,30,900
Salaries, Wages & Bonus	2,39,100	
Contribution to Provident Fund	27,400	
Cash at Bank	64,600	
Directors' fees	2,500	
Advertising	30,800	
Repairs & maintenance	17,600	
Audit fees	7,000	
Miscellaneous expenses	15,400	
Labour welfare expenses	31,500	
Rent, Rates & Taxes	34,300	
Plant & Equipment (at cost)	2,40,000	
Interest on Investments		8,500
Unclaimed Dividend		1,250
Trade Receivables	2,32,400	
Investments	2,80,000	
Provision for Depreciation on Fixed Assets		1,05,700
Opening Stock	1,65,800	
Advanced payment of income tax	52,000	
Surplus in Statement of Profit & Loss (01.04.2019)		20,650
Total	20,90,400	20,90,400

From the above-mentioned balances and the following information, prepare the company's Profit & Loss Statement for the year ended on 31st March 2020 and its Balance Sheet on that date:

- (i) The stock on 31st March 2020 was valued at Rs. 1,50,600.
- (ii) Provide Rs. 44,500 for depreciation on fixed assets.
- (iii) Interest accrued on investment amounted to Rs. 5,400.
- (iv) Make a provision of Rs. 48,000 for income tax.
- (v) Transfer of Rs. 30,000 to General Reserve.

11. The following particulars of a company are available for the year 2019-20:

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- (i) Equity Share Capital: 12,000 Equity Shares of Rs. 10 each
- (ii) Preference Share Capital: 900 11% Preference Shares of Rs. 100 each fully paid
- (iii) Reserves and Surplus:
 - General Reserve: Rs. 10,000
 - Profit and Loss Account: Rs. 14,000
- (iv) The normal profit (after taxation) earned each year by the company:
 - Year 2017-18: Rs. 25,000
 - Year 2018-19: Rs. 35,000

Year 2019-20: Rs. 30,000

The normal rate of return in respect of the Equity Shares of this type of company is calculated as 10%. Calculate Fair Value of each Equity Share of the company.

12. Write short notes on (Any *three*):

5×3 = 15

সংক্ষিপ্ত টীকা লেখঃ (যে-কোনো *তিনটি*)

(i) Liquidator's Final Statement of Accounts

হিসাবের ওপর অবসায়কের চূড়ান্ত বিবরণী

(ii) Amalgamation in the Nature of Merger

সংযোজন প্রকৃতির একত্রীকরণ

(iii) Authorised Capital

অনুমোদিত মূলধন

(iv) Forfeiture of Equity Shares

ইকুইটি শেয়ার বাজেয়াপ্তকরণ

(v) Capital Redemption Reserve.

মূলধন পরিশোধ সঞ্চিতি।

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WEST BENGAL STATE UNIVERSITY
B.A./B.Sc. Programme 5th Semester Examination, 2020, held in 2021

ECOGDSE02T-ECONOMICS (DSE1)

ECONOMICS OF SOCIAL SECTORS

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

GROUP-A

1. Answer any six questions from the following: 2×6 = 12
নিম্নলিখিত যে-কোনো ছয়টি প্রশ্নের উত্তর দাওঃ
- (a) State two limitations of Head Count Ratio.
মাথাগণতি অনুপাত-এর দুটি সীমাবদ্ধতা লেখো।
- (b) Does high Per Capita Income rank of a country imply a corresponding higher rank in terms of Human Development Index?
কোনও দেশের মাথাপিছু-আয়ের ক্রম উচ্চ হলে কি তার মানব উন্নয়ন সূচকের নিরিখে প্রাপ্ত ক্রমাবস্থানও উচ্চ হবে ?
- (c) Define Optimum Population.
কাম্য জনসংখ্যা-এর সংজ্ঞা দাও।
- (d) Name two poverty alleviation programmes taken by Government of India.
ভারত সরকার দ্বারা গৃহীত দুটি দারিদ্র্য দূরীকরণ কর্মসূচির নাম লেখো।
- (e) What is called Vicious Circle of Poverty?
দারিদ্র্যের দুষ্টি-চক্র কাকে বলে ?
- (f) Define Gender Empowerment Measure.
লিঙ্গ ক্ষমতায়ন সূচক-এর সংজ্ঞা দাও।
- (g) What do you mean by Public Health?
জন-স্বাস্থ্য বলতে কি বোঝো ?
- (h) What does Gender Development Index capture over the Human Development Index?
লিঙ্গ উন্নয়ন সূচক মানব উন্নয়ন সূচক থেকে অতিরিক্ত কোন বিষয়কে নির্দেশ করে ?
- (i) What does the 'Poverty gap' measure?
'দারিদ্র্য-ফাঁক' কি পরিমাপ করে ?

- (j) Suppose, the value of Adult Literacy Rate and Gross Enrolment Rate of a country are 61 and 60 respectively. Find out the Education Index under the Human Development framework.

ধরো, কোনো দেশের বয়স্ক শিক্ষার হার এবং মোট অঙ্কভুক্তির হার যথাক্রমে ৬১ এবং ৬০। মানব উন্নয়নের প্রেক্ষাপটে শিক্ষা সূচক এর মান নির্ণয় করো।

- (k) If the population of a country is high enough will economic development move towards the same direction?

কোনও দেশের জনসংখ্যা যদি যথেষ্ট বেশি হয় তবে অর্থনৈতিক উন্নয়ন ও কি সেই দেশে বেশি হবে ?

- (l) Can inequality be measured by Human Development Index?

মানব উন্নয়ন সূচকের মাধ্যমে বৈষম্য মাপা যায় কি ?

GROUP-B

2. Answer *any two* questions from the following:

4×2 = 8

নিম্নলিখিত যে-কোনো দুটি প্রশ্নের উত্তর দাওঃ

- (a) What do you understand by Malthusian Theory of Population?

ম্যালথাস এর জনসংখ্যা তত্ত্ব বলতে কি বোঝায় ?

- (b) What do you mean by Human Capital?

মানবিক মূলধন কি ? বুঝিয়ে বলো।

- (c) What are the determinants of demand for Public Health Care?

সরকারি স্বাস্থ্যসেবার চাহিদা-নির্ধারক বিষয়গুলি আলোচনা করো।

- (d) Discuss two problems of India's Education system.

ভারতীয় শিক্ষা ব্যবস্থার দুটি সমস্যা নিয়ে আলোচনা করো।

GROUP-C

3. Answer *any three* questions from the following:

10×3 = 30

নিম্নলিখিত যে-কোনো তিনটি প্রশ্নের উত্তর দাওঃ

- (a) What do you mean by demographic dividend? How is it related to Economic Development?

5+5

জনবিন্যাসের লভ্যাংশ বলতে কি বোঝায় ? এটি অর্থনৈতিক উন্নয়নের সাথে কিভাবে সম্পর্কিত ?

- (b) How did the concept of Human Development evolve from the idea of Economic Development? How can you measure Human Development Index?

4+6

অর্থনৈতিক উন্নয়ন থেকে মানব উন্নয়নের ধারণা কিভাবে উদ্ভূত হল ? আপনি কিভাবে মানব উন্নয়ন সূচক নির্ণয় করবেন ?

- (c) How an increase in Per Capita Health and Education Expenditure may help in enhancing Economic Development?

শিক্ষা ও স্বাস্থ্য খাতে মাথাপিছু ব্যয় বৃদ্ধি পেলে তা অর্থনৈতিক উন্নয়নে কিভাবে সাহায্য করবে ?

- (d) Discuss the role of private investment in developing the Education system of India.

ভারতীয় শিক্ষা ব্যবস্থার উন্নয়নে বেসরকারি বিনিয়োগের ভূমিকা বিশ্লেষণ করো।

- (e) Do you think a steady economic growth definitely improve Gender Development Index? —Discuss.

তুমি কি মনে করো যে নিরবিচ্ছিন্ন অর্থনৈতিক উন্নয়ন লিঙ্গ উন্নয়ন সূচকের মান উর্ধ্বমুখী করবেই ? - ব্যাখ্যা করো।

- (f) Name any two Elementary Educational schemes undertaken by Government of India and discuss their features. 2+(4×2)

কেন্দ্রীয় সরকারের দুটি প্রাথমিক শিক্ষা কর্মসূচির নাম লেখো এবং তাদের বৈশিষ্ট্য আলোচনা করো।

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ECOGDSE01T-ECONOMICS (DSE1)

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate marks of question.
Candidates should answer in their own words
and adhere to the word limit as practicable.*

*প্রান্তিক সীমার মধ্যস্থ সংখ্যাটি প্রশ্নের মান নির্দেশ করে।
পরীক্ষার্থীদের নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে
উত্তর দিতে হবে।*

1. Answer any *six* questions from the following: 2×6 =12
নিম্নলিখিত যে-কোনো ছয়টি প্রশ্নের উত্তর দাওঃ
- (a) Write two examples of secondary data source.
দৌণ রাশিতথ্য সংগ্রহের উৎসের দুটি উদাহরণ দাও।
- (b) Distinguish between class limits and class boundaries.
শ্রেণী সীমা ও শ্রেণী সীমান্তের মধ্যে পার্থক্য নির্দেশ করো।
- (c) What is the relationship between arithmetic mean, median and mode?
মধ্যক, মধ্যমা ও সংখ্যাগুরু মানের সম্পর্ক লেখো।
- (d) Write the formula of finding Mode in Grouped Frequency Distribution.
শ্রেণীবদ্ধ পরিসংখ্যা বিভাজনের ক্ষেত্রে সংখ্যাগুরু মান নির্ণয়ের সূত্রটি লেখো।
- (e) Write two characteristics of a good measure of Dispersion.
একটি উৎকৃষ্ট বিস্তৃতির পরিমাপকের দুটি বৈশিষ্ট্য লেখো।
- (f) Define Median.
মধ্যমার সংজ্ঞা দাও।
- (g) If $X_i=1, 2, 3, 4, 5$, find simple Arithmetic mean of X_i .
যদি $X_i=1, 2, 3, 4, 5$ হয়, তবে X_i এর গাণিতিক গড় বের করো।
- (h) Define pie chart.
বৃত্তীয় চার্ট এর সংজ্ঞা দাও।
- (i) Define relative frequency.
আপেক্ষিক পরিসংখ্যার সংজ্ঞা দাও।
- (j) What is coefficient of variation?
ভেদাঙ্ক কাকে বলে ?
- (k) Write two advantages of sample survey over complete enumeration method.
পূর্ণ তদন্তের তুলনায় নমুনা তদন্ত পদ্ধতির দুটি সুবিধা উল্লেখ করো।

2. Answer any *two* questions from the following:

4×2 = 8

নিম্নলিখিত যে-কোনো দুটি প্রশ্নের উত্তর দাও:

(a) State whether the following data are Variable or Attribute. If variable, state whether Discrete or Continuous:

- Age of a child,
- Religion of a citizen,
- Number of patients in a hospital,
- Average area of cultivable land in India.

