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ANSWER KEY & STEP-BY-STEP MARKING SOLUTIONS

Reference Code: Worksheet_170926

Topic: National Income Accounting (Class XII
Macroeconomics)

Total Questions: 36

SECTION A: OBJECTIVE & MULTIPLE CHOICE SOLUTIONS

Q1. Solutions to Multiple Choice Questions:

- (i) **Option (a) — stock, flow.** Reason: Inventory at a given date is measured at a particular point in time (stock), whereas change in inventory is measured over an accounting period (flow).
- (ii) **Option (d) — Both statements 1 and 2 are false.** Reason: Net investment is a flow concept (measured per unit of time), while capital is a stock concept (total stock of physical assets at a point in time).
- (iii) **Option (b) — Real flow.** Reason: In a barter system without money, the mutual exchange of physical goods/services and factor inputs represents real flows.
- (iv) **Option (c) — Output, disposition.** Reason: Generation phase represents the generation of output/value added, distribution phase represents factor income distribution, and disposition phase represents final expenditure.
- (v) **Option (c) — ₹ 240 crores.** Calculation: $NFIA = \text{Factor Income from Abroad (FIFA)} - \text{Factor Income to Abroad (FITA)} \Rightarrow 200 = \text{FIFA} - 40 \Rightarrow \text{FIFA} = 200 + 40 = \text{₹ 240 crores}.$
- (vi) **Option (a) — GDP = GNP.** Reason: In a closed economy with no foreign transactions, NFIA is zero; hence $GDP = GNP.$

SECTION B: THEORETICAL & CONCEPTUAL SOLUTIONS

Q2. Distinction between Final Goods and Intermediate Goods:

Basis	Final Goods	Intermediate Goods
Meaning & Use	Goods used either for final consumption by households or capital formation/investment by producers.	Goods purchased by firms for resale or for further reprocessing/use as raw material in the same year.
Production Boundary	Have crossed the production boundary; no further value addition is to be made.	Remain within the production boundary; value is yet to be added to them.
National Income	Included in the estimation of National Income and Domestic Income.	Excluded from National Income to avoid the problem of double counting.

Q3.

- (a) **False.** Gross Value Added at market price (GVA_{MP}) is the value added by a *single producing unit* (Firm), whereas Gross Domestic Product at market price (GDP_{MP}) is the aggregate sum of GVA_{MP} generated by *all* producing units in the domestic territory during an accounting year ($\Sigma GVA_{MP} = GDP_{MP}$).
- (b) **False.** Intermediate goods are typically non-durable single-use producer goods (e.g., wheat, flour, fuel) which lose their physical identity in the process of production. Even durable capital assets purchased for resale within the year are classified as intermediate goods based on end-use.

Q4. Nominal Flow (Money Flow) refers to the reciprocal flow of money payments between sectors (e.g., factor payments by firms to households in terms of wages, rent, interest, profit, and consumption expenditures by households to firms). In contrast, **Real Flow** represents the physical flow of factor services (land, labour, capital, entrepreneurship) from households to firms and goods and services from firms to households without monetary mediation.

Q5. Circular Flow of Income in a Two-Sector Economy: In a simple economy without government or foreign trade:

- **Factor Market:** Households supply factor services (labour, capital, land) to firms; firms return factor payments (wages, interest, rent, profit) to households.
- **Product Market:** Firms supply final goods and services to households; households return the entire factor earnings as consumption expenditure to firms.
- **Equilibrium Axiom:** Total Production (Generation) = Total Factor Income (Distribution) = Total Expenditure (Disposition).

Q6. Agreement & Justification: Yes, the statement is valid. In a two-sector circular flow framework, every monetary expenditure incurred by one economic agent is simultaneously received as income by another. The consumption expenditure incurred by households on buying goods and services forms the sales revenue (income) of producing enterprises. In turn, enterprises disburse this revenue as factor payments (expenditures to firms) which constitute the factor incomes of household owners.

Q7.

- (a) **Defended.** Non-market domestic services performed by homemakers are performed out of family affection and duty, not for monetary remuneration. Because reliable market valuation is absent and no formal market exchange takes place, they are excluded from national income accounting.
- (b) **Excluded.** Compensation to cyclone victims is a unilateral/social welfare *transfer payment*. It is not earned against any current productive service or value addition of goods and services, hence it is excluded from National Income.

Q8.

- (a) (i) **Included in Domestic Income:** Purchases by foreign tourists within India are expenditures incurred on domestically produced goods/services (treated as exports), generating value addition within India's economic territory.
- (a) (ii) **Excluded from Domestic Income:** Kitchen gardening for self-use lacks market transaction and price data, making objective valuation unreliable.
- (b) **Disagree:** A machine purchased by a firm is a capital good only if retained for long-term production. If purchased by a dealer/distributor for resale in the same accounting period, it is treated as an *intermediate good*.