নিচের তথ্যগুলো চলক না গুণোগত চলক? যদি চলক হয় তবে বিচ্ছিন্ন চলক না অবিচ্ছিন্ন চলক?

- একটি শিশুর বয়স,
- একজন নাগরিকের ধর্ম,
- হাসপাতালে রোগীর সংখ্যা,
- ভারতের কৃষি জমির গড় আয়তন।

(b) Explain using suitable examples the concepts of Frequency Density and Cumulative Frequency distribution.

উপযুক্ত উদাহরণের সাহায্যে পরিসংখ্যা ঘনত্ব এবং ক্রমযৌগিক পরিসংখ্যার ধারণাটি ব্যাখ্যা করো।

(c) Draw an appropriate diagram to represent the following data:

নীচের রাশিগুলির জন্য একটি উপযুক্ত চিত্র অঙ্কন করো:

Production of tea in different countries. (বিভিন্ন দেশের চায়ের উৎপাদন)

Countries (দেশ)	Production (1000 metric tonnes) উৎপাদন (হাজার মেট্রিকটন)
India (ভারত)	405
Sri Lanka (শ্রীলঙ্কা)	225
Japan (জাপান)	85
Indonesia (ইন্দোনেশিয়া)	40
Other countries (অন্যান্য দেশ)	275

(d) Draw the histogram for the following data.

নীচের রাশিতথ্যের জন্য আয়তলেখ অঙ্কন করো:

Marks in Economics অর্থনীতিতে প্রাপ্ত নম্বর	26-35	36-45	46-55	56-65	66-75	76-85	86-95
Frequency পরিসংখ্যা	3	15	56	21	12	6	2

3. Answer any *three* questions from the following:

10×3 = 30

নিম্নলিখিত যে-কোনো তিনটি প্রশ্নের উত্তর দাও:

(a) Describe different methods of collecting primary data. What are the advantages and disadvantages of tabular presentation of data?

6+4

প্রাথমিক রাশিতথ্য সংগ্রহের বিভিন্ন পদ্ধতি আলোচনা করো। ছকের মাধ্যমে রাশিতথ্য উপস্থাপনের সুবিধা ও অসুবিধাগুলো আলোচনা করো।

- (b) Write a short note on line diagram. What is frequency polygon? State two uses of it. 5+3+2
রেখাচিত্রের উপর একটি সংক্ষিপ্ত টীকা লেখো। পরিসংখ্যা বহুভুজ কাকে বলে? এর দুটি ব্যবহার লেখো।

- (c) (i) Arithmetic mean of following frequency distribution is 117. Compute the value of x . 6+4
নীচের পরিসংখ্যা বিভাজনের গড় হল 117, x এর মান নির্ণয় করো।

Value (মান)	100	110	120	$x+25$	140
Frequency (পরিসংখ্যা)	1	4	2	2	1

- (ii) Compute the value of median and mode from following data.

নিম্নলিখিত তথ্য থেকে মধ্যমা এবং সংখ্যাগুরু মান নির্ণয় করো।

5, 7, 5, 2, 5, 2, 2, 5, 8, 10, 7, 5, 3, 5, 4, 6, 5, 9, 5.

- (d) What is meant by the measures of Central tendency of data? Discuss the advantages and disadvantages of mean, median and mode. 2+8
কেন্দ্রীয় প্রবণতার পরিমাপ কাকে বলে? মধ্যক, মধ্যমা ও সংখ্যাগুরু মানের সুবিধা ও অসুবিধা আলোচনা করো।

- (e) Draw the Cumulative frequency polygon from the following data and find out the median from them. 8+2

Class	Frequency
225-229	17
230-234	92
235-239	120
240-244	75
245-249	40
250-254	32
255-259	18
260-264	6

উপরোক্ত তথ্যসমূহ থেকে ক্রমবোদ্ধিক পরিসংখ্যা বহুভুজ অঙ্কন করো এবং তা থেকে মধ্যমা নির্ণয় করো।

- (f) Distinguish between absolute and relative measures of dispersion. Write the advantages and disadvantages of standard deviation as a measure of dispersion. 5+5
প্রকৃত এবং আপেক্ষিক বিস্তৃতির পরিমাপের মধ্যে পার্থক্য নির্ণয় করো। সমকবিচ্যুতির সুবিধা ও অসুবিধাগুলি লেখো।

N.B. : Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

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WEST BENGAL STATE UNIVERSITY
B.Sc. Programme 5th Semester Examination, held in 2021

BOTGDSE02T-BOTANY (DSE1)

RESEARCH METHODOLOGY

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate marks of question.
Candidates should answer in their own words
and adhere to the word limit as practicable.*

*প্রান্তিক সীমার মধ্যে সংখ্যাটি প্রদেয়মান নির্দেশ করে।
পরীক্ষার্থীদের নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে
উত্তর দিতে হবে।*

All symbols are of usual significance.

1. Answer the following questions: 1×16 = 16
নিম্নলিখিত প্রশ্নগুলির উত্তর দাওঃ
- (a) What is percent solution?
পার্সেন্টে দ্রবণ কি ?
- (b) What is stain?
রঞ্জক কি ?
- (c) Name one toxic chemical commonly used in botany laboratory.
উদ্ভিদবিদ্যা গবেষণাগারে সাধারণত ব্যবহৃত একটি বিষাক্ত রাসায়নিকের নাম লেখো।
- (d) Define fundamental research.
মৌলিক গবেষণার সংজ্ঞা লেখো।
- (e) Name any two data collection methods.
দুটি তথ্য সংগ্রহের পদ্ধতির নাম দাও।
- (f) Name one fungus that is used as a model organism in biological science.
জীববিজ্ঞানে মডেল জীব হিসাবে ব্যবহৃত একটি ছত্রাকের নাম লেখো।
- (g) Name one coagulating fixative.
একটি কোয়াগুলেটিং ফিক্সিটিভের নাম লেখো।
- (h) What is the main role of chemical fixative during tissue preparation?
টিস্যু প্রস্তুতির সময় রাসায়নিক স্থায়ীকরণ এর প্রধান ভূমিকা কী ?
- (i) Define plagiarism.
প্লাজিয়ারিজমের সংজ্ঞা দাও।
- (j) Name a software used for poster preparation and presentation.
পোস্টার প্রস্তুতি এবং উপস্থাপনার জন্য ব্যবহৃত একটি সফটওয়্যারটির নাম লেখো।

(k) Name one basic dye.

একটি basic dye-র নাম দাও।

(l) Name one technique used for transcriptional profiling of biological samples.

কোনো জৈবিক নমুনার ট্রান্সক্রিপশনাল প্রোফাইলিং-এর জন্য ব্যবহৃত একটি প্রযুক্তির নাম লেখো।

(m) Why is paraffin used in histology?

হিস্টোলজিতে প্যারAFFIN ব্যবহার করা হয় কেন?

(n) What is a micropipette? Write its unit.

মাইক্রোপিপেট কী? এর ইউনিট লেখো।

(o) What is trend line?

ট্রেন্ডলাইন কি?

(p) Define forward genetics.

ফরওয়ার্ড জেনেটিক্স-এর সংজ্ঞা দাও।

2. Answer any **eight** questions from the following:

3×8 = 24

নিম্নলিখিত যে-কোনো আটটি প্রশ্নের উত্তর দাও:

(a) 'Wearing gloves and laboratory coats is essential while working in a laboratory'— Justify.

'পরীক্ষাগারে কাজ করার সময় গ্লাভস-এবং ল্যাবরেটরি কোট পরা জরুরি'— যথার্থতা প্রমাণ করো।

(b) Why is *Arabidopsis* used as a model plant in biological science research?

জীববিজ্ঞান গবেষণায় আদর্শ উদ্ভিদ হিসাবে *Arabidopsis* কেন ব্যবহার করা হয়?

(c) Calculate the normality of 18.25% HCl, if the density of acid is 1g/ml.

অ্যাসিডের ঘনত্ব 1 গ্রাম/মিলি হলে 18.25% HCl-এর normality গণনা করো।

(d) Write down the importance of maintaining laboratory records.

পরীক্ষাগারে নথি বজায় রাখার গুরুত্ব লেখো।

(e) Describe research process in flow chart.

ফ্লো চার্টে গবেষণা প্রক্রিয়াটির বর্ণনা দাও।

(f) Discuss the importance of labeling of reagent bottle as a laboratory safety measure.

পরীক্ষাগারে সুরক্ষা বজায় রাখতে রিএজেন্ট বোতলের লেবেলগুলি পড়ার গুরুত্ব আলোচনা করো।

(g) Describe how the subcellular localization of a protein can be identified in plant cells.

উদ্ভিদকোষে কোনও প্রোটিনের উপকোষীয় স্থানীয়করণ কিভাবে চিহ্নিত করা যায় তা বর্ণনা করো।

(h) Why is literature review required before starting a new research work? State one difference between qualitative and quantitative research.

নতুন গবেষণার কাজ শুরু করার আগে সাহিত্য পর্যালোচনা কেন প্রয়োজন?

গুণগত এবং পরিমাণগত গবেষণার মধ্যে একটি পার্থক্য বর্ণনা করো।

(i) Why is scale bar important in microscopic imaging? Convert 25 mm to armstrong (Å).

আণুবীক্ষণিক চিত্রায়নে স্কেল বার কেন গুরুত্বপূর্ণ? 25 mm কে আর্মস্ট্রং-এ রূপান্তর করো।

- (j) Suppose a researcher has forgotten his scale on a field trip. Write down how he can include a size reference in the photograph of the field specimens.

মনে করো কোনও গবেষক ফিল্ডট্রিপে তার স্কেলটি ভুলে গেছেন। ফিল্ডস্পেসিমেনের ছবিতে তিনি কীভাবে আকারের রেফারেন্স অন্তর্ভুক্ত করতে পারেন তা লেখো।

- (k) Define gene. How can a researcher isolate a gene of known sequence from a plant sample?

জিন-এর সংজ্ঞা লেখো। কোনও গবেষক কীভাবে উদ্ভিদের নমুনা থেকে জ্ঞাত জিনবিন্যাসের একটি জিনকে আলাদা করতে পারে?

- (l) What volume of 0.1N HNO_3 is required to neutralize 50 mL of a 0.15 N solution of $\text{Ba}(\text{OH})_2$?

$\text{Ba}(\text{OH})_2$ -এর 0.15 N দ্রবণটির 50 mL-কে নিরপেক্ষকরণ করতে কত আয়তন 0.1 N HNO_3

-এর প্রয়োজন?