Q9.

- (a) **Excluded:** Purchase of second-hand shares on the stock exchange represents a mere transfer of ownership/paper claim. It does not reflect any fresh production of goods or services or physical value addition.
- (b) **Excluded:** Flood relief compensation is a pure unrequited transfer payment by the government, involving no factor services rendered in return.

Q10. Treatment in Domestic Factor Income of India:

- (i) **Included:** The Indian Embassy in Japan forms part of the political/economic *domestic territory* of India, irrespective of the employee's residential status.
- (ii) **Excluded:** Fees paid to a Chartered Accountant constitute an *intermediate consumption expenditure* for the firm, which is deducted while calculating GVA.
- (iii) **Excluded:** The Russian Embassy in India is part of the domestic territory of Russia, not India. Income earned from it is treated as Factor Income from Abroad (FIFA).
- (iv) **Excluded:** Compensation from an insurance company is a settlement claim, not an employer factor payment (Compensation of Employees) for productive work.

Q11. Conditions:

- (a) **Domestic Income = National Income:** When Net Factor Income from Abroad (NFIA) is **zero** (FIFA = FITA).
- (b) **Domestic Income > National Income:** When Net Factor Income from Abroad (NFIA) is **negative** (FITA > FIFA).
- (c) **Value of Output = Value Added:** When Intermediate Consumption is **zero** (Value Added = Value of Output – Intermediate Consumption).

Q12. Components of Expenditure Method:

1. *Private Final Consumption Expenditure (PFCE):* Household and NPISH spending on final consumer goods and services.
2. *Government Final Consumption Expenditure (GFCE):* Government spending on administrative, defense, education, and public services.
3. *Gross Domestic Capital Formation (GDCF):* Total investment comprising Gross Fixed Capital Formation + Change in Stocks (Inventories).
4. *Net Exports (X – M):* Export of goods/services minus import of goods/services during the year.

Q13. Value of Output vs. Value Added: *Value of Output* is the market value of all goods and services produced by an enterprise during an accounting year (Sales + Δ Stock). *Value Added* is the net addition of value created by the firm's own factor inputs over and above raw materials (Value of Output – Intermediate Consumption).

Q14. Components of Net Factor Income from Abroad (any two):

1. Net compensation of employees (Resident employees working abroad minus non-residents working in domestic territory).
2. Net income from property and entrepreneurship (Rent, interest, dividend from abroad minus paid abroad).
3. Net retained earnings of resident companies abroad.

Q15. Double Counting Problem & Remedies: Double counting refers to counting the value of the same commodity more than once in estimating national product, usually occurring when intermediate inputs are added alongside final goods.

- *Remedy 1 (Final Output Method):* Include only the value of final goods and services, completely excluding intermediate purchases.
- *Remedy 2 (Value Added Method):* Sum only the value added (GVA = Output – Intermediate Consumption) at each successive stage of production.

Q16.

- (a) **Precautions under Product Method:** (1) Exclude sales of second-hand goods (already counted in year of manufacture). (2) Include imputed value of production for self-consumption. (3) Exclude intermediate consumption to prevent double counting. (4) Exclude illegal and speculative gains.
- (b) **Precautions under Expenditure Method:** (1) Exclude expenditure on second-hand goods. (2) Exclude transfer payments (pensions, scholarships, relief). (3) Exclude expenditure on intermediate goods and purely financial assets (shares, bonds).

Q17.

- (i) **Externalities:** Benefits (positive) or harms (negative) that an enterprise or individual causes to third parties for which they are neither paid nor penalized.
- (ii) **Operating Surplus:** Non-wage factor income generated from ownership of property and entrepreneurship (Sum of Rent + Royalty + Interest + Profit).
- (iii) **Consumption Goods:** Goods purchased and directly consumed by households to satisfy human wants without contributing to further production.

Q18. Real GDP vs. Nominal GDP: *Real GDP* values current physical output at constant base-year prices, rising only if physical volume of output expands. *Nominal GDP* evaluates output at current market prices and can rise merely due to inflation even if physical production remains stagnant. **Conclusion:** Real GDP is a superior measure of real economic growth because it eliminates distortive price changes.

Q19. Four Limitations of GDP as a Welfare Index:

1. *Distribution of GDP*: Rising aggregate GDP may concentrate in the hands of the wealthy, leaving income inequality high while average welfare fails to improve.
2. *Composition of GDP*: High growth driven by defense armaments, capital equipment, or luxury items does not translate into better daily welfare for common citizens.
3. *Non-Monetary Exchanges*: Significant non-market productive activities (domestic work, bartering, subsistence agriculture) are omitted, understating true welfare.
4. *Externalities*: GDP ignores social costs like industrial pollution and urban congestion (negative externalities) that severely diminish living standards.