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WEST BENGAL STATE UNIVERSITY
B.Sc. Programme 5th Semester Examination, 2020, held in 2021

BOTGDSE01T-BOTANY (DSE1)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate marks of question.
Candidates should answer in their own words
and adhere to the word limit as practicable.*

*প্রান্তিক সীমার মধ্যস্থ সংখ্যাটি প্রশ্নের মান নির্দেশ করে।
পরীক্ষার্থীদের নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে
উত্তর দিতে হবে।*

1. Answer the following questions:

1×16 = 16

নিম্নলিখিত প্রশ্নের উত্তর দাওঃ

- What is the full form of SEM?
SEM এর পূর্ণ রূপটি কি ?
- What is Fluorescence microscopy?
ফ্লুরোসেন্স মাইক্রোস্কোপি কি ?
- What is the basic difference between prokaryotic and eukaryotic cell?
আদি ও আদর্শ নিউক্লিয়াস যুক্ত কোষের প্রধান পার্থক্য কি ?
- Define Cristae.
ক্রিস্টার সংজ্ঞা লেখো।
- What is the main function of Lysosome?
লাইসোজোমের প্রধান কাজ কি ?
- What is Plasmodesmata?
প্লাসমোডেশমাটা কি ?
- State the main difference between Euchromatin and Heterochromatin.
ইউক্রমাটিন ও হেটারক্রমাটিনের মুখ্য পার্থক্য লেখো।
- What are the main components of the cell wall of the plant cells?
উদ্ভিদ কোষ প্রাচীরের প্রধান উপাদানগুলি কি কি ?
- What is Cell cycle?
কোষ চক্র বলতে কি বোঝো ?
- State the two main functions of cell membrane.
কোষপর্দার যে কোন দুটি গুরুত্বপূর্ণ কাজ উল্লেখ করো।
- What is called Z-DNA?
Z-DNA কাকে বলে ?

- (l) What is lagging strand?
ল্যাগিং স্ট্র্যান্ড কি ?
- (m) What is meant by anticodon?
এন্টিকোডন বলতে কি বোঝো ?
- (n) What is the function of DNA Polymerase III in prokaryotes?
প্রক্যারিওট কোষে DNA Polymerase III কি কাজ করে ?
- (o) Define Genetic code.
জেনেটিক কোডের সংজ্ঞা লেখো।
- (p) What is the chemical constituents of the nucleotide?
একটি নিউক্লিওটাইডের রাসায়নিক উপাদানগুলি লেখো।

2. Answer any *eight* of the following questions:

3×8 = 24

নিম্নলিখিত যেকোনো আটটি প্রশ্নের উত্তর দাও:

- (a) Write a short note on Phase Contrast microscope.
Phase Contrast microscope-এর ওপর টীকা লেখো।
- (b) What are the characteristic features of Mitochondrial DNA?
Mitochondrial DNA-এর চারিত্রিক বৈশিষ্ট্যগুলি লেখো।
- (c) Describe the structure of Nuclear Pore Complex.
Nuclear Pore Complex-এর গঠন বর্ণনা করো।
- (d) What do you mean by the resolving power of a microscope?
একটি অপুর্বীক্ষণ যন্ত্রের রিসল্ভিং পাওয়ার বলতে কি বোঝো ?
- (e) Describe briefly about the packaging of linear DNA into eukaryotic metaphase chromosome.
সূত্রাকার ডিএনএ-র ইউক্যারিওটিক মেটাফেজ ক্রোমোসোমে পরিবর্তিত হওয়ার পদ্ধতি সংক্ষেপে বর্ণনা করো।
- (f) Mention the name of enzymes and proteins involved in prokaryotic DNA replication.
প্রোক্যারিওটিক ডিএনএ-এর প্রতিলিপি গঠনে নিযুক্ত উৎসেচক ও প্রোটিনগুলির নাম উল্লেখ করো।
- (g) How did Griffith and Avery transformation experiment prove the DNA as the genetic material?
গ্রিফিথ এবং আভেরি এর ট্রান্সফরমেশন পরীক্ষা কিভাবে প্রমাণ করেছিল যে ডিএনএ একটি বংশগতির বস্তু।
- (h) Describe the steps of Mitotic cell division.
মাইটটিক কোষ বিভাজনের ধাপগুলি বর্ণনা করো।
- (i) Describe the initiation process of Translation in prokaryotes.
আদিকোষে Translation-এর সূচনা পদ্ধতি বর্ণনা করো।
- (j) What are the different properties of genetic code?
জেনেটিক কোড এর প্রধান বৈশিষ্ট্যগুলি কি কি ?

(k) How the sample for electron microscopy is prepared?

ইলেকট্রন মাইক্রোস্কোপির জন্য নমুনা কিভাবে প্রস্তুত করা হয় ?

(l) What are the basic differences between Meiosis I and Meiosis II stages of cell division?

মিয়োসিসের প্রথম ও দ্বিতীয় দশার মধ্যে প্রধান পার্থক্যগুলি কি কি ?

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WEST BENGAL STATE UNIVERSITY
B.A./B.Sc. Honours 5th Semester Examination, 2020, held in 2021

ECOACOR12T-ECONOMICS (CC12)

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates should answer in their own words
and adhere to the word limit as practicable.*

*প্রান্তিক সীমার মধ্যস্থ সংখ্যাটি পূর্ণমান নির্দেশ করে।
পরীক্ষার্থীরা নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে
উত্তর করিবে।*

All symbols are of usual significance.

1. Answer any **five** questions from the following: 2×5 = 10
নিম্নলিখিত যে-কোনো **পাঁচটি** প্রশ্নের উত্তর দাওঃ
- (a) Define sustainable development.
টেকসই উন্নয়নের সংজ্ঞা দাও।
- (b) What is unbalanced growth?
ভারসাম্যবিহীন বৃদ্ধি কাকে বলে ?
- (c) What is poverty line?
দারিদ্র্য রেখা কাকে বলে ?
- (d) What is hunger index?
ক্ষুধার সূচক কাকে বলে ?
- (e) What is multilateral agreement?
বহুপাক্ষিক চুক্তি কাকে বলে ?
- (f) What is Gender Development Index?
লিঙ্গ উন্নয়ন সূচক কি ?
- (g) What is Lorenz curve?
লরেঞ্জ রেখা কি ?
- (h) What do you mean by vicious circle of poverty?
দারিদ্র্যের দুষ্চক্র বলতে কি বোঝো ?
2. Answer any **four** questions from the following: 5×4 = 20
নিম্নলিখিত যে-কোনো **চারটি** প্রশ্নের উত্তর দাওঃ
- (a) Explain the concept of cumulative causation.
ক্রম সম্বন্ধিতকরণের ধারণাটি ব্যাখ্যা করো।

- (b) Write a note on Bretton Woods Agreement.
ব্রেটন উডস চুক্তি বিষয়ে একটি টীকা লেখো।
- (c) Why is 'Big-Push' needed in a less developed country?
একটি স্বল্পোন্নত অর্থনীতিতে 'জোরে ধাক্কা'র প্রয়োজন হয় কেন?
- (d) Explain the characteristics of underdevelopment.
অনুন্নয়নের বৈশিষ্ট্যগুলি ব্যাখ্যা করো।
- (e) Explain the concept of Human Poverty Index.
মানব দারিদ্র্য সূচকের ধারণাটি ব্যাখ্যা করো।
- (f) How the balanced growth strategies differ from unbalanced growth strategies.
সুষম উন্নয়ন কৌশলের সাথে অসম উন্নয়ন কৌশলগুলির পার্থক্য কি?

3. Answer any *two* questions from the following: 10×2 = 20

নিম্নলিখিত যে-কোনো দুটি প্রশ্নের উত্তর দাও:

- (a) What is economic development with unlimited supply of labour? In this context, discuss Lewis model of development. 3+7
অক্ষুর্ত শ্রমের যোগান নিয়ে আর্থিক বিকাশ বলতে কি বোঝায়? এই প্রসঙ্গে লুইস মডেলটি ব্যাখ্যা করো।
- (b) Discuss the conflict between employment and surplus generation in the process of choice of techniques in less developed countries.
উন্নয়নশীল দেশে উৎপাদন কৌশল চয়নের প্রক্রিয়ায় কর্মসংস্থান এবং উৎপত্ত সৃষ্টির মধ্যে বিরোধ সম্পর্কে আলোচনা করো।
- (c) Explain the concept of 'Human Development Index' and indicate why it is a qualitatively better measure of economic development than per capita income.
মানব উন্নয়ন সূচকের ধারণাটি ব্যাখ্যা করো এবং কেন এটি অর্থনৈতিক উন্নয়নের পরিমাপক হিসাবে মাথাপিছু আয়ের তুলনায় গুণগতভাবে উন্নততর তা নির্দেশ করো।
- (d) What is Globalization? Discuss the impact of Globalization on world income inequality. 4+6
বিশ্বায়ন কাকে বলে? আদ্য বৈষম্যের উপর বিশ্বায়নের প্রভাব আলোচনা করো।

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 5th Semester Examination, 2020, held in 2021

CMSACOR12T-COMPUTER SCIENCE (CC12)
THEORY OF COMPUTATION

Time Allotted: 2 Hours

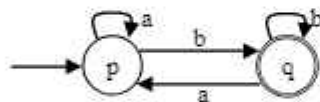
Full Marks: 50

*The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.*

Answer question number 1 and any five from the rest

1. Answer any *five* questions from the following: 2×5 = 10

- (a) Define Kleene Star with example.
- (b) Construct a DFA accepting all string w over $\{0, 1\}$ such that the number of 1's in w is $3 \pmod 4$.
- (c) Describe in words the set of all strings expressed by the following: $111(01)^*$.
What will be the lengths of the shortest and the longest strings expressed by it?
- (d) Convert the following DFA into equivalent regular expression:



- (e) Define Turing machine.
 - (f) What is meant by ambiguous grammar?
 - (g) Define Context-sensitive grammar.
 - (h) State Cook's theorem.
 - (i) What is Halting problem?
2. Let L be a language over $\{0, 1\}$ such that each string starts with a 1 and ends with a minimum of two subsequent 0's. Construct, 2+3+3
- (a) Regular expression for L .
 - (b) A finite state automata M such that $M(L) = L$.
 - (c) A regular grammar G such that $G(L) = L$.
3. (a) Construct a Context-free grammar for all palindromes over $\{a, b\}$. 4+4
- (b) Using Pumping Lemma show that $L = \{a^{i^2} \mid i \geq 1\}$ is not regular.