Q20. GDP Deflator: Defined as the ratio of Nominal GDP to Real GDP expressed as a percentage: $GDP\ Deflator = (Nominal\ GDP / Real\ GDP) \times 100$. It reflects the overall price level change across all domestically produced goods and services and serves as a broad measure of economic inflation.

Q21. Impact of Non-Monetary Exchanges: In developing economies, numerous goods and services (e.g., kitchen gardening, barter trades, household domestic services) are exchanged without monetary transactions. Due to absence of transaction data, they escape GDP records, resulting in an underestimation of both GDP and social welfare.

Q22. Externalities & Welfare Distortion:

- *Positive Externality*: Public parks, flyovers, or tree plantations enhance welfare without market payment; GDP does not record this gain, hence GDP **understates welfare**.
- *Negative Externality*: Chemical factory discharge pollutes rivers and air, deteriorating health; GDP counts the factory's output but ignores health and environmental damage, hence GDP **overstates welfare**.

SECTION C: STEP-BY-STEP NUMERICAL SOLUTIONS**Q23. Calculation of Annual Depreciation:**

$$\begin{aligned} \text{Depreciation} &= (\text{Capital Cost} - \text{Scrap Value}) / \text{Estimated Life} \\ &= (1,000 - 0) / 20 = \text{₹ } 50 \text{ crores per year.} \end{aligned}$$

Q24. Firm B Value of Output & Value Added:**(a) Value of Output of Firm B:**

$$\begin{aligned} &= \text{Sales to C} + \text{Sales to D} + \text{Exports} + \text{Sales to Government} \\ &= 70 + 40 + 30 + 5 = \text{₹ } 145 \text{ crores.} \end{aligned}$$

(b) Value Added by Firm B:

$$\begin{aligned} &= \text{Value of Output} - \text{Intermediate Purchases (from Firm A)} \\ &= 145 - 80 = \text{₹ } 65 \text{ crores.} \end{aligned}$$

Q25. Calculation of NDP_{MP} :

- GVA_{MP} of Firm A = Sales to B – Purchases = 2,000 – 1,000 = ₹ 1,000
- GVA_{MP} of Firm B = Total Sales (Exports 2,500 + Domestic 1,500 = 4,000) – Purchases from A (2,000) = ₹ 2,000
- $GDP_{MP} = GVA_A + GVA_B = 1,000 + 2,000 = ₹ 3,000$
- $NDP_{MP} = GDP_{MP} - \text{Consumption of Fixed Capital} = 3,000 - 200 = \text{₹ } 2,800$.

Q26. Net Value Added at Factor Cost (NVA_{FC}) by Sambhav:

- Total Value of Output = Market Sales (6,800) + Govt Procurement (200) + Self Consumption (50) = ₹ 7,050 crores
- Note: Purchase of Tractor is capital expenditure, not intermediate consumption.*
- Gross Value Added at MP (GVA_{MP}) = Value of Output = ₹ 7,050 crores (Intermediate Consumption = 0)
- $NVA_{FC} = GVA_{MP} - \text{Depreciation (Maintenance of capital stock = 100) + Subsidy (20)}$
 $= 7,050 - 100 + 20 = \text{₹ } 6,970 \text{ crores.}$

Q27. National Income (NNP_{FC}) & Personal Disposable Income:**(a) National Income (NNP_{FC}):**

- $NDP_{FC} = \text{Compensation of Employees (1,600) + Rent (500) + Interest (500) + Profits (300) + Mixed Income (2,500)} = ₹ 5,400 \text{ crores}$
- $NNP_{FC} = NDP_{FC} + NFIA = 5,400 + (-50) = \text{₹ } 5,350 \text{ crores.}$

(b) Personal Disposable Income:

$$\begin{aligned} &= \text{Private Income (4,000) - Corporation Tax (700) - Net Retained Earnings (500) - Direct Taxes by Households (300)} \\ &= 4,000 - 1,500 = \text{₹ } 2,500 \text{ crores.} \end{aligned}$$

Q28. Estimation of Consumption of Fixed Capital (Depreciation):

$$\begin{aligned} \text{Formula: } NNP_{FC} &= GDP_{MP} - \text{Depreciation} - \text{Net Factor Income to Abroad} - \text{Net Indirect Taxes} \\ 2,500 &= 4,000 - \text{Depreciation} - 400 - 450 \\ 2,500 &= 3,150 - \text{Depreciation} \Rightarrow \text{Depreciation} = 3,150 - 2,500 = \text{₹ } 650 \text{ crores.} \end{aligned}$$

Q29. National Income by Expenditure Method:

- Net Domestic Product at MP (NDP_{MP}) = PFCE (900) + GFCE (400) + Net Domestic Capital Formation (200) + Net Exports (–25)
 $= 900 + 400 + 200 - 25 = ₹ 1,475$ crores
- $NNP_{FC} = NDP_{MP} + NFIA (-10) - NIT (100)$
 $= 1,475 - 10 - 100 = ₹ 1,365$ crores.

Q30. Estimation of Domestic Income (NDP_{FC}):

- Gross Domestic Capital Formation (GDCF) = Gross Fixed Capital Formation (200) + Change in Stock (40) = ₹ 240 crores
- $GDP_{MP} = \text{Household Consumption (600)} + \text{Govt Final Consumption (200)} + \text{GDCF (240)} + \text{Net Exports (–40)} = ₹ 1,000$ crores
- $NDP_{FC} = GDP_{MP} - \text{Depreciation (40)} - \text{Net Indirect Taxes (120)}$
 $= 1,000 - 40 - 120 = ₹ 840$ crores.

Q31. Domestic Income & Net National Disposable Income:

- Gross Domestic Capital Formation (GDCF) = Gross Fixed Investment (1,190) + Change in Inventories (–100) = ₹ 1,090 crores
- $GDP_{MP} = \text{PFCE (2,200)} + \text{GFCE (2,500)} + \text{GDCF (1,090)} + \text{Net Exports (–420)} = ₹ 5,370$ crores
- **(a) Domestic Income (NDP_{FC}):**
 $= GDP_{MP} - \text{Current replacement cost / Depreciation (145)} - \text{NIT (470)} = 5,370 - 145 - 470 = ₹ 4,755$ crores.
- **(b) Net National Disposable Income (NNDI):**
 $= NDP_{FC} - \text{Net Factor Income to Abroad (125)} + \text{Net Indirect Taxes (470)} + \text{Net Current Transfers from Abroad (350)}$
 $= 4,755 - 125 + 470 + 350 = ₹ 5,450$ crores.

Q32. Calculation of Compensation of Employees (COE):

- Total Profit = Profit after tax (20) + Corporate Tax (5) = ₹ 25 crores
- $NDP_{FC} = GDP_{MP} (200) - \text{Depreciation (50)} - \text{GST/NIT (10)} = ₹ 140$ crores
- $NDP_{FC} = \text{Compensation of Employees} + \text{Rent (25)} + \text{Interest (45)} + \text{Profit (25)}$
 $140 = \text{COE} + 25 + 45 + 25 \Rightarrow 140 = \text{COE} + 95 \Rightarrow \text{COE} = 140 - 95 = ₹ 45$ crores.

Q33. Domestic Income (NDP_{FC}) by Income Method:

- Total Profits = Dividend (940) + Undistributed Profits (300) + Corporate Tax (460) = ₹ 1,700 crores
- $NDP_{FC} = \text{Compensation of Employees (2,000)} + \text{Rent \& Interest (800)} + \text{Profit (1,700)} + \text{Mixed Income (200)}$
 $= 2,000 + 800 + 1,700 + 200 = ₹ 4,700$ crores.

Q34. Percentage Growth Rate Comparison:

- Nation X Growth Rate = $[(4,000 - 2,000) / 2,000] \times 100 = (2,000 / 2,000) \times 100 = 100\%$
 - Nation Y Growth Rate = $[(2,00,000 - 1,20,000) / 1,20,000] \times 100 = (80,000 / 1,20,000) \times 100 = 66.67\%$
- Conclusion:** Nation X performed significantly better in terms of relative economic growth rate (100% vs 66.67%).

Q35. Numerical Illustration — Real vs. Nominal GDP:

Good	Current Price (P_1)	Base Price (P_0)	Quantity (Q_1)	Nominal GDP ($P_1 \times Q_1$)	Real GDP ($P_0 \times Q_1$)
A	₹ 20	₹ 10	100	₹ 2,000	₹ 1,000
B	₹ 10	₹ 5	200	₹ 2,000	₹ 1,000
C	₹ 30	₹ 20	50	₹ 1,500	₹ 1,000
Total				₹ 5,500	₹ 3,000

Inference: The ₹ 2,500 difference (₹ 5,500 – ₹ 3,000) is purely nominal due to price inflation, whereas physical production remained constant. Hence Real GDP represents genuine economic growth.

Q36. Analysis of GDP Deflator Data:

Year	2014-15	2015-16	2016-17
Nominal GDP	6.5	8.4	9.0
GDP Deflator	100	140	125
Real GDP = (Nominal / Deflator) $\times$ 100	6.50	6.00	7.20

- (i) Real GDP and Nominal GDP are equal in **2014-15** because the GDP deflator is 100 (base year).
 (ii) Real GDP declined in **2015-16** from 6.50 to 6.00 due to rapid inflation (deflator rose to 140) outpacing physical output growth.
 (iii) Nominal GDP = (Real GDP $\times$ Price Index) / 100 = $(500 \times 125) / 100 = ₹ 625$ crores.