4. (a) Construct a Mealy machine which is equivalent to the following Moore machine 4+4

Present State	Next State		Output
	$a = 0$	$a = 1$	
q_0	q_3	q_1	0
q_1	q_1	q_2	1
q_2	q_2	q_3	0
q_3	q_3	q_0	0

(b) Construct a pushdown automata accepting by empty store for the language

$$L = \{a^n b^{2n} \mid n \geq 1\}$$

5. (a) Consider a Context-free grammar G whose productions are: (2+3)+3

$$S \rightarrow aAS \mid a$$

$$A \rightarrow SbA \mid SS \mid ba$$

(i) Show that $S \Rightarrow aabbaa$

(ii) Construct a derivation tree whose yield is $aabbaa$

(b) Consider the grammar G as:

$$S \rightarrow SbS \mid a$$

Show that the grammar G is ambiguous.

6. What do you mean by halting problem of Turing machine? Design a Turing machine M which recognize the language 2+6

$$\{1^n 2^n 3^n \mid n \geq 1\}.$$

7. Design a Turing machine which can multiply two positive integers. 8

8. (a) Construct a Deterministic Finite Automata with reduced states equivalent to the regular expression $10 + (0 + 11)0^*1$. 3+5

(b) Define an ambiguous grammar? Show that a grammar with following production rules is an ambiguous grammar.

$$S \rightarrow S + S \mid S * S \mid a \mid b$$

9. (a) Define a Push-down Automata. 2+6

(b) Construct a Push-down Automata for the language-specific

$$L = \{a^i b^j c^k \mid i, j, k \in N, i > j\}$$

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 5th Semester Examination, 2020, held in 2021

CEMACOR12T-CHEMISTRY (CC12)

Time Allotted: 2 Hours

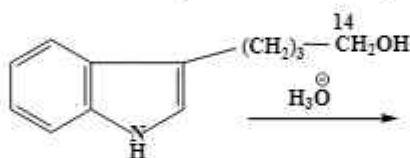
Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

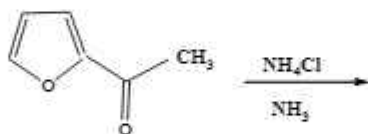
Answer any *five* questions taking *one* from each unit

UNIT-I

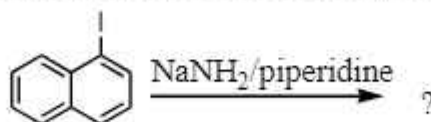
1. (a) How could you synthesize phenanthrene using Bardhan-Sengupta protocol? 2½ × 4 = 10
(b) Identify the product(s) of the following reactions with proper explanation.



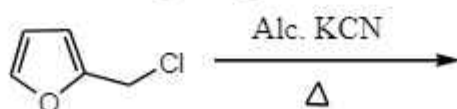
- (c) How could you carry out nitration at C-3 of pyrrole? Explain with plausible mechanism.
(d) Predict the product in the following with plausible mechanism.



2. (a) How can you synthesise 2,4,6-trimethyl pyridine using suitable starting materials? 2½ × 4 = 10
(b) Indicate the major and minor products of the following reaction with mechanism.



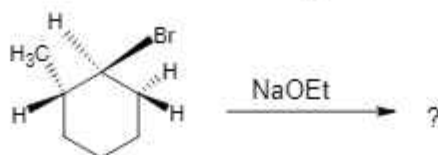
- (c) Predict the product in the following with plausible mechanism.



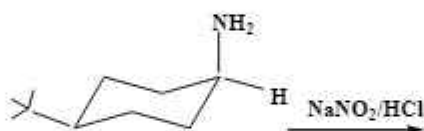
- (d) What happens when aniline, conc. sulphuric acid, glycerol and a mild oxidizing agent are heated together? Explain with plausible mechanism.

UNIT-II

3. (a) Find the major product obtained in the following reaction and justify. 2×3=6

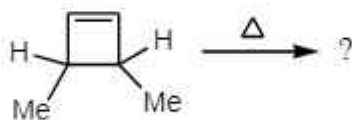


- (b) *cis*-4-*t*-butylcyclohexanol undergoes faster CrO_3 -mediated oxidation than *trans* isomer. Explain.
- (c) Draw the preferred conformation of 1-methyl-1-phenylcyclohexane and justify your answer.
4. (a) Acetylation of optically active *trans*-2-acetoxy cyclohexyl tosylate gives optically inactive *trans*-1,2-diacetoxy cyclohexane but acetylation of optically active *cis*-2-acetoxy cyclohexyl tosylate gives optically active *trans*-1,2-diacetoxy cyclohexane. Explain. 2×3=6
- (b) What happens when *cis*- and *trans*-isomers of 3-hydroxycyclohexane carboxylic acid are heated separately?
- (c) Write down the product with proper stereochemistry for the following reaction and explain.

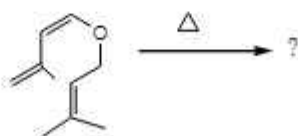


UNIT-III

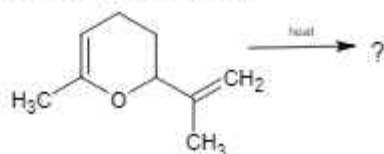
5. (a) Predict the product(s) of the following reaction and justify their formation in terms of FMO interaction. 2×3=6



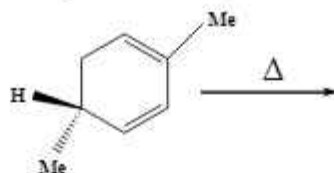
- (b) Thermal [1,5]-hydrogen shift is facile but [1,3]-hydrogen shift is not observed. Explain.
- (c) Indicate the product(s) of the following reaction with mechanism.



6. (a) Predict the product in the following reaction. 2×3=6



- (b) Explain why the following compound undergoes racemisation on heating.



- (c) Depict the FMO interactions for $[^4\pi_s + ^2\pi_s]$ involving thermally allowed process. Explain why the reaction does not take place under photochemical conditions.

UNIT-IV

7. (a) D-glucose reacts with hydroxylamine to give compound A. Heating of A with 1-fluoro-2,4-dinitrobenzene in aqueous sodium bicarbonate furnishes compound B. Identify A and B and show the plausible mechanism for the conversion of A to B. 3
- (b) Discuss the mechanism of osazone formation. Why osazone formation does not proceed beyond the first two carbon atoms? 2+1
- (c) How do epimers differ from anomers? Illustrate with examples. 2
8. (a) How would you convert an aldose into its epimer? Clearly represent the most stable conformation of D-glucose in the β -pyranose form. 2+1
- (b) An *O*-methyl derivative of D-glucose gives active dicarboxylic acid on HNO_3 oxidation. When subjected to Kiliani-Fischer synthesis, it gives two diastereomers, one of them is active and other inactive. Identify the *O*-methyl derivative of D-glucose and justify your answer. 3
- (c) In anhydrous methanol the equilibrium mixture of D-glucose contains 50% of the α -form whereas in water it is 36%. Explain. 2

UNIT-V

9. (a) Show the steps involved in the synthesis of the tripeptide Leu-Phe-Ala using Merrifield's method. 3
- (b) (i) What is nucleoside? Illustrate with suitable example(s). 2+2
- (ii) Explain why RNA and not DNA is sensitive to alkaline hydrolysis.
- (c) Write down the structure of the violet-coloured product in the reaction of an α -amino acid with ninhydrin. Explain the reaction with mechanism. 3
10. (a) Give the synthesis of (\pm) -phenylalanine following azalactone method. Can IR spectroscopy distinguish between D- and L-phenylalanine? 3+1

- (b) How can you separate a mixture of alanine and lysine on the basis of their isoelectric points? 2
- (c) Briefly explain the factors responsible for the stabilisation of a DNA duplex. 2
- (d) Write down the structure(s) of pyrimidine base(s) found in RNA. 2

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 5th Semester Examination, 2020, held in 2021

BOTACOR12T- BOTANY (CC12)

PLANT PHYSIOLOGY

Time Allotted: 2 Hours

Full Marks: 40

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Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

1. Answer **all** questions briefly from the following: 1×6 = 6
- (a) State the Fick's first law in diffusion.
 - (b) What are aquaporins?
 - (c) What happens to water transport if an air bubble forms within the xylem?
 - (d) A source of sugar translocation at one time can become sink later on. Comment on the statement.
 - (e) Name the plant from where Brassinosteroid was first identified.
 - (f) Why it is often said that the flowering pattern of a plant depends on the wavelength last received?
2. Answer any **eight** questions from the following: 3×8 = 24
- (a) There are two adjacent living cell A and B. Cell A has an osmotic potential (Ψ_s) of -10 bars and pressure potential (Ψ_p) of 5 bars, whereas cell B has an osmotic potential (Ψ_s) of -5 bars and pressure potential (Ψ_p) of 2 bars. What will be the direction of water flow in the cell?
 - (b) Define the primary active transport and secondary active transport of ions across cell membrane.
 - (c) What are essential and beneficial elements in plant nutrition? Give one example of each.
 - (d) Differentiate between transpiration and guttation.
 - (e) Movement of substances in xylem is unidirectional while in phloem it is bidirectional — Explain the statement.
 - (f) State the functions of jasmonates in plant growth and development.
 - (g) Mention the role of K ion in stomatal movement.
 - (h) What are natural and synthetic plant growth regulators? Give examples.

- (i) What do you mean by the phytochrome mediated responses, HIR (high irradiance response) and LER (low energy response)?
- (j) What is photo reversibility and physiologically active form of phytochrome?
- (k) Give a short note on chrytochrome mediated photoresponses.
- (l) Schematically give the Tryptophan dependent pathway of auxin biosynthesis.

3. Answer any *two* questions from the following: 5×2 = 10
- (a) What is facilitated diffusion? Discuss the role of channel and carrier proteins in the transport of ions across the membrane. 1+4
 - (b) What are the main objections of cohesion-tension theory of ascent of sap? How this objection was explained by Milburn and Johnson (1966)? 5
 - (c) Schematically represent the molecular events observed in gibberellins induced seed germination. 5
 - (d) State the molecular mechanism of vernalization in the light of Flowering Locus C (FLC). 5

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WEST BENGAL STATE UNIVERSITY
B.A. Honours 5th Semester Examination, 2020, held in 2021

BNGACOR12T-BENGALI (CC12)

Time Allotted: 2 Hours

Full Marks: 50

প্রান্তিক সীমার মধ্যস্থ সংখ্যাটি প্রস্তুতমান নির্দেশ করে।
পরীক্ষার্থীদের নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে উত্তর দিতে হবে।

- ১। প্রতিটি একক থেকে একটি করে মোট চারটি প্রশ্নের (প্রতিটি অনধিক ৩০০ শব্দে) উত্তর দাওঃ ১০ × ৪ = ৪০
- একক - ১**
- (ক) উপন্যাসের লক্ষণাক্রান্ত হয়েও মানস বৈশিষ্ট্যে 'নষ্টনীড়' ছোটগল্প-ই হয়ে উঠেছে। — আলোচনা করো। ১০
- অথবা
- (খ) জৈবতা নয়, শুদ্ধ প্রেমে উত্তরণের গল্প 'শেষকথা।' — মন্তব্যটি কতদূর গ্রহণযোগ্য তা বুঝিয়ে দাও। ১০
- একক - ২**
- (গ) আত্মসী ধর্মযাজকতন্ত্র এবং আরণ্যক মানুষের আত্মরক্ষার সংগ্রাম সুবোধ ঘোষের 'চতুর্থ পাণিপথের যুদ্ধ' গল্পের মূল উপজীব্য। — আলোচনা করো। ১০
- অথবা
- (ঘ) অর্থ, গোত্র, মানুষের অধঃপতনকে 'গোত্রান্তর' গল্পে লেখক কীভাবে রূপায়িত করেছেন, কাহিনি অনুসরণে তা' আলোচনা করো। ১০
- একক - ৩**
- (ঙ) বাংলা সাহিত্যের কৌতুক রসাত্মক রচনার এক বিরল উপস্থাপনা প্রভাতকুমার মুখোপাধ্যায়ের 'রসময়ীর রসিকতা।' — মন্তব্যটির গ্রহণযোগ্যতা বিশ্লেষণ করো। ১০
- অথবা
- (চ) ইতিহাসের পটভূমিতে আধুনিক জীবনের প্রেম-সম্পর্কের অপূর্ব চিত্রায়ণ 'রক্তসন্ধ্যা।' — আলোচনা করো। ১০
- একক - ৪**
- (ছ) মহাভারতের দ্রৌপদী ও জয়া মিত্রের স্কুমলা কোন তাৎপর্বে সমীকৃত হয়ে যায় — 'দ্রৌপদী' গল্পটি বিশ্লেষণ প্রসঙ্গে তা' দেখাও। ১০
- অথবা
- (জ) 'গোল্ল' গল্পের নামকরণ কতখানি স্বাভাবিকচিত্ত তা' নির্দেশ করো। ১০

- ২। নিম্নলিখিত যে-কোনো দুটি প্রশ্নের সংক্ষিপ্ত উত্তর দাওঃ (প্রতিটি অনধিক ১৫০ শব্দ) ৫×২=১০
- (ক) 'ঠাকুর, বউ গেলে বউ পাইব কিন্তু আমার ভাই ফাঁসি গেলে আর তো ভাই পাইব না।'
— প্রসঙ্গ উল্লেখ করে বঙ্গের এই মন্তব্যের তাৎপর্য লেখো। ৫
- (খ) 'জগদলের সমাধি খনন চলেছে, যেন কোদাল আর শাবলের শব্দ।'
— প্রসঙ্গ উল্লেখ করে 'জগদল' শব্দটির নিহিত তাৎপর্য বিশ্লেষণ করো। ২+৩
- (গ) '... মোহরগুলি পাইয়া আমার যেন স্বর্গলাভ হইল।'
— কোন 'মোহরগুলির' কথা বলা হয়েছে? মোহর নিয়ে কী কাণ্ড হয়েছিলো সংক্ষেপে লেখো। ১+৪
- (ঘ) 'শব্দহীন সেই চরাচরে বসে অনুভব করলাম, আমাদের মায়ের সংকার যেন এইমাত্র সমাধা হলো।'
— কোন্ পরিপ্রেক্ষিতে এই উপলব্ধির সীমানায় পৌঁছনো — তা' বুঝিয়ে দাও। ৫

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 5th Semester Examination, 2020, held in 2021

ZOOACOR12T-ZOOLOGY (CC12)

GENETICS

Time Allotted: 2 Hours

Full Marks: 40

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Candidates should answer in their own words and adhere to the word limit as practicable.
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1. Answer any **eight** questions from the following: 2×8 = 16
- (a) What are the different traits of the pea plant that Mendel used in plant breeding experiments?
 - (b) State what type of Mendelian inheritance leads to Sickle Cell Anaemia and Haemophilia.
 - (c) What are recombination hotspots?
 - (d) What type of mutation is seen in case of Down's syndrome and Klinefelter's syndrome? Mention the chromosomes that are affected.
 - (e) During recombination of genes x , y and z , double crossover did not occur at all. What will be the percent of interference and coefficient of coincidence?
 - (f) What will be the sexual type in *Drosophila* which has —
 - (i) three (3) X chromosomes and two (2) autosomes
 - (ii) three (3) X chromosomes and three (3) autosomes
 - (g) What is point mutation? Give an example.
 - (h) What is the function of the cis-trans test in genetics?
 - (i) Define epistasis.
 - (j) What are class I and class II transposable genetic elements? Give an example of each.
 - (k) Differentiate between the process of transformation and transduction in bacteria.
 - (l) What are the different types of linkage?
 - (m) What is the composition of an insertion sequence (IS)?
 - (n) State the law of independent assortment.
 - (o) What are gynandromorphs?

2. Answer any *three* questions from the following: 3×3 = 9
- (a) The ABO blood group system is an example of incomplete dominance or co-dominance Explain briefly. 3
- (b) Discuss about the pattern of sex-linked inheritance. 3
- (c) Explain the three types of point mutations-silent, mis-sense and nonsense mutation with example. 1+1+1
- (d) Define Incomplete dominance and Co-dominance with example. $1\frac{1}{2}+1\frac{1}{2}$
- (e) What is the F-factor and how does it help in conjugation in bacteria? 3
- (f) What is Alu element and its importance? 2+1

3. Answer any *three* questions from the following: 5×3 = 15
- (a) What are the different types of chromosomal aberrations? Discuss with examples. 5
- (b) Define cistron and recon. What is conditional lethal mutation? 3+2
- (c) Discuss the role of *sxl*, *tra* and *dsx* genes in the male sex determination pathway in *Drosophila*. 2+1+2
- (d) (i) What is the purpose of performing a test cross in breeding experiments? 1+4
 (ii) Mr. and Mrs. Jones have six (6) children. Three (3) of them have attached earlobes (recessive trait) like their father and the other three (3) children have free earlobes like their mother. What are the genotypes of Mr. and Mrs. Jones and all their children?
- (e) What is the function of transposase? Discuss the role of Ac-Ds system of transposable genetic elements with respect to seed colour in maize. 2+3
- (f) In a three-point testcross following data are obtained: 2+3

ABC	abc	aBc	AbC	ABc	abC	aBC	Abc
230	240	96	104	138	142	12	8

Find out the correct linear order of genes and calculate recombination values.

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WEST BENGAL STATE UNIVERSITY
B.A. Honours 5th Semester Examination, 2020, held in 2021

PLSACOR12T-POLITICAL SCIENCE (CC12)

INDIAN POLITICAL THOUGHT-I

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates should answer in their own words
and adhere to the word limit as practicable.*

*প্রান্তিক সীমার মধ্যে সংখ্যাটি পূর্ণমান নির্দেশ করে।
পরীক্ষার্থীরা নিজের ভাষায় যথাসম্ভব শব্দসীমার মধ্যে
উত্তর করিবে।*

1. Answer any *five* questions from the following: (within 30 words each) 2×5 = 10
নিম্নলিখিত যে-কোনো *পাঁচটি* প্রশ্নের উত্তর দাওঃ (প্রতিটি ৩০ শব্দের মধ্যে)
- (a) What do you mean by the term Syncretism?
সমন্বয়বাদ শব্দটির অর্থ কি ?
- (b) Identify the sources of Islamic thought.
ইসলামিক চিন্তার উৎসগুলি চিহ্নিত করো।
- (c) How do you relate Bhishma with Veda Vyasa?
তুমি কিভাবে ভীষ্মকে বেদব্যাসের সঙ্গে সম্পর্কযুক্ত করবে ?
- (d) Explain the *varna* system as espoused by Manu.
মনু প্রবর্তিত বর্ণব্যবস্থার ব্যাখ্যা করো।
- (e) Who wrote the *Fatawa-i-Jahandari* and what does this book deal with?
ফতোয়া-ই-জাহানদারী কে লিখেছেন এবং বইটির বিষয়বস্তু কি ?
- (f) Who is the author of '*Arthashastra*' and what does it contain?
'অর্থশাস্ত্র'-র রচয়িতা কে এবং এর আলোচ্য বিষয় কি ?
- (g) Write about two duties of *Amatya* as mentioned in '*Arthashastra*'.
অর্থশাস্ত্রে উল্লেখিত অমাত্যের দুটি কর্তব্য লিপিবদ্ধ করো।
- (h) How does Abul Fazal define monarchy?
আবুল ফজল রাজতন্ত্রের সংজ্ঞা কিভাবে দিয়েছেন ?
- (i) Mention the names of two Sufi saints.
দুজন সুফী সন্তের নাম উল্লেখ করো।
2. Answer any *two* questions from the following: (within 100 words each) 5×2 = 10
নিম্নলিখিত যে-কোনো *দুটি* প্রশ্নের উত্তর দাওঃ (প্রতিটি ১০০ শব্দের মধ্যে)
- (a) Discuss the basic features of Brahmanic tradition.
ব্রাহ্মণ্যবাদী ঐতিহ্যের মূল বৈশিষ্ট্যগুলি আলোচনা করো।

- (b) Examine Manu's concept of social laws.
মনুর সামাজিক আইনের ধারণাটি বিচার করো।
- (c) Explain the key features of the Sufi movement.
সুফী আন্দোলনের প্রধান বৈশিষ্ট্যগুলি ব্যাখ্যা করো।
- (d) Write a note on Kautilya's *Dandaniti*.
কৌটিল্যের দণ্ডনীতির বিষয়ে একটি টীকা লেখো।

3. Answer any *three* questions taking *one* question from each module:
(within 350 words each)

10×3 = 30

প্রতিটি মডিউল থেকে *একটি* করে প্রশ্ন নিয়ে মোট *তিনটি* প্রশ্নের উত্তর দাও:
(প্রতিটি ৩৫০ শব্দের মধ্যে)

MODULE-I

- (a) Discuss the main features of Shramanic tradition of Indian political thought.
ভারতের রাষ্ট্রনৈতিক চিন্তাধারায় শ্রমণিক ঐতিহ্যের মূল বৈশিষ্ট্যগুলি আলোচনা করো।
- (b) Evaluate Syncretistic tradition of Indian political thought.
ভারতের সমন্বয়বাদী রাষ্ট্রচিন্তার ঐতিহ্যটির মূল্যায়ন করো।

MODULE-II

- (c) Analyse Veda Vyasa's concept of *Rajadharma*.
বেদব্যাসের রাজধর্মের ধারণাটি বিশ্লেষণ করো।
- (d) Explain Kautilya's *Saptanga* theory. Do you consider it as relevant to the modern statecraft? Give reasons.
কৌটিল্যের সপ্তাঙ্গতত্ত্ব ব্যাখ্যা করো। তুমি কি মনে করো বর্তমান রাষ্ট্র পরিচালনায় এটির প্রাসঙ্গিকতা আছে? যুক্তিসহ উত্তর দাও।

MODULE-III

- (e) Make a critique of Abul Fazal's view of Monarchy.
আবুল ফজলের রাজতন্ত্র বিষয়ক চিন্তার মূল্য বিচার করো।
- (f) Analyse Ziauddin Barani's concept of ideal polity.
জিয়াউদ্দিন বরানীর আদর্শ-রাষ্ট্রের ধারণাটি বিশ্লেষণ করো।

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 5th Semester Examination, 2020, held in 2021

PHSACOR12T-PHYSICS (CC12)

SOLID STATE PHYSICS

Time Allotted: 2 Hours

Full Marks: 40

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Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Question No. 1 is compulsory and answer any two from the rest

1. Answer any *ten* questions from the following: 2×10 = 20
- (a) Show that the lattice constant for a cubic crystal with n number of molecules per unit cell, molar mass M and density ρ is given by $\left(\frac{nM}{\rho N_A}\right)^{1/3}$, where N_A is the Avogadro number.
 - (b) The radius of an argon atom is 10^{-10} m. Calculate the electronic polarizability of an argon atom. Given that $\epsilon_0 = 8.854 \times 10^{-12} \text{ Fm}^{-1}$.
 - (c) Calculate the wavelength of the X-ray if the glancing angle for the 1st order is 30° for a crystal with 2.8×10^{-10} m separation between the atomic planes.
 - (d) The Hall voltage for the metal sodium is found to be 0.001 mV, for a current (through the sample) $I = 100$ mA and a magnetic field $B = 2.0 \text{ Wb m}^{-2}$. The width of the specimen is 0.05 mm. Calculate the number of carriers per cubic meter in sodium.
 - (e) All primitive cells are unit cells but the reverse is not true. Illustrate with an example.
 - (f) Estimate the specific heat C_V for a material at 30 K where the Einstein temperature for it is 157 K. Find your answer in terms of the universal gas constant R .
 - (g) Could you explain the existence of band gap in solids using the Drude model? Explain.
 - (h) Show on the same graph the schematic variations of frequency ω as a function of the wave number q (considering a one-dimensional solid) for (i) optical phonons and (ii) acoustic phonons near the point $q \rightarrow 0$.
 - (i) How does the magnetic susceptibility, according to Weiss' theory, depend on absolute temperature T for a ferromagnetic material above its Curie temperature? Plot the susceptibility as a function of T .

- (j) Band gaps between the highest occupied band and the lowest empty band for five materials, A , B , C , D and E , are given below

$$A \rightarrow 0.8 \text{ eV}; B \rightarrow 0.69 \text{ eV}; C \rightarrow 5.3 \text{ eV}; D \rightarrow 10 \text{ eV}; E \rightarrow 1.09 \text{ eV}.$$

Identify with justification the prospective semiconductors among these.

- (k) For a metal kept in a magnetic field \vec{H} at a very low temperature, it is found that the sample develops a magnetic induction $\vec{B} = 0$ inside it. Calculate its magnetic susceptibility. How do you classify the material in terms of its magnetic property?
- (l) What is a Wigner-Seitz cell? Show with a diagram how it is constructed for a two dimensional square lattice.
- (m) The two plates of a parallel plate capacitor are identical and carry equal amount of opposite charges. The separation between the plates is 5 mm and the space between the plates is filled with a solid slab of dielectric constant 3. The electric field within the dielectric is 10^6 V/m . Calculate the magnitude of the polarization vector ($\epsilon_0 = 8.854 \times 10^{-12} \text{ F/m}$).
- (n) Why is the Dulong-Petit law not useful for calculation of specific heat of a solid at low temperatures?

2. (a) Show that the reciprocal lattice to a bcc lattice is an fcc lattice. 3
- (b) A copper wire has length 0.5 m, diameter 0.3 mm and its resistance at 20°C is 0.12Ω . The thermal conductivity of copper at 20°C is $390 \text{ Wm}^{-1}\text{K}^{-1}$. Estimate the Lorentz number. 2
- (c) The frequency of an elastic wave passing through a one dimensional monatomic lattice is given by $\omega(q) = \omega_0 \sin\left(\frac{qa}{2}\right)$, where a is the lattice spacing and q is the wave number and ω_0 is a material-specific constant. How does ω_0 depend on atomic mass? Calculate the velocity of the wave when the wavelength becomes much greater than the lattice spacing. Explain how a lattice could be used as a mechanical frequency filter. 1+2+2
3. (a) Starting from Laue's equations of X-ray diffraction, arrive at the condition for Bragg reflection. 3
- (b) Show that the dc electrical conductivity of a metal is given by $\sigma = \frac{ne^2\tau}{m}$, where the symbols carry their usual meanings. State clearly the assumptions, if any, involved in the derivation. 2+2
- (c) Using the Clausius-Mossotti relation, make an estimate of the Avogadro number from the data set given below. 3
- Dielectric constant of Ne gas at normal pressure and temperature: $\epsilon = 1.000148$.
- Electronic polarizability of Ne: $\alpha = 0.4 \times 10^{-24} \text{ cm}^3$.
- Assume an ideal gas behaviour for Ne.

4. (a) Consider the following one dimensional periodic potential $V(x)$ in which an electron is constrained to move. 1+3

$$V(x) = 0 \text{ for } 0 < x < a$$

$$= V_0 \text{ for } a < x < a+b$$

Suggest a form of the wave function that is expected to satisfy the corresponding Schrödinger equation. In the limit $b \rightarrow 0$ and $V_0 \rightarrow \infty$, the quantization condition of the wave-vector k in the above problem (subject to suitable boundary conditions) turns out to be $\frac{P}{Qa} \sin Qa + \cos Qa = \cos ka$, where $P \propto ba$ is a finite quantity, and $Q \propto \sqrt{E}$ (E is the energy eigenvalue). Hence show that this model explains formation of band gaps of disallowed energy values.

- (b) Using Langevin's theory, obtain the temperature dependence of magnetic susceptibility of a paramagnetic gas (mention the inherent assumption in the derivation). 5
- (c) Mention an application of Hall effect. 1
5. (a) Consider a lattice with lattice constants \vec{a} , \vec{b} and \vec{c} . Define the reciprocal lattice vectors and find a relation between the volumes of primitive cells in the direct and the reciprocal lattices. 2+2
- (b) Iron is a ferromagnetic material. However, an iron nail usually does not show ferromagnetic properties even below the Curie temperature. Why? What happens to its microscopic structure above the Curie temperature? 2+1
- (c) "The dispersion (frequency ω vs. wave-vector k) relation of an elastic wave in a fluid is linear in k . But it is not so in a solid in general" – why? Why does the group velocity of an elastic wave propagating in a solid vanish at the Brillouin zone boundaries? 1+2

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 5th Semester Examination, 2020, held in 2021

PHSACOR12T-PHYSICS (CC12)

SOLID STATE PHYSICS

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- Assume an ideal gas behaviour for Ne.

4. (a) Consider the following one dimensional periodic potential $V(x)$ in which an electron is constrained to move. 1+3

$$V(x) = 0 \text{ for } 0 < x < a$$

$$= V_0 \text{ for } a < x < a+b$$

Suggest a form of the wave function that is expected to satisfy the corresponding Schrödinger equation. In the limit $b \rightarrow 0$ and $V_0 \rightarrow \infty$, the quantization condition of the wave-vector k in the above problem (subject to suitable boundary conditions) turns out to be $\frac{P}{Qa} \sin Qa + \cos Qa = \cos ka$, where $P \propto ba$ is a finite quantity, and $Q \propto \sqrt{E}$ (E is the energy eigenvalue). Hence show that this model explains formation of band gaps of disallowed energy values.

- (b) Using Langevin's theory, obtain the temperature dependence of magnetic susceptibility of a paramagnetic gas (mention the inherent assumption in the derivation). 5
- (c) Mention an application of Hall effect. 1
5. (a) Consider a lattice with lattice constants \vec{a} , \vec{b} and \vec{c} . Define the reciprocal lattice vectors and find a relation between the volumes of primitive cells in the direct and the reciprocal lattices. 2+2
- (b) Iron is a ferromagnetic material. However, an iron nail usually does not show ferromagnetic properties even below the Curie temperature. Why? What happens to its microscopic structure above the Curie temperature? 2+1
- (c) "The dispersion (frequency ω vs. wave-vector k) relation of an elastic wave in a fluid is linear in k . But it is not so in a solid in general" – why? Why does the group velocity of an elastic wave propagating in a solid vanish at the Brillouin zone boundaries? 1+2

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WEST BENGAL STATE UNIVERSITY
B.A. Honours 5th Semester Examination, 2020, held in 2021

PHIACOR12T-PHILOSOPHY (CC12)

ETHICAL AND SOCIAL PHILOSOPHY OF INDIA

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates should answer in their own words
and adhere to the word limit as practicable.*

*প্রান্তিক সীমার মধ্যস্থ সংখ্যাটি পূর্ণমান নির্দেশ করে।
পরীক্ষার্থীরা নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে
উত্তর করিবে।*

All symbols are of usual significance.

1. Answer any **five** questions:

2×5 = 10

যে-কোনো পাঁচটি প্রশ্নের উত্তর দাওঃ

- (a) How many kinds of liberations are accepted in Indian Philosophy?
ভারতীয় দর্শনে কয়প্রকার মুক্তি স্বীকার করা হয়েছে ?
- (b) What are *Anuvratas*?
অনুব্রত কি ?
- (c) Why are the Cārvāka philosophers called hedonists?
চার্বাক দার্শনিকদের সুখবাদী বলা হয় কেন ?
- (d) Mention the name of the *Puruṣārthas* recognized in Indian philosophy.
ভারতীয় দর্শন স্বীকৃত পুরুষার্থগুলির উল্লেখ করো।
- (e) What is meant by *varṇadharmā*?
বর্ণধর্ম কাকে বলে ?
- (f) What is meant by *Nitya Karma*?
নিত্যকর্ম কাকে বলে ?
- (g) What is *Lokasamgraha*?
লোকসংগ্রহ কি ?
- (h) What is *Viśesa Dharma*?
বিশেষ ধর্ম কি ?
- (i) What is *Naimittika Karma*?
নৈমিত্তিক কর্ম কি ?
- (j) What is meant by the term '*Prārabdha*'?
'প্রারব্ধ' শব্দের দ্বারা কি বোঝানো হয়েছে ?
- (k) What is the distinction between the consequences of *Sancita* and *Sanciyamān karma*?
সঞ্চিত ও সঞ্চিয়মান কর্মফলের মধ্যে কি পার্থক্য ?
- (l) What is the relation between *artha* and *kāma*?
অর্থ ও কামের মধ্যে কি সম্বন্ধ বর্তমান ?

2. Answer any *two* questions: 5×2 = 10
যে-কোনো দুটি প্রশ্নের উত্তর দাওঃ
- (a) What is *Yogakṣema*?
যোগক্ষেম কি ?
- (b) What do you mean by *Svadharmā* as mentioned in the *Gītā*?
গীতায় কথিত স্বধর্ম বলতে কি বোঝো ?
- (c) What is the difference between *Sakāma karma* and *Niskāma karma*?
সকাম কর্ম ও নিষ্কাম কর্মের মধ্যে পার্থক্য কি ?
- (d) Explain the meaning and significance of *Ahiṃsa*.
অহিংসার অর্থ এবং তাৎপর্য কি ?
- (e) Explain the concept '*Brahmavihāra*'.
'ব্রহ্মবিহার' রূপ ধারণাটি ব্যাখ্যা করো।
- (f) What is the significance of *Pañcastīla* in Indian Ethics?
ভারতীয় নীতিতত্ত্বে পঞ্চশীলের তাৎপর্য কি ?
3. Answer any *two* questions: 15×2 = 30
যে-কোনো দুটি প্রশ্নের উত্তর দাওঃ
- (a) Explain and examine the ethics of *Cārvāka*. 15
চার্বাক নীতিতত্ত্ব ব্যাখ্যা ও বিচার করো।
- (b) What is the meaning of *Dharma*? Explain the difference between *Sādhāraṇa Dharma* and *Viśeṣa Dharma* with suitable examples. 3+12=15
ধর্মের অর্থ কি ? সাধারণ ধর্ম ও বিশেষ ধর্মের পার্থক্যগুলি উপযুক্ত দৃষ্টান্তের সাহায্যে ব্যাখ্যা করো।
- (c) Comparatively discuss between Indian and Western Ethics. 15
ভারতীয় ও পাশ্চাত্য নীতিতত্ত্বের মধ্যে তুলনামূলক আলোচনা করো।
- (d) State the essential features of *Sthiraprajñā*. 15
স্থিরপ্রজ্ঞের প্রধান লক্ষণগুলি উল্লেখ করো।
- (e) Discuss the concept of *karmayoga* after *Bhagavat Gītā*. 15
ভগবদগীতা অনুসরণে কর্মযোগের ধারণাটি আলোচনা করো।
- (f) Explain the various *puruṣārtha* recognized in Indian Philosophy. Why *Mokṣa* is considered as the highest *puruṣārtha*? 12+3
ভারতীয় দর্শন স্বীকৃত বিভিন্ন পুরুষার্থগুলি ব্যাখ্যা করো। মোক্ষকে কেন পরম পুরুষার্থরূপে স্বীকার করা হয় ?

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 5th Semester Examination, 2020, held in 2021

MTMACOR12T-MATHEMATICS (CC12)

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Answer Question No. 1 and any five from the rest

1. Answer any *five* questions from the following: 2×5 = 10
- (a) Let G be an abelian group. Show that the mapping $f: G \rightarrow G$ defined by $f(x) = x^{-1}$, for all $x \in G$ is an automorphism of the group G .
 - (b) Determine the order of the automorphism group $\text{Aut}(\mathbb{Z}_{15})$ of the additive group \mathbb{Z}_{15} of integers modulo 15.
 - (c) Prove that the subgroup $Z(G)$ (the center of a group G) is a characteristic subgroup of G .
 - (d) Let $G = S_3 \times \mathbb{Z}_{12}$ be the external direct product of the symmetric group S_3 of degree 3 and the additive group \mathbb{Z}_{12} . If $\alpha = (1\ 2\ 3) \in S_3$ and $\beta = [3] \in \mathbb{Z}_{12}$, find the order of the element (α, β) in G .
 - (e) Determine the number of non-isomorphic abelian groups of order 32.
 - (f) Examine whether a group of order 63 is simple.
 - (g) Let G be a group and X be a G -set. For each $x \in X$, prove that the set $G_x = \{g \in G : gx = x\}$ is a subgroup of the group G .
 - (h) Let G be a finite group and H be a subgroup of G of index n ($\neq 1$) such that order of G does not divide $n!$. Prove that G contains a non-trivial normal subgroup.
 - (i) Let G be a finite group that has only two conjugacy classes. Show that $|G| = 2$.
 - (j) Let G be a finite group and H be a Sylow p -subgroup of G for some prime p . If H is a normal subgroup of G , then show that G has no Sylow p -subgroup other than H .
2. (a) Let G be a finite group of order n and m be a positive integer such that $\gcd(m, n) = 1$. Show that the mapping $\phi: G \rightarrow G$ given by $\phi(x) = x^m$, for all $x \in G$, is an automorphism of G . 4
- (b) Let α be an element of the automorphism group of \mathbb{Z}_{10} . Then, find the possible values of k ($1 \leq k \leq 9$) such that $\alpha([2]) = [k]$. 4

3. Let G be a group and N be a normal abelian subgroup of G .
- (a) Show that, for each $g \in G$, the mapping $\psi_g : N \rightarrow N$ defined for all $n \in N$ by $\psi_g(n) = gng^{-1}$, is an automorphism of N . 2
- (b) Prove that the mapping $\psi : G \rightarrow \text{Aut}(N)$ defined by $\psi(g) = \psi_g$, for all $g \in G$ is a group homomorphism from G to $\text{Aut}(N)$. 2
- (c) Show that the orders of the groups $\text{Aut}(N)$ and G/N are multiples of the order of $G/\ker \psi$. 2
- (d) Show that $N \subseteq Z(G)$ if orders of G/N and $\text{Aut}(N)$ are relatively prime. 2
4. (a) Define the commutator $[x, y]$ of two elements x and y of a group G . 1
- (b) Prove that a subgroup H of a group G is a normal subgroup of G if and only if $[H, G] \subseteq H$, where $[H, G]$ denotes the subgroup generated by commutators of elements from H and from G . 2
- (c) For any $\sigma \in \text{Aut}(G)$, prove that $\sigma([x, y]) = [\sigma(x), \sigma(y)]$ for all $x, y \in G$. Hence, show that the commutator subgroup G' of G is characteristic in G . 3
- (d) Show that G/G' is an abelian quotient group of G . 2
5. (a) (i) Let G_1 and G_2 be two finite cyclic groups. Suppose that $|G_1| = m$ and $|G_2| = n$. Prove that the external direct product $G_1 \times G_2$ of G_1 and G_2 is a cyclic group if and only if $\text{gcd}(m, n) = 1$. 4+1
- (ii) Use the result stated in (i) above, examine whether $\mathbb{Z}_8 \times \mathbb{Z}_{15} \times \mathbb{Z}_7$ is a cyclic group.
- (b) Let G be a group and H, K be two subgroups of G . If G is an internal direct product of H and K , then prove that $G \cong H \times K$. 3
6. (a) Suppose $U(n)$ denotes the group of units modulo $n > 1$. Then, for two relatively prime integers $s (> 1)$ and $t (> 1)$, prove that $U(st)$ is isomorphic to the external direct product $U(s) \times U(t)$ of the groups $U(s)$ and $U(t)$. 5
- (b) Using the result in (a) above, prove that 1+2
- (i) $U(7) \times U(15) \cong U(21) \times U(5)$
- (ii) $U(105) \cong \mathbb{Z}_2 \times \mathbb{Z}_4 \times \mathbb{Z}_6$
7. (a) State the fundamental theorem of finite abelian groups. 1
- (b) Let $G (\neq \{0\})$ be a finite abelian group and let $|G| = p_1^{n_1} p_2^{n_2}$, where p_1, p_2 are two primes and n_1, n_2 are two positive integers. Then prove that 4
- (i) $G = G(p_1) \oplus G(p_2)$, and

- (ii) $|G(p_i)| = p_i^{n_i}$ for each $i = 1, 2, \dots$,
 where for any prime p , the subgroup $G(p)$ of G is given by
 $G(p) = \{g \in G : O(g) = p^s \text{ for some } s \geq 0\}$.
- (c) Describe all the non-isomorphic abelian groups of order 504. 3
8. Let $X = \{1, 2, 3, 4, 5, 6\}$ and suppose that G is the permutation group given by the permutations of X as $\{(1), (1\ 2)(3\ 4\ 5\ 6), (3\ 5)(4\ 6), (1\ 2)(3\ 6\ 5\ 4)\}$. Let X be a G -set under the action given by $\sigma \cdot x = \sigma(x)$ for all $x \in X$ and $\sigma \in G$.
- (a) Find for each $\sigma \in G$, the set X_σ of fixed points of σ in X . 3
- (b) Determine the stabilizer subgroups G_x of G for all $x \in X$. 3
- (c) Find all distinct orbits of X under the given action. 2
9. (a) Let G be a group and X be a G -set. Suppose x, y are two elements of X having same orbit in X . Then, prove that the stabilizer subgroups G_x and G_y are isomorphic. 5
- (b) Let G be a group of order 77 acting on a set X of 20 elements. Show that G must have a fixed point in X . 3
- 10.(a) Define permutation representation associated with a given group action. (No proof or justification is needed to show.) 1
- (b) Let G be a group and A be a non-empty set. Let $\phi : G \rightarrow S(A)$ be a homomorphism from the group G to the group $S(A)$ of all permutations of the set A . Show that there is a left action of G on A , associated with which the permutation representation is the given homomorphism ϕ . 4
- (c) Let G be a finite group and H be a subgroup of G of index p , where p is the smallest prime dividing the order of G . Applying generalized Cayley's theorem, show that H is a normal subgroup of G . 3
- 11.(a) If a group G acts on itself by conjugation, then for each $a \in G$, show that the stabilizer subgroup G_a of a in G is the centralizer $c(a)$ of a in G . 2
- (b) Let p be a prime and n be a positive integer. Suppose that G be a group of order p^n . Show that $|Z(G)| > 1$. 3
- (c) For any prime p , prove that every group of order p^2 is commutative. 3
- 12.(a) Find the class equation of S_5 . 2
- (b) Determine the number of distinct conjugacy classes of the symmetric group S_4 . Write down the representative elements, one for each of these distinct conjugacy classes of S_4 . 3
- (c) Let $\sigma \in S_n$ ($n \geq 2$) be a 3-cycle such that the order of its centralizer $c(\sigma)$ in S_n is 18. Determine the value of n and hence find the order of the conjugacy class $\text{cl}(\sigma)$ of σ in S_n . 3

- 13.(a) If a group G of order 68 contains a normal subgroup of order 4, show that G is a commutative group. 2
- (b) By applying Sylow test for non-simplicity, show that any group of order 98 is non-simple. 2
- (c) Let G be a finite group of order $p^r m$, where p is a prime number, r and m are positive integers, and p and m are relatively prime. Prove that G has a subgroup of order p^k for all, $0 \leq k \leq r$. 4

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WEST BENGAL STATE UNIVERSITY
B.A. Honours 5th Semester Examination, 2020, held in 2021

HISACOR12T-HISTORY (CC12)

HISTORY OF INDIA (1858-1947 CE)

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate marks of question.
Candidates should answer in their own words
and adhere to the word limit as practicable.*

*প্রান্তিক সীমার মধ্যে সংখ্যাটি প্রশ্নের মান নির্দেশ করে।
পরীক্ষার্থীদের নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে
উত্তর দিতে হবে।*

GROUP-A / বিভাগ-ক

Answer any two questions from the following: (within 250 words)

5×2 = 10

নিম্নলিখিত যে-কোনো দুটি প্রশ্নের উত্তর দাওঃ (শব্দসীমা ২৫০ রাখা বাঞ্ছনীয়)

1. Explicate the significance of the Queen's Proclamation of 1858.
১৮৫৮ সালে মহারানীর ঘোষণাপত্রের তাৎপর্য ব্যাখ্যা করো।
2. Write a short note on the Prarthana Samaj.
প্রার্থনা সমাজের উপর একটি সংক্ষিপ্ত টীকা লেখো।
3. What was the significance of the Chauri Chaura incident?
চৌরীচৌরা-র ঘটনাটির তাৎপর্য কী ছিল?
4. What was the significance of Government of India Act of 1935?
১৯৩৫ সালের ভারত শাসন আইনের গুরুত্ব কী ছিল?
5. Why did the Quit India Movement fail?
ভারত ছাড়ো আন্দোলন ব্যর্থ হয়েছিল কেন?

GROUP-B / বিভাগ-খ

Answer any two questions from the following: (within 400 words)

8×2 = 16

নিম্নলিখিত যে-কোনো দুটি প্রশ্নের উত্তর দাওঃ (শব্দসীমা ৪০০ রাখা বাঞ্ছনীয়)

6. Explain the emergence of Aligarh Movement.
আলিগড় আন্দোলনের উত্থান ব্যাখ্যা করো।
7. Critically analyze the Morely-Minto Reforms.
মর্লে-মিন্টো সংস্কারের সমালোচনামূলক বিশ্লেষণ করো।

8. Write a short note on the Rowlatt Satyagraha.
রাওলাট সত্যাগ্রহ সম্পর্কে একটি সংক্ষিপ্ত টীকা লেখো।
9. Analyze the events leading to the Non Cooperation Movement (1920-22).
যে সমস্ত ঘটনাগুলি অসহযোগ আন্দোলনের (১৯২০-২২) জন্ম দিয়েছিল, সেগুলি বিশ্লেষণ করো।
10. Discuss the features and significance of the Tebhaga Movement in the post-Second World War period.
দ্বিতীয় বিশ্বযুদ্ধ-পরবর্তীকালে তেভাগা আন্দোলনের বৈশিষ্ট্য ও গুরুত্ব আলোচনা করো।

GROUP-C / বিভাগ-গ

Answer any two questions from the following: (within 600 words)

12×2 = 24

নিম্নলিখিত যে-কোনো দুটি প্রশ্নের উত্তর দাওঃ (শব্দসীমা ৬০০ রাখা বাঞ্ছনীয়)

11. Analyze the background to the establishment of the Indian National Congress in 1885.
১৮৮৫ সালে ভারতীয় জাতীয় কংগ্রেস প্রতিষ্ঠার পটভূমি বিশ্লেষণ করো।
12. Account for Gandhi's rise to leadership in Indian politics.
ভারতীয় রাজনীতির নেতৃত্বে গান্ধীর উত্থানের কারণ আলোচনা করো।
13. Is it correct to define the Quit India Movement as the Revolution of 1942?
ভারত ছাড়ো আন্দোলনকে ১৯৪২ সালের বিপ্লব বলা কি যথার্থ?
14. Discuss the role of Subhas Chandra Bose and the Indian National Army in India's freedom struggle.
ভারতের স্বাধীনতা আন্দোলনে সুভাষচন্দ্র বসু ও ভারতীয় জাতীয় সেনাবাহিনীর ভূমিকা আলোচনা করো।
15. Was the Partition of India inevitable in 1947?
১৯৪৭ সালে ভারত বিভাগ কি অনিবার্য ছিল?

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WEST BENGAL STATE UNIVERSITY
B.Com. Honours 5th Semester Examination, 2020, held in 2021

FACACOR12T-B.COM. (CC12)

INDIAN FINANCIAL SYSTEM

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.*

GROUP-A

Answer any five questions from the following

2×5 = 10

1. Mention any two components of financial system of a country.
2. What is the full form of NABARD and SEBI?
3. Mention any two services that are offered by Non-Banking Financial Company.
4. Define Commercial Paper.
5. Define Financial System.
6. What is Stock Exchange?
7. Define a Jobber.
8. Write two functions of EXIM bank.
9. Mention two names of credit rating agency in India.
10. Mention any two functions of money.
11. What do you mean by Investors' Protection?
12. Mention any two major services rendered by merchant bank.
13. What is Cash Reserve Ratio?
14. Write two functions of SIDBI.
15. Mention any two types of mutual funds.

GROUP-B

Answer any four questions from the following

5×4 = 20

16. Discuss the role of finance in an economy.
17. Distinguish between commercial and central bank.
18. What do you mean by credit control policy of the central bank?
19. What are the objectives of NABARD?
20. Discuss the functions of Non-Banking Financial Company.

21. Briefly discuss about the structure of Indian Money Market.
22. Discuss about the role of stock exchanges in an economy.
23. Differentiate between Primary and Secondary markets.
24. Give the concept of credit rating.
25. Write a short note on Grievance Redressal Mechanism in Stock Exchanges.
26. Discuss the role of media in the protection of investors.
27. Discuss the functions of Merchant Bank.

GROUP-C

Answer any two questions from the following

10×2 = 20

28. Explain the significance of financial system.
29. Discuss briefly the functions of Life Insurance Corporation of India.
30. Discuss the importance of Commercial Banks in India.
31. Discuss about recent trend in Indian money market.
32. Explain the role of Securities and Exchange Board of India (SEBI) in investors' protection.
33. Discuss about the functions and limitations of credit rating agencies in India.

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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WEST BENGAL STATE UNIVERSITY
B.A. Honours 5th Semester Examination, 2020, held in 2021

ENGACOR12T-ENGLISH (CC12)

EARLY 20TH CENTURY BRITISH LITERATURE

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.*

1. Answer any *two* questions from the following: (within 500 words each) 15×2 = 30
- (a) W.B. Yeats's poem "Sailing to Byzantium" is a poem of escape. Do you agree? Argue with reference to the text.
 - (b) Discuss T.S. Eliot's "The Love Song of J. Alfred Prufrock" as a modernist dramatic monologue.
 - (c) Would you consider Wilfred Owen's "Spring Offensive" as an anti-war poem? Justify.
 - (d) Rupert Brooke's poem "Peace" intertwines patriotism with religiosity. Justify with close textual reference.
 - (e) 'About suffering they were never wrong' — Discuss the significance of this statement with reference to the paintings that feature in Auden's poem "Musée des Beaux Arts".
2. Explain, with reference to the context, any *one* of the following: (within 200 words) 5×1 = 5
- (a) They never forgot
That even the dreadful martyrdom must run its course
 - (b) O sages standing in God's holy fire
As in the gold mosaic of a wall,
Come from the holy fire, perne in a gyre,
And be the singing-masters of my soul.
 - (c) No alarms
Of bugles, no high flags, no clamorous haste—
Only a lift and flare of eyes that faced
The sun, like a friend with whom their love is done.

- (d) To have squeezed the universe into a ball
To roll it towards some overwhelming question,
To say: "I am Lazarus, come from the dead,
Come back to tell you all, I shall tell you all."

3. Answer any *one* question from the following: (within 500 words) 15×1 = 15
- (a) How are the issues of race and imperialism woven into Joseph Conrad's novella *Heart of Darkness*? Discuss with reference to the text.
- (b) Critically comment on how obsession and ambition figure in the novel *Heart of Darkness*.

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WEST BENGAL STATE UNIVERSITY
B.A. Honours 5th Semester Examination, 2020, held in 2021

EDCACOR12T-EDUCATION (CC12)
EDUCATIONAL TECHNOLOGY

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words
and adhere to the word limit as practicable.*

*প্রান্তিক সীমার মধ্যস্থ সংখ্যাটি পূর্ণমান নির্দেশ করে।
পরীক্ষার্থীরা নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে
উত্তর করিবে।*

All symbols are of usual significance.

1. Answer any *two* questions from the following: 15×2 = 30
নিম্নলিখিত যে-কোনো দুটি প্রশ্নের উত্তর দাওঃ
- (a) Define Educational Technology. State the differences between hardware and software approaches to educational technology. 5+10
শিক্ষা প্রযুক্তিবিজ্ঞানের সংজ্ঞা দাও। শিক্ষা প্রযুক্তিবিজ্ঞানের হার্ডওয়্যার ও সফটওয়্যার দৃষ্টিভঙ্গির মধ্যে পার্থক্যগুলি লেখো।
- (b) What are the components of communication? State the barriers of effective classroom communication. 8+7
যোগাযোগ প্রক্রিয়ার উপাদানগুলি কি? শ্রেণীকক্ষে উত্তম যোগাযোগ প্রক্রিয়ার প্রতিবন্ধকতাগুলি কি কি?
- (c) Write the characteristics of linear programme learning. What are the importance of seminar and workshop as a mass instructional technique? 5+5+5
রৈখিক প্রোগ্রাম শিখনের বৈশিষ্ট্যগুলি লেখো। গণ নির্দেশমূলক কৌশল হিসেবে সেমিনার এবং কর্মশালার গুরুত্বগুলি কি?
2. Answer any *two* questions from the following: (Each within 200 words) 5×2 = 10
নিম্নলিখিত যে-কোনো দুটি প্রশ্নের উত্তর দাওঃ (প্রতিটি ২০০ শব্দের মধ্যে)
- (a) State the characteristics of system approach.
সিস্টেম পদ্ধতির বৈশিষ্ট্যগুলি কি কি?
- (b) What are the different types of communication?
যোগাযোগ প্রক্রিয়ার বিভিন্ন প্রকারগুলি কি কি?
- (c) State the importance of computer assisted instruction (CAI) in education.
শিক্ষাক্ষেত্রে CAI-র গুরুত্ব বিবৃত করো।
- (d) Write the importance of mastery learning.
পাণ্ডিত্য শিখনের গুরুত্বগুলি লেখো।

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